Article III

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Drone Operations in the Specific Category: A Unique Approach to Aviation Safety

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Introduction

European Union (EU) air law[1], pertaining to the safety of manned aviation, divides air operations into several broad categories. Most obviously, there is commercial air transport (CAT), which refers to an operation to transport either passengers, cargo, or mail for remuneration or other valuable consideration. There is also general aviation, where flying takes place for no compensation. More precisely, general aviation is divided into non-commercial operations using complex motor-powered aircraft (NCC) and non-commercial operations using non-complex aircraft (NCO). Additionally, air law recognizes specialized operations (SPO), where the aircraft is used for activities like agriculture, construction, photography, and so forth. SPO, known in ICAO as aerial work, can be either commercial or non-commercial[2].

In the case of unmanned aircraft systems (UAS), often known as drones,[3] however, such a categorization is not ideal. This is because of the unique features of many (though not all) drones, including their small size, simplicity, inherently lower risk, and the ability to operate in an urban environment, which result in great potential for certain applications. Passenger safety is not a concern either, apart from drones used for human transport.[4] Hence, the new EU legal framework for drones does not distinguish between commercial and non-commercial, or aerial work and transport. Rather, the division is founded proportionately upon the risk of the operation, the characteristics of the system, and the operational environment.[5]

To this end, drone operations are split into three categories. The *open* category primarily incorporates leisure flying and simple professional applications using consumer grade drones. Therein, the operation is not subject to a prior authorization nor declaration, but it must follow strict limitations. The *certified* category, on the other hand, requires the operator to comply with rules similar to manned aviation. It is designed to regulate the most complex drones and operations, such as passenger transport or international cargo flights. Between these two extremes lies the *specific* category, where operations are authorized on an individual basis. The authorization details the exact conditions for flying.

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The basis for the categorization was set forth in the 2018 Basic Regulation establishing the European Aviation Safety Agency(EASA)[6]
which has since been supplemented by the Implementing and Delegated Regulations, respectively for putting consumer drones on the EU market and for drone operations[7].

Of the three categories, the open one seems the most obvious. It sets forth a fixed set of rules, which everyone wishing to operate in that category must follow. The basic rules for the certified one are also as clear as those applied to manned aviation although exact policies for the category are still, at the time of writing this, under development at EASA[8]. The specific category, being based on non-prescriptive rules, however, seems more of a *tabula rasa* than the other two. How exactly does the category incorporate common elements of aviation safety? To what extent are the adopted procedures comparable to rules pertaining to manned aviation?

In this article, I seek to answer the given questions. To do so, I take a look at three themes, which I consider the most central aspects of aviation safety regulated in the specific category: the authorization of air operators, the competency of pilots, and the airworthiness of aircraft. More specifically, I reflect on the new European Union rules on drones in comparison with the one previously established for manned aviation. Hence, much of my discussion involves detailing and comparing the features of the two systems with reference to EU regulations. I devote particular attention to the non-binding but recommended as Acceptable Means of Compliance (AMC), Specific Operations Risk Assessment (SORA) method, which will play a central role in the specific category. My overarching argument is that the specific category represents a unique approach to aviation safety, since it seeks to incorporate traditionally distinct elements of aviation safety into a single process. In the concluding chapter, I also assess the advantages and problems of the approach taken in the category.

Many if not most rules pertaining to aviation have their basis in the provisions of the Convention on International Civil Aviation (Chicago Convention) and the Standards and Recommended Practices (SARPs) enacted by the International Civil Aviation Organization (ICAO)[9]. This also goes for the rules on manned aviation discussed here. However, the tripartite categorization of drone operations is a European innovation that is not derived from ICAO standards. Furthermore, the EU rules on drones are to be applied also in domestic aviation, rather than only in international aviation, the latter being the scope of the Chicago Convention and SARPs[10]. Finally, the SARPs under development regarding drones are not designed to be applied in the open and specific category of operations[11]. Hence, to avoid confusion, in this article I only refer to rules of air law as they are set forth in EU documents.[12]

Besides international air law, I also leave out national air law on both manned and unmanned aircraft. Only a few remarks are presented on how the latter rules may have affected the content of the new EU rules. The reasoning behind this exclusion is the fact that when the Implementing and Delegated Regulation enter into force and become applicable, national rules on drones in Europe will lose most of their significance. Discussing them at this stage would bring little additional value in analyzing the European-wide specific category of operations.

The following discussion relies mainly on primary legislative material. This is simply because there is yet no EU case law relating to the questions at hand. On the side of literature, only a handful of works have commented on the new regulations on drones. All in all, the theme of the article could be characterized as highly topical but insufficiently researched. Therefore, this piece should be read as part of the groundwork for further studies on the regulation of unmanned aviation.

Authorization of Operators

- **The Traditional Model**

According to EU air law, operating a manned aircraft commonly requires a permission from the competent authority or a qualified entity (QE)[13]. Operations exempted from this rule include the ones using aircraft that fall outside the jurisdiction of EASA, such as historic, experimental, and certain lightweight aircraft (unless national law so requires)[14]. Additionally, EASA does not require non-commercial operations using non-complex aircraft (NCO) to acquire a permission. Otherwise, however, operators of aircraft must either declare their capability to comply with operational rules or hold an air operator certificate (AOC)[15].

The exact rules for making a declaration or acquiring an AOC depend on the type of operation and aircraft. Capability must be declared in three cases: when engaging in non-commercial operations using complex motor-powered aircraft (NCC), when engaging in non-commercial specialized operations (SPO) using complex motor-powered aircraft, and when engaging in commercial SPO regardless of the complexity of the aircraft. Declaring capability means that the operator provides the competent authority with relevant information, such as the type of operation, type of aircraft, and statements about the airworthiness of the aircraft and the training of the crew. Additionally, the operator must notify the authority of the use of alternative means of compliance (AltMoCs)[16], of any changes to the declaration or the use of AltMoCs, and of ceasing operation. Hence, the operator has an obligation to maintain compliance with the information given in the declaration and applicable requirements.[17]

An AOC issued by the competent authority is, by EU law, only required for one (but probably the most demanding) type of operation: commercial air transport (CAT). To be certified for CAT, the operator must provide to the authority particular crucial information, such as a description of the proposed operation, organizational structure, and a copy of the operations manual. More importantly, though, the operator has to *demonstrate* to the authority several things: compliance with the EASA Basic Regulation, organizational obligations, rules relating to commercial air transport, as well as the airworthiness certification (or dry lease) of each their aircraft. This seems simple but is actually a very stringent process, requiring the operator to demonstrate sufficient personnel and training systems, airworthy aircraft, documentation like manuals and logs, systems and procedures for aircraft operation, a safety management system (SMS), insurance, finances, infrastructure, and so forth[18]. Many boxes need to be checked in order for an air transport business to begin operating.

- **The Basic Structure of Operational Authorization**

The specific category of drone operations takes an approach quite different from manned aviation. By default, for specific operations, the drone operator does not declare its competency nor applies for an AOC; rather they must undergo operational authorization (OA) before beginning their operation[19]. The OA is not exactly comparable to the AOC. The latter, in manned aviation, is only issued for commercial air transport, while the former can involve all types of operations, including those labeled in manned aviation as SPO, like aerial surveys and inspections. [20] The scope of the OA is thus wider, at least in terms of diversity in practical applications.

As a process, too, obtaining an OA is rather unique. To do so, the operator must perform a risk assessment to be evaluated by the competent authority. [21] Naturally, risk assessments have been conducted in manned aviation for decades. However, in manned aviation risk assessment has been viewed as merely one element of the safety management system (SMS) of each organization. [22] Pursuant to EU air law, an operator must establish a management system that, *inter alia*, identifies aviation safety hazards as well as evaluates and manages associated risks. [23]

Risk assessment in the specific category is a broader concept, since it incorporates some elements categorized in traditional risk assessment as hazard identification or control (mitigation). Furthermore, in the specific category, risk assessment has legally a more fundamental role. It is not merely a mandatory feature of the operating organization, through which it must affirm that its operations are safe. Nor is it a supplementary means to aid the actual authorization process. Rather, it is the centerpiece of safety, constituting the vast majority of the authorization process as a whole. Risk assessment is the defining procedure of the specific category. As for the assessment itself, many elements appear familiar to aviation professionals. Pursuant to the Implementing Regulation, the assessment must first include a description of the operation: the purpose and complexity of the activities, the environment (population, type of airspace, and landscape), the features of the UAS, and the competence of the personnel. Second, one must identify risks, which includes both ground risks. [24]

- **The Method(s) of Risk Assessment**

The Implementing Regulation's description is, of course, abbreviated. To actually conduct a risk assessment, a more precise method is required. In manned aviation, numerous methods of risk assessment have been developed[25]. The natural starting point of those methods is detailing the characteristics of the operation. The operation may have already begun (or other operators may have executed similar operations), which means that hazards can be identified and classified through operational observation. Another means of identification is process analysis, which involves experts listing potential hazards. Risk assessment itself focuses on the likelihood (probability, frequency) and severity of occurrence, and the assessment and control of risks to an acceptable level. [26] Ideally, this involves probabilistic software modeling, which incorporates safety principles, hazard severity and likelihood, and the effectiveness and cost of control measures. However, a more rudimentary model involves a matrix where the likelihood and severity of a negative occurrence provides a particular value [27] (the higher the worse). Unless the risk is completely unacceptable, mitigation measures (controls) should be considered to reduce it to as low as possible.[28] Similar methods have also been applied to unmanned aviation.[29]

Yet, for the specific category a distinct method, the Specific Operations Risk Assessment (SORA), has been developed. SORA is the work of a group of experts called the Joint Authorities for Rulemaking on Unmanned Systems (JARUS). The second edition of the document, which was published in early 2019, contains ten steps which the operator and competent authority can follow to determine how severe risks the drone operation poses to the environment[30]. From the viewpoint of EU air law, SORA is planned as an acceptable means of compliance (AMC)[31], that is, non-binding standards adopted by EASA to illustrate means to establish compliance with the Basic and Implementing Regulation.[32]

In terms of methodology, SORA draws some inspiration from traditional methods. Similar to manned aviation, the method defines risk as a combination of probability and severity of an occurrence. The starting point of the assessment is the operator's description (concept of operations, CONOPS) of all relevant information about the operation. Hazards, though, have been pre-identified by the drafters of the method. There is the ground risk of the drone hitting a person, and the air risk of the drone colliding with another aircraft. Hence, a particular impact energy of the drone(s) leads to a particular ground risk class (GRC), whereas operating in certain class of airspace at a certain altitude above a certain territory determines the air risk class (ARC). It is also possible for the competent authority or air navigation service providers (ANSPs) to map risks for a particular volume of airspace, which supersedes the SORA ARC procedure. The GRC and ARC can be lowered by using mitigation measures. Particularly, it may be necessary to apply tactical mitigations to reduce the risk of a midair collision—hence, the concept of tactical mitigation performance requirement (TMPR). [33]

Based on the final GRC and ARC, the operator must use a matrix to establish the specific assurance and integrity levels (SAIL), which represent the level of confidence that the operation will stay under control. The established SAIL determines, through another matrix (colloquially, the "bingo table"), the extent to which the operator must comply with operational safety objectives (OSOs). OSOs concern, *inter alia,* the features and maintenance of the drone, which must be satisfied with a low, medium, or high level of robustness. The meaning of the levels is unique to each objective, though generally the low level requires self-declaration, the medium level requires providing supporting evidence, and the high level calls for validation by a third party. In some cases, fulfilling the OSO is optional. The assessment is finalized by considerations relating to the infringement of adjacent areas, and the writing of a safety portfolio. [34]

To briefly illustrate how SORA functions, consider for instance a scenario where a small drone is used in aerial photography in a city. Operating VLOS in a populated environment with a drone that has typical kinetic energy of less than 700 joules puts the GRC at 4 (out of 10). Let us assume that the operator can apply mitigations that reduce the effects of ground impact to some extent, reducing the final GRC to 3. Since the operation takes place at an altitude of under 500 feet above ground in uncontrolled airspace (class G) over an urban area, the ARC is C (out of D). Combining these two classes, we find out that SAIL is level IV (out of VI). Based on this level, the operator must comply with the appropriate OSOs, such as that the competency of operator must be high, and that the recovery performance from technical issues must be medium. [35]

Assessing the GRC and ARC necessarily requires taking into account the perspective of air traffic management (ATM). As hinted above, instead of relying on the criteria outlined in SORA to determine the risk classes, it is possible for operators to base their assessment on a risk mapping conducted by the air navigation service provider. To this end, the European Organization for the Safety of Air Navigation (Eurocontrol) is developing distinct Airspace Assessment Guidelines. To be precise, the purpose of the Guidelines is to play a part in the determination of the GRC and ARC by taking into account special interests on the ground (e.g. military installations) and all air traffic (including drone traffic pursuant to previous OAs) in a certain volume of airspace—factors not explicitly included in the SORA criteria. [36] Hence, risk assessments to be conducted in the specific category will likely also incorporate elements external to the core SORA process. This will also include solutions like SAMWISE, which has been developed by an Italian QE to help operators to understand the risk of their operation before undertaking a full SORA.

- **Standardization Efforts**

From the process of operational authorization flows a concept that sets the specific category clearly apart from traditional air law: standard scenario (STS)[37]. According to the official definition, an STS refers to a type of UAS operation … for which a precise list of mitigating measures has been identified in such a way that the competent authority can be satisfied with declarations in which operators declare that they will apply the mitigating measures when executing this type of operation[38].
In other words, an STS is a set of operational parameters that have undergone the risk assessment process under the responsibility of a CAA, resulting in pre-defined conditions that provide an acceptable level of mitigation. It is an acceptable means of compliance with the Implementing Regulation. Its purpose is to relieve drone operators as well as authorities from the burden of repeatable similar risk assessments throughout Europe. [39]

In terms of substance, a standard scenario resembles an OA. Following here SORA terminology, there is a particular CONOPS. This includes, among other things, the level of human intervention, the population density of the overflown areas, the segment of airspace where the operation takes place, the technical features of the drone, the training of the remote crew, and whether the operation takes place within or beyond the visual line of sight of the pilot (VLOS, BVLOS). These factors lead to a GRC and ARC, which determine the SAIL level, which itself determines the relevant operational safety objectives: risk buffers, crew training, airworthiness, and so forth. Hence, an STS is based on operational aspects rather than the practical *application* of the operation, like photography or forestry. This is quite apparent from the first draft of an STS (as presented by JARUS during spring 2019), which concerns BVLOS aerial work operations over sparsely populated area in airspace reserved for the operation, using drones with a characteristic dimension of less than 3 meters. [40]

The creation of STSs is, as of yet, unregulated. However, pursuant to a presentation given by EASA, we already have a good idea of the process. To begin with, STSs are created outside the normal authorization process. Whereas an OA is always applied for by a single operator, a standard scenario can be proposed by operators, drone manufacturers, and associations at the national or European level. When an STS is approved by a national competent authority, it becomes applicable only in that country, but the NCA can also propose it as an AltMoC to EASA. The Agency can then undertake a process of approving the STS as an AMC, which involves consulting an advisory drone committee and which will make the STS valid in all Member States. It is also possible to propose the STS directly to EASA itself. Scenarios that are feasible and have a high level of acceptability, a large number of potentially interested operators, and a significant impact on public health, are prioritized in the standardization process. [41]

When an STS exists for the planned operation, the operator must simply declare that they will apply those measures. They need not undergo the normal authorization process[42]. This solution, which is justified by Article 56(5) of the 2018 EASA Basic Regulation, likely draws upon and is somewhat comparable to the process adopted for specialized operations in manned aviation[43]. That process, as described above, also requires the operator to only submit a declaration. However, while SPO is a category that includes a wide range of operations with varying conditions, an STS is a single operational model for a particular set of conditions: the distance of the aircraft from the crew, the areas that can be flown over, and performance limitations on the aircraft, to name a few[44]. In any case, depending on the SS, the operator may need to provide evidence of the level of assurance determined through SORA, which may be documents or attestations issued by independent third parties.

Besides the OA and STS there is, though, another institution in the specific category that comes closer to AOCs issued in manned aviation: the light UAS operator certificate (LUC). Acquiring the LUC supplants the regular OA process, and is rather similar to obtaining an AOC. The operator must demonstrate its capabilities through measures like the establishment of a safety management system (SMS) and a manual that describes activities carried out within the organization. Still, the purpose of the LUC differs from the AOC. The LUC is chiefly intended as a tool to grant the most professional drone operators the privilege of being able to conduct operational risk assessments without involving the competent authority. [45]

Competency and Fitness of Pilots

- **Pilots of Manned Aircraft**

Pilots of manned aircraft are commonly required to hold a pilot licence and ratings in order to fly. To acquire a licence, the pilot must first acquire theoretical knowledge about various topics, such as air law, technical matters, flight performance and planning, meteorology, navigation, operational procedures, and communications. Second, licensing requires practical skill regarding, *inter alia*, pre-flight and in-flight activities, collision avoidance, and flying by both visual and instrument reference. Knowledge and practical skill alike must be demonstrated both during training and after licensing through assessments and, in some cases, examinations. Thus, an appropriate level of both knowledge and practical skill has to be maintained. Additionally, it is worth pointing out that for certain functions (such as acting as the pilot in command), a pilot must also have sufficient experience. [46]

The exact training requirements for a pilot depend on the type of aircraft (s)he wants to operate, and also on the type of operation. For example, there is a licence for flying a light aircraft, as well as for acting as an airline transport pilot. Ratings are more specific, concerning particular aircraft classes and types, equipment, and operations. Requirements for both licenses and ratings have been determined in a very detailed manner, including for example the topics that must be tested in written exams, the minimum hours of flight training and flying, and skill tests.[47]

Besides a licence, pilots of manned aircraft must also hold a medical certificate. This requires them to periodically demonstrate, through assessments based on aero-medical best practice, their medical fitness. Fitness here signifies that the pilot does not suffer from any mental or physical disease or disability that makes the pilot unable to perceive their environment correctly, or unable to perform necessary operative tasks or assigned duties at any time. Naturally, as with licences, certification has to take into account the type of activity the pilot engages in, but additionally the possible age-based mental and physical degradation.[48] Since 2018, special rules exist for further monitoring the mental fitness of the aircrew of particular aircraft.[49]

- **Drone Pilots in the Specific Category**

On the rudimentary level, the competency standards of remote pilots in the specific category appear similar to those employed in manned aviation. According to the essential requirements established in the EASA Basic Regulation, a drone pilot (regardless of category) must be aware of all operational rules. They must have the ability to ensure the safety of operation, including the separation of the drone from other airspace users and people on the ground. A pilot must also have good knowledge of operating instructions, of all relevant functionalities of the drone, and of applicable rules of the air and procedures relating to air traffic management (ATM). Medical fitness must be demonstrated if the risks involved in the operation so demand. [50]

The requirements for specific category drone pilots, as set forth in the Implementing Regulation, are equally elementary. At minimum, pilots must be able to plan flights and inspect their aircraft, manage the flight path and automation of their aircraft, and maintain situational awareness. They must also be able to manage aeronautical communication. Additionally, basic competency includes skills like problem solving, decision-making, workload management, leadership, teamwork, and self-management. Handing over the drone to another pilot also falls within basic competency, as does coordination in general. Overall, a drone pilot in the specific category must have the capacity to fly the drone in both normal and emergency conditions.[51]

On a closer look, there are a number of important differences in the regulation of regular and drone pilots. Most notably, the Implementing Regulation or any other regulation does not set forth a separate procedure through which a pilot could acquire the necessary license or ratings to conduct certain operations with certain types of UAS in the specific category. One's competency to fly in the specific category is not assessed generally nor independently. There is no "specific category remote pilot licence" that would always authorize the pilot to fly. Rather, the competency requirements of the pilot (and the crew as a whole) are determined through the operational authorization or the standard scenario[52] as part of a holistic assessment.

How is the competency of the crew evaluated, then, as part of the risk assessment? Following JARUS's SORA, one must first determine the SAIL level for the CONOPS, which in turns determines the operational safety objectives regarding crew[53] competency. In all cases, regardless of SAIL, the operator must propose training that is both theoretical and practical. The operator must ensure that the crew has adequate (in relation to the proposed operation) knowledge of drones themselves, drone regulations, and principles for operating drones in airspace. Additionally, the crew must know of airmanship, aviation safety, human performance limitations, meteorology, air navigation by charts, and operating procedures. Other OSOs depend on the SAIL. When the low level of assurance is required, the training is self-declared but documented. In the case of the medium level, a training syllabus must be available (for the authority to assess) and the operator is itself responsible for the training. At the high level, the syllabus and the crew's competency have to be verified by a competent third party. [54]

The competency of the crew is specified with regard to other safety objectives, too. When the SAIL is III or higher, the crew must be trained to procedures and checklists in order to safely recover from human error. If the operation involves multi crew coordination, this must be covered in the training. As the risks increase, crew resource management training is also required. If the operation involves adverse environmental conditions, meteorological training is necessary.[55]

The given requirements established in SORA give a slightly more detailed indication of the training of pilots in the specific category. However, to a great extent the assessment process operates on a very general level and is open-ended. It does not dictate the exact flight experience and testing necessary to determine that a particular pilot has "adequate knowledge" of a particular topic. Nor does it say what a training syllabus for a particular OSO level must include. Indeed, SORA explicitly states that it does not provide a regulatory framework for states to apply with respect to training and licensing, among other things.[56] Since this is the case, there remains the possibility (and perhaps necessity) to devise the exact training standards for particular missions under the auspices of operators, authorities, and training organizations[57] across Europe.

Evaluating the fitness of the crew, like the competency thereof, is also part of the risk assessment. Hence, one OSO set forth in SORA is that the remote crew is fit to operate, which refers to both physical and mental fitness. At the low level of integrity and assurance, the operator must have a documented policy that defines how the crew can declare themselves fit to operate prior to any operation. At the medium level, the operator must define and document adequate duty, flight duty, and resting times for the crew, and also define requirements appropriate for the crew to operate the drone. Duty cycles must also be logged, and the operator must be provide evidence about the crew's fitness. At the high level, the crew must have medical fitness pursuant to authoritative standards and verification, and there must be a system for fatigue risk management in place and monitored by a third party who also has to validate duty times for the crew.[58]

Airworthiness

- **Certifying Manned Aircraft**

In Europe and elsewhere, the safety of aviation as a whole has traditionally relied a lot on the safety of aircraft. In other words, the system has been aircraft centric.[59] The key concept in this regard is airworthiness, which is a key issue of EASA.[60] According to the Basic Regulation, every aircraft within the Agency's jurisdiction[61] must comply with essential airworthiness requirements. This includes also their engines, propellers, parts, and non-installed equipment. Airworthiness is achieved through three measures: product integrity, product operation, and organizational approval. Among other things, the first means that the aircraft can withstand its designed use for the duration of its operational life; the second that the aircraft can safely be controlled in its designed use; and the third that the design, production, and maintenance organizations have the necessary capabilities to do their duties.[62]

More specifically, the airworthiness of aircraft is achieved through a layered system. First, any organization that designs aircraft must demonstrate its capability to do so, holding an approval. Then, any aircraft designed by an organization must be certified for its safety, that is, initial airworthiness (type certification, TC).[63] Type certification is a stringent process, which often takes several years and basically involves four steps: establishing a certification basis, agreeing on a certification programme, demonstrating compliance with rules, and issuing the certificate.[64] It requires the design to comply with a myriad of standards listed in the certification specification (CS) for the particular category of aircraft, such as "normal-category aeroplanes".[65] It is necessary to point out that aircraft parts and appliances must also show compliance.[66]

Besides certifying the design of the aircraft type, each individual aircraft must undergo certification, after which it is issued a certificate of airworthiness, CofA. This requires that the aircraft conforms to the type certificate issued for its design, and that it is in condition for safe and environmentally compatible operation. The CofA is valid for the aircraft as long as it is maintained in accordance with the rules pertaining to continuing airworthiness. Continuing airworthiness means first that the organizations who are in charge of maintaining aircraft are approved, and that the personnel doing so are licensed. Second, maintenance must be performed in accordance with a heap of standards. The aircraft as well as all relevant organizations are also inspected regularly.[67]

- **Assessing the Integrity of Drones**

In terms of airworthiness, the specific category follows the given regulatory approach on a rudimentary level. The Basic Regulation requires that unmanned aircraft (regardless of category) must be designed and constructed as airworthy, essentially referring to the same three methods as with manned aircraft. Drones must provide product integrity proportionate to the risk; they must be operable so that the safety of people and property can satisfactorily be demonstrated; and the organizations that design, produce, and maintain UAS must have the necessary means for the scope of their work and ensure compliance with EU air law on drones.[68]

However, in the specific category, the actual system of ensuring airworthiness is very different from that established for manned aircraft. According to the Delegated Regulation, only particular drones in the specific (and certified) category must hold a type certificate and be maintained in a certified manner. This includes drones that have a characteristic dimension[69] of 3 meters or more *and* are designed to be operated over assemblies of people; drones that are designed for human transportation; drones that are designed for transporting dangerous goods; or drones whose certification is required by the operational authorization. In either of these cases, the aforementioned system of certification applies all the way, pursuant to the standards that are still under development.
If none of the criteria applies, pursuant to the operation-centric approach, the drone must have the technical capabilities set forth in the operational authorization or the standard scenario.[70]

Airworthiness, then, also falls within the ambit of the risk assessment. Indeed, JARUS's SORA explicitly notes that the method can be applied where traditional certification is not appropriate, and that it may support the process of determining airworthiness requirements.[71] For this purpose, SORA incorporates many elements of traditional airworthiness certification, which—similar to standards of crew competency—are established as operational safety objectives that follow from the SAIL level of the CONOPS.

As a corollary to type certification and manufacturing standards, one OSO established in SORA is that drones have to be developed to recognized design standards. SORA does not include such standards, though, as it simply refers to standards considered adequate by the competent authority. Another objective dealing with TC is that the drone must be manufactured by a competent and/or proven entity. At the low level, this standard mainly covers materials and is assured through declaration; at the medium level, it extends to matters like inspections and testing, and storage, which are assured through evidence; at the high level, the standard also includes qualifications of the manufacturing personnel and supplier control, which are recurrently verified through audits. Additional OSOs regarding initial airworthiness concern the design of the UAS with regard to system safety and reliability, characteristics of the command, control, and communication link(s), safe recovery from technical issues, the deterioration of supportive systems, system that automatically protects the flight envelope, [72] and design for adverse environmental conditions.[73] It is worth noting that the EU is funding a project (AW-DRONES) to develop a meta-standard supporting OSOs through consensus-based voluntary industry standards (e.g. prEN 4709-001 or ISO 21384-2).

Continuing airworthiness is addressed by an obligation to maintain the UAS by a competent and/or proven entity. At the low level, the drone must be maintained by competent and authorised maintenance staff in accordance with documented instructions. Maintenance performed on the UAS must be logged, and the operator must keep an updated list of their staff and the qualifications thereof. The medium level of integrity and assurance requires additional safeguards, such as scheduled maintenance, a maintenance program developed pursuant to authoritative standards, and systematic training for the staff. The high level necessitates a maintenance procedure manual, validation of the maintenance program, and a program for recurrent staff training. Besides maintenance, there is an objective for the crew to conduct and document inspections on the UAS, which at the high level are validated by a competent third party.[74]

Conclusions

- **Structural Differences**

The traditional system of aviation safety relies on a multilayered approach. In other words, the safety of flying is ensured through a combination of diverging elements. These include, in particular, the three themes discussed in this article: controlling the capability of each operator to handle all tasks necessary for safe aviation; establishing and enforcing licensing and fitness criteria for people involved in the operation of aircraft, including especially pilots; and certifying, monitoring, and maintaining the physical condition of each aircraft type and individual aircraft. In particular, given the emphasis on airworthiness, the system can be characterized as aircraft centric.

Legally speaking, the three elements operate as individual institutions. Operators are authorised through declarations and certification, and they have their unique obligations relating to organizational safety management. The competency of pilots is regulated through a different set of regulations than the airworthiness of aircraft, so the two things are evaluated separately and according to different criteria. Yet, the elements are also connected and complementary to each other. Every operator, for example, has an overarching duty to ensure the airworthiness of its aircraft and the competency of its employees. [75] Additionally, the type certification of aircraft must take into account factors like the average skill of pilots, [76] and each pilot bears the responsibility for conducting a pre-flight check to finalize the airworthiness of the aircraft before every take-off. [77]

Similar to traditional aviation law, the specific category of drone operations views aviation safety as a combination of elements. The difference is, however, that the specific category attempts to encapsulate all elements into a single, joint process: the risk assessment. This incorporates not only the approval of the operator itself, but matters that are traditionally controlled separately. One of such matters is the airworthiness of drones, as only drones passing a particular threshold will have to hold a traditional type certificate. The assessment therefore involves evaluating the drone with regard to its manufacturing standards and manufacturer, technical features, as well as maintenance procedures and oversight. Part of the process is also to ensure the qualifications, knowledge, training, experience, and fitness of the crew.

Risk assessment, hence, does not merely refer to the activities conducted as part of the safety management system of air operators. While the assessment borrows some elements therefrom, its scope is broader and its purpose more fundamental than that of traditional risk assessment. The assessment seeks to take into account every aspect of safe aviation in one process that determines the conditions for each operation. However, SORA is simultaneously simpler than the methods used in manned aviation, which sometimes utilize high-end solutions like probabilistic software modelling. Rather than being a tool of self-analysis, SORA seeks to provide a symmetrical way to provide similar operational conditions for similar drone operations across Europe. Therefore, the method pre-identifies the types and scale of risks an unmanned aircraft may pose to its environment, and the extent of mitigations necessary to bring such risks to a more acceptable level.

It must be acknowledged, however, that risk assessment, at least in its current formulation as the Specific Operations Risk Assessment, leaves certain issues unregulated. Such include, for example, the exact training syllabi for remote pilots and the standards for the safe design of drones. This suggests that aviation safety in the specific category will not utterly depend on the assessment procedure, but also on supplementary, non-binding industry standards. The difference with the traditional system remains, though, that such standards will only work as sub-elements of the assessment procedure, and that the competent authority can exercise plenty of discretion as to what constitutes sufficient compliance with the relevant safety objective.

- **Advantages and Shortcomings**

What are the pros and cons of the approach taken in the specific category? On the positive side, the category introduces a lot of flexibility into the regulation of unmanned aircraft systems. It acknowledges the great variance in drone equipment and practical applications, the lack of global standards for drone technology and pilot competency, and the uncertainties and potential of unmanned aviation. An attempt to create a "one size fits all" approach, especially in the case of aerial work, would risk stifling the emerging industry. To take one simple case, aerial photography above urban areas and aerial inspections above agricultural land require different operational limitations, safeguards, and so forth. Some of the necessary flexibility is already built into the tripartite main categorization (open, specific, and certified), but the specific category establishes a framework for further case-specific consideration. Overall, the category helps small to medium businesses to offer drone services without spending years to grasp the whole scope of traditional air law.

On the negative side, such flexibility may of course increase risks caused by drones to the general public. By establishing a risk assessment process that deals with many questions at once, the specific category loses some of the refined structure and attention to detail on which the safety of civil aviation has been built upon. Thus, much attention has to be devoted to the thorough consideration of all operational aspects during the assessment.

Another problem is that the case-specific approach creates a lot of pressure on competent aviation authorities across Europe. While the SORA method provides a yardstick to assess the proportionate risk of each scenario, it still leaves the actual assessments to be executed at the national level—or at the European level by cooperating national authorities. Hence, much coordination is required between the authorities in order to create harmonized operational conditions in every EASA Member State. After all, requirements should be the same for the same type of drone operations, regardless of which authority issues the operational authorization. A related issue is establishing clear and harmonized boundaries between the specific and certified category, although SORA provides guidance in this regard, too.

Luckily, the system of air law already provides one solution to the given problem. Qualified entities, as briefly mentioned above, can be charged with certain tasks otherwise falling within the duties of authorities. Furthermore, the specific category introduces a specialized solution to the issue of recurring assessments: standard scenarios. The STSs enable EASA and aviation authorities of member states to create uniform models for particular operations, including provisions on operator, training, airworthiness, and flight rules.

For common operation types, at least, achieving symmetrical standards within Europe is thus possible. The STSs also ease the burden of both operators and authorities by enabling conformity through declaration rather than authorization. One natural caveat in the system is, though, that drafting STSs takes time.

The system of standard scenarios has not been without its critics. Most notably, the European Cockpit Association (ECA)—the representative body of European air pilots—has pointed out that an STS may make operating a drone too easy, emphasizing that an STS can only work for its exact intended scenario. A scenario is a holistic package, rather than a toolbox, so changing even one element of the package should always trigger the operational authorization process. Furthermore, according to the Association, operating on the basis of declaration should only be allowed after sufficient experience with SORA and STSs has been gathered by relevant stakeholders. [78]

It is easy to agree with ECA on the holistic nature of standard scenarios. To give a basic example, there is a big difference in operating in class C airspace as opposed to class G. Changing such a parameter drastically alters the risks and nature of the operation, which SORA does recognize. The comment about having sufficient experience with SORA before accepting declarations should also be given serious consideration, though what this means in practice is less easy to say. After all, declarations are only envisioned as sufficient in cases where the risks have been considered so thoroughly that repetitive assessments are not necessary; this is the purpose of STSs. Since drone operations of various types have been practiced around Europe (and elsewhere) for years, the industry has already accumulated plenty of experience of the risks involved. SORA and STSs are simply a translation of the risks into a systematized format. Regardless, since it is difficult at this stage to fully grasp the total volume of future drone operations, prudency must be practiced when choosing what kind of STSs are first developed. While EASA appears to prioritize impactful and feasible scenarios with real demand, the safety-oriented approach might be to begin from scenarios with an inherently low risk. The experience gained this way would help standardizing complex cases.

- **Controversy over Risk Assessment**

A particularly controversial aspect of the specific category, as hinted above, is the SORA method of risk assessment. To an aviation professional, the method may seem overly simple and permissive; in contrast, to a drone operator the procedure may appear too complex and restrictive. The truth, according to JARUS, is somewhere between these extreme viewpoints. As unmanned operations bring together a diverse collection of stakeholders, striking a balance between their views is necessary.[79] The procedure envisioned by JARUS indeed seeks to address the interests of both experts and laymen. It derives many of its aspects from traditional models, but does not require special training to use.

Such an approach may, of course, risk establishing a false balance[80] between views of those with the appropriate knowledge and experience of aviation safety, and those without. Civil aviation, particularly air transport, prides on its pristine safety record, which disruptive drone technology[81]-if not groomed to the peculiarities of the industry- may endanger.

People whose perspective is limited by their own experience as a drone pilot are not always familiar with the odds and ends of aviation, which creates a rift between them and legacy experts: a rift, which EASA, national bodies, and industry representatives like UVS International have been trying to close through inclusive meetings and the endorsement of informative websites and mobile apps.[82]

As it stands, though, the SORA method should not be read as promoting the economic growth of the drone industry at the expense of aviation safety—or vice versa. The method carefully considers both the ground and air risk of operations, and it does not preclude the professionals, such as ANSP personnel, from being involved in the assessment. Nor does the simplicity of the method *per se* suggest that important factors are left without proper attention.The results of the method in at least one study seem “largely in agreement” with detailed high-fidelity risk modelling (HFRM)[83].

The problem with the given comparison is, according to ECA, that SORA actually relies too much on a quantitative approach and inadequately considers the complexity of unmanned aviation. According to the Association, the traditional approach to collision avoidance provides layered resilience, which cannot be substituted altogether with statistical methods. To achieve similar resilience, ECA provides essentially two suggestions. First, SORA should look at the intrinsic risk of mid-air collisions rather than potential fatalities; second, in order to ensure expertise about the operational volume, SORA should consult an independent and competent group of experts in certain operations. This would result in SORA competency centres, which could be qualified entities. The centres would be used to store and share data on operations and incidents, enhancing harmonization and safety.[84]

There is some truth to ECA’s critique that SORA might fail to assess the ARC with sufficient rigor, since the method itself does not contain a procedure to thoroughly assess the operational volume. However, as discussed above, any risk mapping conducted by the appropriate parties supersedes the initial ARC which would result from the SORA flowchart. Regardless, SORA emphasizes that the initial assessment of the ARC is more of an assumption that must be validated by the ANSP in order to determine the actual collision risk. Finally, even the initial ARC does not simply focus on potential fatalities but rather the characteristics of the airspace (class, altitude, overflown area), which provide an estimated rate of encountering a manned aircraft.[85] Therefore, concerns over resilience appear to be somewhat exaggerated.

Meanwhile, the consultation of competent third parties is something not excluded by the SORA process; as noted above (and in SORA itself), many issues not fully tackled by the method will still require cooperation of all stakeholders at the national and European level. When considering the establishment of centres with the ability to affect the exercise of public authority, other complications like equal representation and lobbying may come into play. Given the increasing importance of drones, it is also worthwhile to assess whether establishing centres for solely drone related issues makes sense. Drones, for now as disruptive technology, should remain under special scrutiny, but with the goal of achieving an airspace where they are integrated rather than treated as an anomaly.

[1] The air law discussed in this article also applies to the four non-EU states (Iceland, Liechtenstein, Norway, and Switzerland) that are members of the European Aviation Safety Agency (EASA).

[2] 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, Art. 2(1)(1, 7) and Annexes.

[3] Of terminology, see my earlier article: Mikko Huttunen, Unmanned, Remotely Piloted, or Something Else? Analysing the Terminological Dogfight, 43(2) Air & Space Law 349 (2017). See also Benjamyn Ian Scott, Chapter 2: Terminology, Definitions and Classifications. In Benjamyn Ian Scott (ed), The Law of Unmanned Aircraft Systems: An Introduction to the Current and Future Regulation under National, Regional and International Law, pp. 9–14. Alphen aan den Rijn: Kluwer Law International (2016).

[4] Of the unique features of drones vis-à-vis the traditional system of air law, see Anna Masutti and Filippo Tomasello, International Regulation of Non-Military Drones, pp. 13–20. Cheltenham, UK: Edward Elgar (2018). In the context of airspace management, see also my previous take: Mikko Huttunen, The U-space Concept, 44(1) Air & Space 69 (2019).

[5] Commission Implementing Regulation (EU) …/… of … on the rules and procedures for the operation of unmanned aircraft, Preamble, para. 5. Of the new regulatory framework in detail, see Masutti and Tomasello (n 4), *passim*; Malte Krumm, Der neue europäische Rechtsrahmen für unbemannte Luftfahrzeuge – Anpassungsbedarf im deutschen Luftverkehrsrecht? 30(3) Europäische Zeitschrift für Wirtschaftsrecht 114 (2019). See also Gustavo Boccardo, Chapter 12: European Aviation Safety Agency, pp. 145–151. In The Law of Unmanned Aircraft Systems (n 3), pp. 135–152.

[6] Regulation (EU) 2018/1139 of the European Parliament and of the Council of 4 July 2018 on common rules in the field of civil aviation and establishing a European Union Aviation Safety Agency, and Amending Regulations (EC) No 2111/2005, (EC) No 1008/2008, (EU) No 996/2010, (EU) No 376/2014 and Directives 2014/30/EU and 2014/53/EU of the European Parliament and of the Council, and repealing Regulations (EC) No 216/2008 and (EC) No 552/2004 and (EC) No 216/2008 of the European Parliament and of the Council and Council Regulation (EEC) No 3922/91, Arts 55–58.

[7] Implementing Regulation (n 5); Commission Delegated Regulation (EU) …/… of 12 March 2019 on unmanned aircraft systems and on third-country operators of unmanned aircraft systems. See also Masutti and Tomasello (n 4), pp. 79–80. The reader is advised to note that, at the time of writing this, the Implementing and Delegated Regulation have not been published in the Official Journal of the European Union and thus have no number.

[8] This includes themes discussed in this article, such as airworthiness and pilot licensing, but also separate issues like aerodromes. See EASA Civil drones (Unmanned aircraft), *in fine*. https://www.easa.europa.eu/easa-and-you/civil-drones-rpas (undated, accessed 29 May 2019). Under the previous Basic Regulation, the airworthiness of UAS was considered in Policy Statement E.Y01301: Airworthiness Certification of Unmanned Aircraft Systems (UAS) (EASA 2009).

[9] For an overview of ICAO's ongoing developments regarding unmanned aviation, see e.g. ICAO Unmanned Aviation. https://www.icao.int/safety/ua/Pages/default.aspx (undated, accessed 29 May 2019). See in detail Masutti and Tomasello (n 4), *passim*.

[10] The scope is thus limited although, for reasons of compatibility, SARPs are in many cases followed in domestic aviation, too.

[11] Masutti and Tomasello (n 4), pp. 122–123.

[12] Some reference is also made to the advisory efforts of the European Organisation for the Safety of Air Navigation (Eurocontrol), which is not an EU agency.

[13] Qualified entities are essentially legal or natural persons who are tasked with certain duties relating to certification or oversight. See Basic Regulation (n 6), Arts 3(11), 69. Whatever here is said of competent authorities also applies to QEs to the extent the former have charged the latter with their duties.

[14] Ibid., Art 2(3) and Annex I.

[15] Ibid., Art. 30.

[16] See Regulation 965/2012 (n 2), Annex I(1)(9).

[17]Ibid., Annex III(ORO.DEC.100, Appendix I).

[18] Ibid., Annex III(ORO.AOC.100) and Annex IV.

[19] Implementing Regulation (n 5), Art 3(1)(b).

[20] Since this article focuses on the specific category, discussion on AOCs in the *certified* category of drone operations is excluded.

[21]Implementing Regulation (n 5), Art. 5(2).

[22] See e.g. Alan J. Stolzer, Carl D. Halford, and John J. Goglia, Safety Management Systems in Aviation. Aldershot, UK: Ashgate (2008).

[23] Regulation 965/2012 (n 2), Annex III(ORO.GEN.200).

[24] Implementing Regulation (n 5), Arts 11, 12.

[25] Traditional measures have, of course, also faced criticism. See e.g. The ARMS Methodology for Operational Risk Assessment in Aviation Organizations (ARMS Working Group 2010).

[26] Acceptable means of compliance (AMC) and Guidance Material (GM) to Annex III: Organisation requirements for air operations [Part-ORO] of Commission Regulation (EU) 965/2012 on air operations, AMC1 ORO.GEN.200(a)(3)(b).

[27] See originally ICAO Doc 9859: Safety Management Manual (SMM) (2013), Figs 2-11, 2-12, 2-13.

[28] Stolzer, Halford, and Goglia 2008 (n 22), especially pp. 109–202.

[29] Anders la Cour-Harbo, The Value of Step-by-Step Risk Assessment for Unmanned Aircraft, p. 149. In 2018 International Conference on Unmanned Aircraft Systems (ICUAS), pp. 149–157.

[30] Specific Operations Risk Assessment (SORA), Executive Summary, pp. 2–3 (JARUS 2019).

[31] Draft acceptable means of compliance (AMC) and guidance material (GM) to Regulation …/… laying down rules and procedures for the operation of unmanned aircraft and to the Annex, p. 18.
Regulation 965/2012 (n 2), Annex I(1)(2).

[32] Regulation 965/2012 (n 2), Annex I(1)(2).

[33] SORA (n 30), Executive Summary, pp. 2–3; Guidelines, pp. 17–26. See also Introduction to SORA: A risk based approach to drone approvals. https://youtu.be/sq7wozIzXBM (2018, accessed 29 May 2019). Of discussion on the concept of risk and the regulation thereof, see generally the European Journal of Risk Regulation. https://www.cambridge.org/core/journals/european-journal-of-risk-regulation (undated, accessed 29 May 2019).

[34] SORA (n 30), Executive Summary, p. 3 and Guidelines, pp. 26–30. See also Masutti and Tomasello (n 4), pp. 103–104; Introduction to SORA (n 33).

[35] See SORA (n 30), Guidelines, pp. 19–29. For an exemplary case, see CORUS Intermediate Concept of Operations for U-Space, Annex C - SORA example (2019).

[36] UAS ATM Airspace Assessment Discussion Document, Edition 1.2 (2018). Of the introduction of drones into controlled airspace, see also Andrija Vidović, Tomislav Mihetec, Bo Wang, and Igor Štimac, Operations of Drones in Controlled Airspace in Europe, 9(1) International Journal for Traffic and Transport Engineering 38 (2019).

[37] The concept followed the 2015 French decree on drones, which established four operational scenarios outlining the allowed operations to be conducted for non-recreational purposes. See Arrêté du 17 décembre 2015 relatif à la conception des aéronefs civils qui circulent sans personne à bord, aux conditions de leur emploi et aux capacités requises des personnes qui les utilisent, Annexe III(1.3); Masutti and Tomasello (n 4), p. 85.

[38] Implementing Regulation (n 5), Art. 2(2)(6).

[39] EASA Standard Scenarios: Introduction & Structure, at 0:25 *et seq*. https://youtu.be/9gH3mb8PmWk (2018, accessed 29 May 2019

[40] JARUS Standard Scenario 02 for Aerial Work Operations, Edition Draft 1.1 (2019). See also Standard Scenarios (n 39), at 3:11 *et seq*.

[41] EASA Process for Proposing a Standard Scenario. https://youtu.be/6GIVfVkGn3w (2018, accessed 29 May 2019).

[42] Implementing Regulation (n 5), Arts 2(2)(6), 5(5).

[43] Another source of inspiration likely was the Italian drone regulation, according to which non-critical operations require a declaration, while critical operations require an authorisation. As of 2018, though, the regulation also incorporates the concept of standard scenarios in the case of critical operations. See Mezzi aerei a pilotaggio remote, Edizione 2 del 16 luglio 2015 Emendamento 4 del 21 maggio 2018, Arts 9 –11.

[44] Standard Scenarios (n 39), at 3:11.

[45] Implementing Regulation (n 5), Arts 2(2)(9), 5(6)(a), 7(2)(2), 8(2) and Annex(C).

[46] Basic Regulation (n 6), Arts 20–21, 23 and Annex IV(1–2).

[47] Traditional measures have, of course, also faced criticism. See e.g. The ARMS Methodology for Operational Risk Assessment in Aviation Organisations (ARMS Working Group 2010).

[48] Basic Regulation (n 6), Arts 20–21, 23 and Annex IV(3)

[49] See Commission Regulation (EU) 2018/1042 of 23 July 2018 amending Regulation (EU) No 965/2012, as regards technical requirements and administrative procedures related to introducing support programmes, psychological assessment of flight crew, as well as systematic and random testing of psychoactive substances to ensure medical fitness of flight and cabin crew members, and as regards equipping newly manufactured turbine-powered aeroplanes with a maximum certified take-off mass of 5 700 kg or less and approved to carry six to nine passengers with a terrain awareness warning system.

[50] Basic Regulation (n 6), Art. 55 and Annex IX(1.1, 2.3).

[51] Implementing Regulation (n 5), Art. 8(2).

[52] Ibid. The exception to this, pursuant to para. 3, is operating in the framework of model aircraft clubs or associations, where the authorisation is issued in accordance with Art. 16.

[53] By remote crew, the SORA includes "any person involved in the mission." See SORA (n 30), *passim*.

[54] Ibid., Annex E, p. 14.

[55] Ibid., Annex E, p. 17

[56] Ibid., Annex C, p. 4.

[57] See in my home country (Finland) e.g. Insta ILS Training, https://www.airhow.fi/en/training/ (undated,accessed 29 May 2019).

[58] SORA (n 30), Annex E, p. 19.

[59] Masutti and Tomasello (n 4), p. 18.

[60] Pablo Mendes de Leon, Introduction to Air Law, 10th edition, p. 331. Alphen aan den Rijn: Kluwer Law International (2017); Boccardo (n 5), p. 139.

[61] See Basic Regulation (n 6), Art 2 and Annex

[62] Ibid., Art. 9(1) and Annex II. See also Filippo De Florio, Airworthiness: An Introduction to Aircraft Certification, 2nd edition. Amsterdam et al.: Elsevier (2011).

[63] Basic Regulation (n 6), Arts 10, 11, 15. See in detail 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, Arts 2, 8, 9 and Annex I(A)(B, E, G, J).

[64] See Skybrary: Certification of Aircraft, Design and Production, https://www.skybrary.aero/index.php/Certification_of_Aircraft,_Design_and_Production (2018, accessed 29 May 2019).

[65] See EASA Certification Specifications for Normal-Category Aeroplanes: CS-23 (2003, as amended). Note that the categories of *aircraft* are not directly linked to the categories of *operation*.

[66] Standard Scenarios (n 39), at 3:11.

[67] Basic Regulation (n 6), Arts 10, 12. See in detail Regulation 748/2012 (n 63), Arts 2, 8, 9 and Annex I(A)(K).

[68] Basic Regulation (n 6), Arts 14, 17. See in detail Regulation 748/2012 (n 63), Annex I(A)(H); Commission Regulation (EU) No 1321/2014 of 26 November 2014 on the continuing airworthiness of aircraft and aeronautical products, parts and appliances, and on the approval of organisations and personnel involved in these tasks.

[69] Basic Regulation (n 6), Arts 55, 56 and Annex IX(1.2–1.4, 2.1–2.2).

[70] The concept of "characteristic dimension" is not explained anywhere in the Delegated or Implementing Regulation. However, an earlier draft reveals that it refers to e.g. wingspan or rotor diameter. See Draft Annex to the Implementing Regulation, UAS.SPEC.020.

[71] Delegated Regulation (n 7), Art. 40; Implementing Regulation (n 5), Art. 10. Note, however, that drones that are privately built, drones used in the framework of model aircraft clubs and associations, and certain drones already on the market are exempted from the described airworthiness rules. Of the developing airworthiness certification for drones, see Masutti and Tomasello (n 4), pp. 111–132.

[72]SORA (n 30), Guidelines, p. 11.

[73] Flight envelope "defines the operating boundaries in terms of altitude, Mach number and normal load factor." Chris Fielding and Robert Luckner, Industrial Considerations for Flight Control, pp. 16–17. In Roger W. Pratt (ed), Flight Control Systems: Practical issues in Design and Implementation, pp. 1–55. Stevenage, UK: The Institution of Electrical Engineers (2000).
Ibid., Annex E, pp. 5, 7–10, 15, 20, 25, 26.

[74] SORA (n 30), Annex E, pp. 5, 7–10, 15, 20, 25, 26.

[75] Ibid., Annex E, pp. 6, 11.

[76] Regulation 965/2012 (n 2), e.g. Annex III(ORO.GEN.110).

[77] E.g. CS-23 (n 65), CS 23.2105(c), CS 23.2130(b).

[78] Regulation 965/2012 (n 2), e.g. CAT.GEN.MPA.105(a)(12). See in detail Regulation 1321/2014 (n 67), Annex I(M.A.201(d)).

[79] European Cockpit Association Specific Operations Risk Assessment (SORA) Position Paper, https://www.eurocockpit.be/positions-publications/specific-operations-risk-assessment-sora (2019, accessed 29 May 2019).

[80] Introduction to SORA (n 33), at 1:02:45.

[81] The concept of false balance has especially been studied within environmental journalism. See e.g. Michael Brüggemann and Sven Engesser, Beyond false balance: How interpretative journalism shapes media coverage of climate change, 42 Global Environmental Change 58 (2017).

[82] Masutti and Tomasello (n 4), pp. 9-13.

[83] See e.g. DroneRules EU, http://www.dronerules.eu/en/ (undated, accessed 29 May 2019).

[84] Cour-Harbo (n 29), p. 156.

[85] ECA Position Paper (n 78).

[86] SORA (n 30), Guidelines, p. 23.