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Regulating Commercial Drones: Bridging the Gap Between American and European Drone Regulations

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REGULATING COMMERCIAL DRONES: BRIDGING THE GAP BETWEEN AMERICAN AND EUROPEAN DRONE REGULATIONS

By Adem Ilker[*]

I. INTRODUCTION

Drones were predicted to be one of the most popular gifts during the 2015 holiday season.[1] Drones are being manufactured in all shapes and sizes.[2] The cost of drones is decreasing dramatically while the quality of the built-in cameras continues to increase.[3] Drones are being used for both recreational and commercial purposes, but the current framework greatly limits commercial drones from being used.[4] In fact, there are no significant technical difference between a recreational drone and a commercial drone.[5] Yet still, the Federal Aviation Administration (FAA) has drawn a clear legal distinction between the two.[6] The FAA allows drones to be used for recreational purposes, but only allows drones to be used for commercial purposes after a special permit is acquired.[7]

The United States' approach to regulating drones does not distinguish between different size drones, but is instead a "one size fits all" set of regulations.[8] The regulations do, however, differentiate between commercial drones and recreational drones, even though both may pose the same level of risk.[9] The FAA was expected to ease the requirements for commercial drone use, but have not done so. "To date, the FAA has not issued any rules to allow commercial use except via its special permit process."[10] The European Union, on the other hand, has taken a strong pro-business approach.[11] The European Aviation Safety

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[*]J.D. Candidate, 2017, Maurice A. Deane School of Law at Hofstra University. I would like to thank the staff of the Journal of International Business & Law for all of their efforts throughout the year. I would like to thank my parents, my brother and my grandmother for their love and support. I would like to dedicate this note to my parents, without whom I would never have enjoyed so many opportunities.

[1] Sean O'Kane, *People Are Unwrapping Drones For Christmas And It's Not Going So Well*, THE VERGE (Dec. 25, 2015, 12:19 PM), http://www.theverge.com/tldr/2014/12/25/7449183/drones-for-christmas-presents.

[2] *Id.*

[3] Richard C. Balough, *Under Current Law, There's No Place for Commercial Drones*, CBA Rec., April/May 2015, at 34, 35.

[4] FAA Modernization and Reform Act of 2012 Pub. L. No.112-95, Feb. 14, 2012, 126 Stat. 11 (2012) (showing that special certificates must be obtained for commercial drones, but are unnecessary for recreational drones).

[5] Balough, *supra* note 3.

[6] *Id.*

[7] Balough, *supra* note 3.

[8] Hogan Lovells, *The New EU Aviation Strategy: Take-off for the UAS Industry?*, LEXOLOGY (Dec. 10, 2015), http://www.lexology.com/library/detail.aspx?g=c9f7fe28-8e7d-4fa4-b6d5-651101220527.

[9] *Id.*

[10] Balough, *supra* note 3.

[11] Lovells, *supra* note 8.

Agency (EASA) is currently working on a set of regulations that will consider existing industry standards and focus on creating a risk-based approach.[12]

This note will compare the FAA's proposed approach to drone regulation and the EASA's proposed approach to drone regulation. Part II will offer a background into this area of law and will discuss the current drone regulations in the United States, the drone regulations that were proposed by the FAA, and the drone regulations that were proposed by the EASA. This section will also examine the predicted growth of the drone industry and several major corporations that are deeply involved in the research and development of drone technology.

Part III will address the problems with both the current drone regulations and the proposed drone regulations. This section will discuss how both fail to address safety concerns, fail to accommodate businesses' needs, and will ultimately create a culture of non-compliance. This section will also provide a glimpse into the drone industry outside of the United States and will briefly discuss lobbying efforts made by some companies.

Part IV will propose that the FAA use the EASA's risk-based regulatory framework. This framework involves drones being separated into three different categories with different restrictions based on the levels of risk. Part V is the conclusion to this note

II. BACKGROUND

A. FAA Modernization and Reform Act of 2012

The Federal Aviation Administration has been trying to incorporate small unmanned aircraft systems (UAS) (unmanned aircraft system) into the National Airspace System (NAS) since 2008.[13] On February 14, 2012 Congress passed the FAA Modernization and Reform Act of 2012.[14] It required the FAA to create a comprehensive plan to "safely accelerate the integration of civil unmanned aircraft systems into the national airspace system" by November 10, 2012, and to publish a five-year "roadmap" by February 14, 2013.[15] The plan was supposed to integrate drones into the national airspace system no later than September 30, 2015.[16] The FAA, however, failed to create national drone regulations by this date.[17]

Instead, the FAA gave some regulatory guidance regarding small UAS.[18] Section 331 of the FAA Modernization and Reform Act of 2012 lists necessary definitions to understand this law. Section 331 subtitle (9) states, "(t)he term 'unmanned aircraft system' [UAS] means an unmanned aircraft and associated elements (including communication links and the components that control the unmanned aircraft) that are required for the pilot in

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[12] *Id.*.

[13] Operation and Certification of Small Unmanned Aircraft Systems, 80 Fed. Reg. 9544, at 9545 (proposed Feb. 23, 2015) (to be codified at 14 C.F.R. pt. 21, 43, 45, 47, 61, 91, 101, 107, and 183).

[14] FAA Modernization and Reform Act of 2012, *supra* note 4.

[15] Henry H. Perritt, Jr. & Eliot O. Sprague, *Law Abiding Drones*, 16 COLUM. SCI. & TECH. L. REV. 385, 400 (2015).

[16] *Id.*

[17] Keith Wagstaff, *FAA Misses Deadline for Creating Drone Regulations*, NBCNEWS (Oct. 1, 2015 3:29 PM), http://www.nbcnews.com/tech/innovation/faa-misses-deadline-creating-drone-regulations-n437016.

[18] FAA Modernization and Reform Act of 2012, *supra* note 4.

command to operate safely and efficiently in the national airspace system."[19] Section 331 subtitle (8) states, "(t)he term 'unmanned aircraft' means an aircraft that is operated without the possibility of direct human intervention from within or on the aircraft."[20] These are also known as drones. Section 331 subtitle (6) states, "(t)he term 'small unmanned aircraft' [sUAS] means an unmanned aircraft weighing less than 55 pounds.[21] These sUAS are the focus of this paper.

The FAA Modernization and Reform Act of 2012 distinguishes between sUAS that are used for commercial purposes, which requires a Section 333 exemption and those used for recreational purposes, which is allowed under Section 336.[22] Section 336, which allows individuals to operate their sUAS for recreational purposes without FAA approval, sets out safety guidelines that must be followed.[23] These safety guidelines state that the unmanned aircraft must be (1) operated in accordance with "a community-based" set of safety guidelines and within the programming of a nationwide community-based organization; (2) no more than 55 pounds; (3) operated in a manner that does not interfere with and gives way to any manned aircraft; (4) flown at least 5 miles from an airport unless the airport has been given prior notice; (5) capable of sustained flight in the atmosphere; (6) flown within visual line of sight of the person operating the aircraft.[24]

The sUAS used for commercial purposes, however, are not allowed to fly without an exemption under Section 333, which requires the FAA's approval. [25] Four requirements

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[19] FAA Modernization and Reform Act of 2012, *supra* note 4, at § 331.

[20] *Id.*.

[21] *Id.*

[22] FAA Modernization and Reform Act of 2012, *supra* note 4, at § 333, 336.

[23] *Model Aircraft Operations,* FEDERAL AVIATION ADMINISTRATION, https://www.faa.gov/uas/model_aircraft/ (last modified Mar. 4, 2015, 1:17 PM).

[24] FAA Modernization and Reform Act of 2012, *supra* note 4, at § 336 ("Sec. 336. Special rule for model aircraft

(a) In general.—Notwithstanding any other provision of law relating to the incorporation of unmanned aircraft systems into Federal Aviation Administration plans and policies, including this subtitle, the Administrator of the Federal Aviation Administration may not promulgate any rule or regulation regarding a model aircraft, or an aircraft being developed as a model aircraft, if—(1) the aircraft is flown strictly for hobby or recreational use; (2) the aircraft is operated in accordance with a community-based set of safety guidelines and within the programming of a nationwide community-based organization; (3) the aircraft is limited to not more than 55 pounds unless otherwise certified through a design, construction, inspection, flight test, and operational safety program administered by a community-based organization; (4) the aircraft is operated in a manner that does not interfere with and gives way to any manned aircraft; and (5) when flown within 5 miles of an airport, the operator of the aircraft provides the airport operator and the airport air traffic control tower (when an air traffic facility is located at the airport) with prior notice of the operation (model aircraft operators flying from a permanent location within 5 miles of an airport should establish a mutually-agreed upon operating procedure with the airport operator and the airport air traffic control tower (when an air traffic facility is located at the airport)). (b) Statutory construction.—Nothing in this section shall be construed to limit the authority of the Administrator to pursue enforcement action against persons operating model aircraft who endanger the safety of the national airspace system.

(c) Model aircraft defined.—In this section, the term model aircraft means an unmanned aircraft that is—(1) capable of sustained flight in the atmosphere; (2) flown within visual line of sight of the person operating the aircraft; and (3) flown for hobby or recreational purposes.").

[25] FAA Modernization and Reform Act of 2012, *supra* note 4, at § 333 ("Sec. 333. Special rules for certain unmanned aircraft systems (a) In general.—Notwithstanding any other requirement of this subtitle, and not later than 180 days after the date of enactment of this Act, the Secretary of Transportation shall determine if certain

must be met in order to operate a sUAS for commercial purposes. First, the aircraft must be registered with the FAA.[26] Second, the pilot must have an FAA airman certificate to be able to serve in any capacity as an airman on such an aircraft.[27] Third, a Certificate of Waiver or Authorization (COA) is needed.[28] Fourth, the person must have an airworthiness certificate to operate such an aircraft.[29] Obtaining an airworthiness certificate can take up to three to five years.[30] The problem with this is that the drone industry is rapidly changing.[31] If a manufacturer were to go and try to get an airworthiness certificate a drone today, the drone would be obsolete by the time the airworthiness certificate was granted.[32] Section 333 grants the Secretary of Transportation the authority to determine whether an airworthiness certificate is required for a sUAS to operate safely in the National Air Space (NAS).[33] This determination is made on a case-by-case basis.[34] In order for sUAS to operate under the authority of section 333, the sUAS must not: (1) create a hazard to users of the national airspace system or the public; and (2) pose a threat to national security.[35] In order to determine whether such a hazard or threat is created, the Secretary of Transportation will analyze the sUAS size, weight, speed, operational capability, proximity to airports and populated areas, and operation within visual line of sight.[36] This process, however, has been slow and has limited businesses from being able to immediately start integrating sUAS.[37]

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unmanned aircraft systems may operate safely in the national airspace system before completion of the plan and rulemaking required by section 332 of this Act or the guidance required by section 334 of this Act. (b) Assessment of unmanned aircraft systems.—In making the determination under subsection (a), the Secretary shall determine, at a minimum—(1) which types of unmanned aircraft systems, if any, as a result of their size, weight, speed, operational capability, proximity to airports and populated areas, and operation within visual line of sight do not create a hazard to users of the national airspace system or the public or pose a threat to national security; and (2) whether a certificate of waiver, certificate of authorization, or airworthiness certification under section 44704 of title 49, United States Code, is required for the operation of unmanned aircraft systems identified under paragraph (1). (c) Requirements for safe operation.—If the Secretary determines under this section that certain unmanned aircraft systems may operate safely in the national airspace system, the Secretary shall establish requirements for the safe operation of such aircraft systems in the national airspace system.)

[26] Operation and Certification of Small Unmanned Aircraft Systems, *supra* note 13, at 9549; *Section 333 Frequently Asked Questions (FAQ)*, FED. AVIATION ADMIN, https://www.faa.gov/uas/legislative_programs/section_333/333_faqs/#q1 (last modified Aug. 17, 2015, 3:31 PM).

[27] Operation and Certification of Small Unmanned Aircraft Systems, *supra* note 13, at 9549; *Section 333 Frequently Asked Questions (FAQ)*, *supra* note 26.

[28] *Id.*

[29] *Id.*

[30] Operation and Certification of Small Unmanned Aircraft Systems, *supra* note 13, at 9549.

[31] *Id.*.

[32] *Id.*

[33] *Section 333*, FED. AVIATION ADMIN., https://www.faa.gov/uas/legislative_programs/section_333/ (last modified Aug. 21, 2015, 2:22 PM).

[34] *Id.*

[35] FAA Modernization and Reform Act of 2012, *supra* note 4, at § 331(b)(1).

[36] FAA Modernization and Reform Act of 2012, *supra* note 4, at § 333(b)(1).

[37] John Goglia, *FAA Speeds Up Small Drone Exemptions. But Why Not Just Issue Blanket Exemption?*, FORBES.COM (Apr. 12, 2015 8:45 AM), http://www.forbes.com/sites/johngoglia/2015/04/12/faa-speeds-up-small-drone-exemptions-but-why-not-just-issue-blanket-exemption/.

Only recently have Section 333 approvals begun to speed up.[38] The problem with Section 333 is that case-by-case approvals cannot provide a long-term solution.[39]

Most recently, as of December 21, 2015, the FAA has issued a regulation that requires people to register drones weighing 0.55 pounds to 55 pounds. This registration costs $5.[40]

B. FAA's Proposed Rulemaking: "Operation and Certification of Small Unmanned Aircraft System"

In February of 2015, the FAA published a notice of proposed rule making ("NPRM") entitled "Operation and Certification of Small Unmanned Aircraft Systems".[41] If passed, they would replace the §333 exemption and provide a new regulatory framework. No part of these proposals has gone into effect however. Instead, the current regulations, including the FAA Modernization and Reform Act of 2012, still apply.[42] Even if they were eventually enacted, they would still be insufficient.

In any case, this proposed rule would not apply to sUAS identified under Section 336 of The FAA Modernization and Reform Act of 2012.[43] What it would do is make it easier to operate sUAS for commercial purposes. The NPRM states that businesses will be able to operate sUAS as long as the aircraft is registered and the pilot has an "Unmanned Aircraft Operator Certificate".[44] It would no longer be necessary to obtain a certification of airworthiness (or a Section 333 Exemption) or a COA to permit commercial operations in low-risk, controlled environments.[45] Approval would be determined on a case-by-case basis.[46]

The NPRM also sets out guidelines that must be followed by those who are operating sUASs. The guidelines for sUASs state that: (1) the unmanned aircraft must remain within visual line-of-sight of the operator or visual observer; (2) the unmanned aircraft may not operate over any persons not directly involved in the operation; (3) operations may only take place during daylight, which is official sunrise to official sunset, local time; (4) the operator must yield right-of-way to other aircraft, manned or unmanned; (5) the small unmanned aircraft may fly at a maximum speed of 100 mph at a maximum altitude of 500 feet above ground level; (6) flown at least 5 miles from an airport.[47]

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[38] *Id.*

[39] Brian Wynne, *Unleash the flying machines: Drones can boost our economy*, PITTSBURGH POST-GAZETTE (Sept. 20, 2015, 12:00 AM), http://www.post-gazette.com/opinion/Op-Ed/2015/09/20/Unleash-the-flying-machines-Drones-can-boost-our-economy/stories/201509200064.

[40] *Unmanned Aircraft Systems (UAS) Registration,* FED. AVIATION ADMIN., https://www.faa.gov/uas/registration/ (last modified Jan. 08, 2016, 11:18 AM).

[41] Juliane Hilf & Klaus Umbach, *Commercial Drones: The Current Legal Framework*, FRESHFIELDS BRUCKHAUS DERINGER, http://www.freshfields.com/en/global/Digital/New_regulations_on_commercial_drones_part_2/?LangType=2057. (last visited Oct. 3, 2015).

[42] *Section 333 Frequently Asked Questions (FAQ), supra* note 26.

[43] 80 Fed. Reg. 9544-01, 9546

[44] Operation and Certification of Small Unmanned Aircraft Systems, *supra* note 13, at 9546.

[45] Hilf & Umbach, *supra* note 41.

[46] *Id.*.

[47] Operation and Certification of Small Unmanned Aircraft Systems, *supra* note 13, at 9546.

The first requirement exists because the FAA imposes a "see-and-avoid" requirement on all aircraft operations.[48] This "see-and-avoid" requirement means "vigilance shall be maintained by each person operating an aircraft so as to see and avoid other aircraft."[49] The FAA believes that no technology can provide "an acceptable see-and-avoid replacement for human vision for small UAS operations."[50] The FAA states that a first-person view camera cannot satisfy the "see-and-avoid" requirement.[51] This is why the FAA further states that the first requirement cannot be satisfied with the use of any device other than corrective lenses.[52] The FAA also requires that there must be a "minimum weather visibility of 3 miles from [the] control station."[53]

The NPRM also created a new sub-classification called micro UAS.[54] It includes all UAS that weigh up to 4.4 pounds.[55] The guidelines for micro UAS are: (1) the unmanned aircraft must remain within visual line-of-sight of the operator or visual observer; (2) the small unmanned aircraft may operate over any persons; (3) operations may only take place during daylight, which is official sunrise to official sunset, local time; (4) the operator must yield right-of-way to other aircraft, manned or unmanned; (5) the small unmanned aircraft may fly at a maximum speed of 30 knots (approximately 34.5 mph) at a maximum altitude of 400 feet above ground level; (6) flown at least 5 miles from an airport.[56] The visual line-of-sight requirement also requires that these micro UASs are within 1,500 feet of the operator."[57]

C. EASA's Proposed Rulemaking: "Concept of Operations for Drones"

On March 12, 2015, about a month after the NPRM release, the European Aviation Safety Agency published the Concept of Operations for Drones.[58] This document outlines a risk-based regulatory framework for drone operations.[59] The two main goals of this document are to integrate and to encourage the acceptance of drones into the existing aviation system in a safe and proportionate manner and to "foster an innovative and competitive European Drone industry, creating new employment, in particular for SMEs [Small and Medium-sized Enterprises]."[60] The EASA has recognized that SMEs will likely benefit the most from commercial drone operations.[61] Thus, the EASA tried to create rules that are sensible and easy for small businesses to abide by, without the need for large regulatory compliance

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[48] Operation and Certification of Small Unmanned Aircraft Systems, *supra* note 13, at 9560.

[49] *Id.*

[50] *Id.*

[51] Operation and Certification of Small Unmanned Aircraft Systems, *supra* note 13, at 9546.

[52] Operation and Certification of Small Unmanned Aircraft Systems, *supra* note 13, at 9560.

[53] *Id.*

[54] Operation and Certification of Small Unmanned Aircraft Systems, *supra* note 13, at 9557.

[55] *Id.*

[56] *Id.*

[57] *Id.*.

[58] Hilf & Umbach, *supra* note 41.

[59] Ben Marcus, *Europe is Full of Good Ideas About Drones*, MINUTE (Mar. 13, 2015), https://medium.com/future-of-flight/europe-is-full-of-good-ideas-about-drones-390e84acef55.

[60] EUROPEAN AVIATION SAFETY AGENCY, CONCEPT OF OPERATIONS FOR DRONES (2015), https://www.easa.europa.eu/system/files/dfu/204696_EASA_concept_drone_brochure_web.pdf.

[61] Marcus, *supra* note 59.

overheads.[62] The EASA accomplishes this by dividing drones into three categories based on operations and providing regulatory rules for each category.[63] The three categories are open, specific, and certified.[64]

1. Open Category

The open category is for low risk drone operations.[65] This category is designed to "allow simple operations and for the small and medium-sized enterprises to gain experience."[66] The open category of drones would not require airworthiness approval by an aviation authority or licenses for operators and pilots.[67] In this category safety is ensured through "a minimum set of rules, operational limitations, industry standards, and the requirement to have certain functionalities."[68] The drone must be flown: under direct visual line of sight within 500 meters (approximately 1,640 feet); at an altitude not exceeding 150 meters (approximately 492 feet) above the ground or water; and outside of specified reserved areas such as airports, security areas, or environmental areas.[69] Furthermore, flights above crowds are prohibited, but flights above people in cities or populated areas are allowed.[70] If drones are operated in a populated area, they must comply with an acceptable industry standard requiring "adequate safety measures such as assistance to the drone operator to respect maximum altitude and/or to remain outside specified reserved areas."[71] The open category is further broken down into three smaller categories. The first category is "Toys" and "Mini Drones." These are drones weighing less than 1 kilogram. The second category is "Very Small Drones." These are drones that weigh less than 4 kilograms. The third category is "Small Drones." These are drones that weight less than 25 kilograms.

2. Specific Category

The specific category is for medium risk drone operations.[72] The specific operation category covers operations that do not fall into the open category because certain significant risks need to be mitigated by additional limitations or by requiring higher capability of the involved equipment and personnel.[73] An "Operations Authorization" (OA) is necessary to operate in this category.[74] In order to obtain this, the operator will need to perform a safety

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[62] *Id.*

[63] EUROPEAN AVIATION SAFETY AGENCY, CONCEPT OF OPERATIONS FOR DRONES, *supra* note 60.

[64] *Id.*.

[65] *Proposal to Create Common Rules for Operating Drones in Europe*, EASA (2015), https://easa.europa.eu/system/files/dfu/205933-01-EASA_Summary%20of%20the%20ANPA.pdf.

[66] EUROPEAN AVIATION SAFETY AGENCY, CONCEPT OF OPERATIONS FOR DRONES, *supra* note 60.

[67] *Id.*.

[68] PROPOSAL TO CREATE COMMON RULES FOR OPERATING DRONES IN EUROPE, *supra* note 65.

[69] EUROPEAN AVIATION SAFETY AGENCY, CONCEPT OF OPERATIONS FOR DRONES, *supra* note 60.

[70] *Id...*

[71] *Id...*

[72] PROPOSAL TO CREATE COMMON RULES FOR OPERATING DRONES IN EUROPE, *supra* note 65.

[73] EUROPEAN AVIATION SAFETY AGENCY, CONCEPT OF OPERATIONS FOR DRONES, *supra* note 60.

[74] *Id...*

risk assessment to identify risks and take measures to mitigate such risks.[75] The safety risk assessment takes into account: airworthiness; operating procedures and environment; competence of involved personnel and organizations; and airspace issues.[76] Airworthiness may be defined and demonstrated through compliance to acceptable industry standards.[77] The National Aviation Authority would review the safety risk assessment and determine whether or not to issue an OA.[78] However, if the operator is approved, they have the privilege to approve their own safety risk assessment.[79] The OA would specify "the specific conditions and limitations for the intended operation and can be issued to authorize a single event or a series of operations under specified conditions."[80]

3. Certified Category

The certified operation category is for high-risk drone operations.[81] These operations involve "large drones used for operations by small or large organizations."[82] The certified operation category will require certification because of the higher risk associated with the operation.[83] This higher associated risk must be at a level similar to normal manned aviation operation.[84] The limit between the specific group and the certified group is not yet determined, but could be based on "kinetic energy considerations, type of operations and complexity of the drone notably in terms of autonomy."[85] Operation in this category would require environmental certification, and airworthiness certificate, and a noise certificate for each drone.[86] Additionally, pilots are required to have a license and the operator needs to receive organizational approval.[87]

D. Future Growth in the Drone Industry

The drone industry is expected to grow in the future because drone technology can be implemented by many different types of businesses. "The global commercial drone market will take shape around applications in a handful of industries."[88] Some of the industries

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[75] *Id...*

[76] *Id...*

[77] *Id.*.

[78] EUROPEAN AVIATION SAFETY AGENCY, CONCEPT OF OPERATIONS FOR DRONES, *supra* note 60 (stating that another organization could be approved to issue Operations Authorizations instead of the National Aviation Authority).

[79] *Id...*

[80] *Id.*

[81] PROPOSAL TO CREATE COMMON RULES FOR OPERATING DRONES IN EUROPE, *supra* note 65.

[82] *Id.*.

[83] EUROPEAN AVIATION SAFETY AGENCY, CONCEPT OF OPERATIONS FOR DRONES, *supra* note 60.

[84] *Id...*

[85] *Id.*

[86] *Id...*

[87] *Id.*

[88] *THE DRONES REPORT: Market forecasts, regulatory barriers, top vendors, and leading commercial applications*, BUSINESS INSIDER (May 27, 2015, 9:08 AM), http://www.businessinsider.com/uav-or-commercial-drone-market-forecast-2015-2.

affected will include agriculture, utilities, energy, mining, construction, news, media, real estate, and film production.[89] The drone market is making a shift away from military applications and is turning toward more commercial applications.[90]

The Consumer Electronic Association predicts that the global drone market will be worth $1 billion by 2018.[91] The Volpe National Transportation Systems Center predicts that by 2035 the U.S. commercial drone market could easily be worth $5 billion dollars and the global commercial market may be several times greater.[92] Major companies in the drone industry believe that the industry will create more than "100,000 jobs and $82 billion in economic impact during the first decade following integration."[93] With the correct regulatory framework, these companies believe that this number could be even higher.[94] It is predicted that 30,000 drones will fly by 2020.[95]

E. Major Players in the United States Drone Industry

The FAA's failure to create a pro-business drone regulatory framework has not stopped companies from researching and developing drone technology. There are three main groups of businesses that are interested and stand to benefit from a new regulatory framework. These groups include businesses that offer drone related services, businesses that broker services to large companies, and those that manufacture drones.

The first group of companies that will be discussed are those that offer drone related services. Amazon, the world's largest online retailer, has plans to create a service known as Amazon Prime Air.[96] Once fully developed, it will "deliver packages up to five pounds in 30 minutes or less using small drones."[97] Amazon has already developed "many different vehicle designs and delivery mechanisms to discover how best to deliver packages in a variety of environments."[98] Amazon has built these vehicles to "take advantage of . . . automation, to safely operate beyond the line of sight to distances of 10 miles or more."[99] Amazon has created "more than a dozen prototypes that [they] developed in [their] research and

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[89] *Id.*

[90] *Id.*

[91] Conor Gaffey, *Europe First in Line For Amazon's Drone Superhighway*, NEWSWEEK (July 30, 2015, 7:52 PM), http://europe.newsweek.com/europe-first-line-amazons-drone-superhighway-331017.

[92] GEORGES AOUDE ET AL., COMMERCIAL DRONES: THE UNITED STATES MUST SPEED UP GLOBALLY COMPETITIVE REGULATIONS 2, http://www.oliverwyman.com/content/dam/oliver-wyman/global/en/2015/nov/Commercial%20Drones.pdf.

[93] Letter from Brian Wynne, President & CEO, Association for Unmanned Vehicle Systems International, to Michael Huerta, Administrator, Federal Aviation Administration (Sept. 30, 2015) (can be found at https://higherlogicdownload.s3.amazonaws.com/AUVSI/b657da80-1a58-4f8f-9971-7877b707e5c8/UploadedImages/FAA%20Letter_93015.pdf).

[94] *Id.*

[95] Michael Dahmen, *What the U.S. Can Learn From Europe's Growing Commercial Drone Industry*, TECHCRUNCH (Apr. 25, 2015), http://techcrunch.com/2015/04/25/what-the-u-s-can-learn-from-europes-growing-commercial-drone-industry/.

[96] *Amazon Prime Air*, AMAZON, http://www.amazon.com/b?node=8037720011 (last visited Jan. 30, 2016).

[97] *Id.*

[98] *Id.*

[99] *Id.*

development labs."[100] Amazon has stated, "safety is our top priority. Our vehicles will be built with multiple redundancies, as well as sophisticated 'sense and avoid' technology. We will not launch Prime Air until we are able to demonstrate safe operations."[101] Amazon has set up "Prime Air development centers in the United States, the United Kingdom and Israel."[102]

Google is also working on a drone delivery system code-named Project Wing.[103] This system differs from Amazon in that it would be a system of two different types of vehicles.[104] The patent described "a system by which an aerial drone would communicate with a robotic 'mobile delivery receptacle'— a box with wheels — so a package could be delivered in a safe location and then ferried to a secure drop off point."[105] In order to locate each other, "[t]he box would use infrared to flag down the drone to receive the package and would most likely contain a locking mechanism to prevent people from snatching objects before they're brought to the holding location."[106] The transaction would take place at "a secure spot [like] a public pickup point . . . a place for local delivery companies to grab packages and bring them to your door, or somewhere on a private residence like a garage."[107] The purpose of the two-part system is to "alleviate concerns such as the drone injuring pets and destroying property or the package being stolen from someone's porch. 'Conventional aerial delivery methods do not allow for safe, secure delivery of packages to delivery locations.'"[108]

Wal-Mart is also looking to drones to expand its operations. The company has been testing drones for "home delivery, curbside pickup and checking warehouse inventories."[109] Drones have a lot of potential especially for Wal-Mart because "there is a Wal-Mart within five miles of 70 percent of the U.S. population, which creates some unique and interesting possibilities for serving customers with drones."[110]

> In addition to having drones take inventory of trailers outside its warehouses and perform other tasks aimed at making its distribution system more efficient, Wal-Mart is asking the Federal Aviation Administration for permission to research drone use in deliveries to customers at Walmart facilities, as well as to consumer homes . . . [d]rones

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[100] *Id.*

[101] *Id.*

[102] *Amazon Prime Air, supra* note 96.

[103] Nick Statt, *Google Might Have Drones Deliver Packages to Robots on Wheels*, THE VERGE (Jan. 27, 2016, 4:14 PM), http://www.theverge.com/2016/1/27/10852786/google-project-wing-drone-delivery-robots-patent..

[104] *Id.*

[105] *Id.*

[106] *Id.*

[107] *Id.*

[108] *Id.*

[109] Nathan Layne, *Exclusive: Wal-Mart Seeks to Test Drones For Home Delivery, Pickup*, REUTERS (Oct. 27, 2015, 5:10 AM), http://www.reuters.com/article/us-wal-mart-stores-drones-exclusive-idUSKCN0SK2IQ20151027.

[110] *Id.*

> have a lot of potential to further connect our vast network of stores, distribution centers, fulfillment centers and transportation fleet.[111]

Wal-Mart's interest in drone technology came about as a way to compete with Amazon and Google's drone delivery service.[112]

Facebook has also been developing drone technology for a completely different reason. Facebook has been working on a drone code-named "Aquila."[113] Aquila is a solar powered drone with the ability to fly for three months without landing.[114] The purpose of the drone is to provide internet access to parts of the world where it just isn't accessible.[115] Facebook plans on doing this by equipping the drone with "a laser to beam data to a base station on the ground."[116] There will be a "linked network of the drones" to provide internet access.[117]

The second group of companies that will be discussed are those that broker services to large companies. This is a new area that has emerged in the drone industry.

> There are drone makers, there are the companies that want to use drones, and then there's everything in between," says Lisa Ellman, a drone policy expert and co-leader of the UAS Group at the Washington D.C. offices of law firm Hogan Lovells. "Drones as service" companies see opportunities in a growing space that exists between those certified to operate commercial drones and potential clients that want to utilize drone data, she says.[118]

Fly4me is one such company and uses drones to collect aerial data and conduct research for commercial gain.[119] It differs from many other companies because it doesn't actually operate any drones.[120] This company launched a website that "connects drone pilots with companies that need aerial data collection, but don't necessarily want to invest in their own drone fleet."[121] Fly4me is already working with "several certified drone pilots to provide data to customers, mostly aerial video and imagery for photographers and commercial properties like golf courses. The company is also working with a solar company to capture roof dimensions and shading data for solar panel placement and infrastructure inspections."[122]

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[111] *Id.*

[112] *Id.*

[113] Alex Hern, *Facebook Launches Aquila Solar Powered Drone for Internet Access*, THEGUARDIAN (July 30, 2015, 11:23 PM), http://www.theguardian.com/technology/2015/jul/31/facebook-finishes-aquila-solar-powered-internet-drone-with-span-of-a-boeing-737.

[114] *Id.*

[115] *Id.*

[116] *Id.*

[117] *Id.*

[118] Clay Dillow, *As Commercial Drone Use Soars, 'Drone Services' Take Flight*, FORTUNE.COM (July 17, 2015, 2:15 PM), http://fortune.com/2015/07/17/commercial-drone-service/.

[119] *Id.*

[120] *Id.*

[121] *Id.*

[122] *Id.*

Measure, a company based in Washington, D.C., has also begun providing similar drone services.[123] "The company acts as something of a consultant and drone service provider that targets larger Fortune 1000 companies."[124] The company currently works with "400 different types of aircraft . . . allowing Measure to contract just about any drone a client could need for any application."[125] However, "brokering drone services is only part of what Measure does for clients."[126]

> Right now the company is focused on developing relationships with corporations that could benefit from drones and helping them figure out how best to integrate the technology into their operations. The ultimate goal...is to show these companies exactly how drones fit into their business model and then ink long-term contracts for providing those drone services.[127]

This strategy has paid off and Measure has already started working with a variety of different industries. Measure has developed relationships with "mining companies in Western Australia, Guinea, Zambia and Tanzania, as well as with a utility in Gabon."[128] Measure is also working on launching an "ROI calculator for the American Farm Bureau Federation to help farmers determine whether incorporating drones into their business makes sense."[129] The company has also helped humanitarian organizations, such as the American Red Cross, by producing a report detailing how drones could aid in disaster response.[130]

There are a few smaller companies in the drone services space. One such company is Gofor, which offers "drones on demand, an app-based platform allowing customers to use their smartphones to 'task a drone to complete a variety of helpful tasks.'"[131] Another company, a San Francisco-based startup Skycatch, offers its own "proprietary drone platform for lease to commercial customers [and] is developing a platform called Workmode that connects companies to third-party pilots, similar to Fly4Me."[132] The growing number of businesses entering the drone services area space indicates "a certain maturity within the larger drone marketplace."[133]

The third group of companies that will be discussed are those that manufacture drones. If businesses take advantage of drone technology, this would create more sales for manufacturers. The largest drone manufacturer in the world today is DJI.[134] DJI is a Chinese-

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[123] *Id.*

[124] Dillow, *supra* note 118.

[125] *Id.*

[126] *Id.*

[127] *Id.*

[128] *Id.*

[129] Dillow, *supra* note 118.

[130] Dillow, *supra* note 118.

[131] *Id.*

[132] *Id.*

[133] *Id.*

[134] Ryan Mac, *This is the Drone Company Walmart is Hoping to Use for Deliveries*, FORBES (Oct. 27, 2015, 5:04 AM), http://www.forbes.com/sites/ryanmac/2015/10/27/this-is-the-drone-company-walmart-is-hoping-to-use-for-deliveries/#7f839d1f1ad7.

based consumer drone manufacturer.[135] Some analysts estimate that DJI controls more than 70% of the global consumer drone market.[136] Another drone manufacturer is 3D Robotics. 3D Robotics is the largest drone maker in the United States.[137]

> 3D Robotics develops innovative, flexible and reliable personal drones and [UAS] technology for everyday exploration and business applications. 3DR's [UAS] platforms capture breathtaking aerial imagery for consumer enjoyment and data analysis, enabling mapping, surveying, 3D modeling and more.[138]

Even companies who are not currently producing drones are trying to get into the industry. GoPro is most known for selling lightweight, compact, and mountable cameras that are used to capture action videos, such skiing.[139] However, recently it has started developing its own line of drones.[140] The company is developing a drone called Karma that will take advantage of the GoPro camera.[141] The drone will be able to be equipped with a GoPro camera, old or new, and record footage while flying the drone.[142]

III. THE PROBLEM WITH CURRENT DRONE REGULATIONS

A. Focus On Safety And Business

Drone regulations should allow for drones to be integrated safely into the existing aviation infrastructure and allow for businesses to thrive.[143] The FAA regulations, however, do neither. First of all, the regulations do not allow using drones for commercial purposes without first meeting a series of requirements and getting approval.[144] The regulatory framework differentiates between commercial drones and recreational drones, even though both pose the same level of risk.

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[135] *Id.*

[136] *Id.*

[137] James Trew, 3D Robotics: The Future of Drones Needs to Be Smart Yet Simple, ENGADGET (Jan. 16, 2016), http://www.engadget.com/2016/01/06/3dr-the-future-of-drones/ [hereinafter *James Trew*].

[138] *3D Robotics*, ROBOTICS BUSINESS REVIEW, http://www.roboticsbusinessreview.com/company/3d_robotics (last visited Jan. 30, 2016).

[139] *What is GoPro?*, GADGET REVIEWS (Nov. 16, 2014), http://www.mygadgets.my/what-is-gopro/.

[140] James Trew, *Nick Woodman Talks Karma and the Future of GoPro*, ENGADGET (Jan. 7, 2016), http://www.engadget.com/2016/01/07/nick-woodman-talks-karma-gopro/.

[141] *Id.*

[142] *Id.*

[143] Marcus, *supra* note 59.

[144] *Section 333 Frequently Asked Questions (FAQ)*, *supra* note 26.

B. Culture of Non-Compliance

The FAA's current drone regulations greatly restrict businesses from using drones for commercial operations.[145] The regulations are so unreasonable that they are creating a culture of non-compliance.[146] Air safety has traditionally been an area that has relied on voluntary compliance.[147] Regulations, such as those requiring an unmanned aircraft operator certificate to fly a drone that can rest on the palm of your hand, are unduly restrictive and even irrational, and create this culture of non-compliance.[148] Even the FAA's most recent regulation requiring drone registration is similarly restrictive because it applies to drones weighing as little as 0.55 pounds and does not look at the risk that the drone poses.[149] People have become so used to flying drones without the FAA's permission that they would be resistant to follow in any rules that the agency puts in place.[150] Even if people want to follow FAA regulations, they find that complying with a Section 333 exemption or future potential rules set out in the NPRM can be difficult or preclude them from achieving their goals.[151] Non-compliance is the norm.[152] The EASA is more realistic in this regard than the FAA. It has demonstrated that "overburdening low-risk operations leads to a climate of indifference or to illegal operations adversely affecting safety."[153]

C. Greater Growth Of The Drone Industry In Other Areas Of The World

The FAA is putting the United States at a competitive disadvantage.

> Although the use of drones is relatively novel in the US that is not the case with other developed countries. In Japan, for example, farmers have been using drones for decades to inspect crops. In Canada, police use drones for search-and-rescue operations. In the United Kingdom, drones are used for commercial photography. Yet in the US, such activities have been relatively rare because the Federal Aviation Administration (FAA) considers commercial drone usage illegal without special permission.[154]

The European Union, for example, supports the drone industry so that it can flourish.[155] Business rumor has it that companies like Google will move to Europe because of

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[145] John Goglia, *Torqued: Unreasonable UAS Rules Promote Culture of Non-compliance,* AINONLINE.COM (Oct. 1, 2015, 5:30 AM), https://www.ainonline.com/aviation-news/blogs/torqued-unreasonable-uas-rules-promote-culture-non-compliance.

[146] *Id.*

[147] *Id.*

[148] *Id.*

[149] *Unmanned Aircraft Systems (UAS) Registration, supra* note 40.

[150] Goglia, *supra* note 145.

[151] *Id.*

[152] *Id.*

[153] Goglia, *supra* note 145.

[154] AOUDE, *supra* note 92.

[155] Dahmen, *supra* note 95.

its more permissive regulations.[156] In fact, Amazon has already gone to Europe to test it's drone technology there.[157] Critically, "Europe is producing some of the most technologically advance[d] drones globally, and drones are estimated to be 10 percent of the European aviation market by 2025" and will create 150,000 jobs by 2050.[158]

This is by design. "The requirements set forth by the EASA for . . . commercial operations are looser than those suggested in the FAA's Notice of Proposed Rulemaking. For example, under EASA's framework, no operator certificate would be required. The FAA's NPRM requires an operator certificate."[159] The European Union has focused on the need for regulators to "treat drones as new types of aircraft with proportionate rules based on the risk of each operation and urged regulators to quickly create rules to value innovation and allow for drone services to be developed immediately."[160] Those principles are clearly reflected in the EASA's regulatory framework.[161]

One European company taking advantage of drone technology is German-based delivery firm DHL.[162] DHL originally launched a "parcelcopter" research project in 2013."[163]

> The service will use an autonomous quadcopter to deliver small parcels to the German island of Juist, a sandbar island 12km into the North Sea from the German coast, inhabited by 2,000 people. Deliveries will include medication and other goods that may be "urgently needed"...the drone takes a fully automated route to a dedicated landing area on Juist. "From there," the company says, "a DHL courier will then deliver the goods to the recipient. To optimally secure the goods during transport, DHL Parcel developed a special air-transport container that is extremely lightweight as well as weather- and waterproof."[164]

D. Lobbying Efforts in the United States

Even though the drone business is flourishing in foreign countries, American businesses are still pushing to open up the drone market locally. Companies like Amazon and Google have been lobbying to allow commercial drones to fly.[165] "The Academy of Model

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[156] Gregory S. McNeal, *Amazon and Google Delivery Drones Will Likely Fly In Europe First*, FORBES.COM (Mar. 23, 2015, 3:49 PM), http://www.forbes.com/sites/gregorymcneal/2015/03/23/amazon-and-google-delivery-drones-will-likely-fly-in-europe-first/.

[157] Robert Macpherson, *Amazon Sees Line-of-sight Hurdle to US Drone Parcel Delivery*, PHYS.ORG (June 17, 2015), http://phys.org/news/2015-06-amazon-line-of-sight-hurdle-drone-parcel.html.

[158] Dahmen, *supra* note 95.

[159] Marcus, *supra* note 59.

[160] McNeal, *supra* note 156.

[161] *Id.*

[162] Alex Hern, *DHL Launches First Commercial Drone 'Parcelcopter' Delivery Service*, THEGUARDIAN.COM (Sept. 25, 2014, 9:51 AM), http://www.theguardian.com/technology/2014/sep/25/german-dhl-launches-first-commercial-drone-delivery-service.

[163] *Id.*

[164] *Id.*

[165] Cecilia Kang, *Drone Lobbying Heats Up On Capital Hill*, NYTIMES.COM (Jan. 24, 2016, 9:00 AM), http://bits.blogs.nytimes.com/2016/01/24/drone-lobbying-turns-to-captiol-hill/?_r=0.

Aeronautics, which represents hobbyists, and trade groups for companies like Google and Amazon, are even showing up at city hall hearings in Miami and Los Angeles to influence local rules."[166] "Amazon and Google have...pushed lawmakers to apply pressure on the F.A.A. to move faster with their first-time rules for commercial drones...companies want to be able to benefit from drones by flying beyond visual line of sight, or near congested areas or over people, in a way that is safe[.]"[167]

> Amazon spent $9.44 million lobbying in Washington D.C. last year, 91 percent more than what it spent in 2014...The e-commerce giant increased its lobbying efforts more than any of the other top 50 lobbying organizations in the last year...Google's parent Alphabet...spent upwards of $16 million in 2015...Facebook also spent about $400,000 more than Amazon on lobbying[.][168]

"GoPro, DJI and other makers of recreational drones, meanwhile, are lobbying against more rules...DJI and GoPro executives sat on the F.A.A.'s task force that came up with recommendations for the registration system that began in December."[169] Even though the United States is currently behind the rest of the developed world, with more "reasonable and globally competitive regulations, the US could become a front-runner in this fast-changing, growing industry."[170]

IV. PROPOSED SOLUTION

A. Adopt the EASA's Regulatory Framework

To solve the problem, we must understand why the FAA took this approach in the first place.

> The rationale for the distinction between recreational and commercial drone activities mirrors the manned aircraft world, where commercial pilots are responsible for transporting large numbers of passengers safely in large aircraft and are held to the highest level of experience and training. Recreational pilots are held to a lower standard in terms of experience because of the lesser potential for harm to life and damage to property.[171]

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[166] *Id.*

[167] *Id.*

[168] James Risley, *Amazon's Lobbying Nearly Doubles As It Pushes For New Drone Regulations,* GEEKWIRE (Feb. 4, 2016, 10:01 AM), http://www.geekwire.com/2016/amazons-lobbying-up-91-percent-as-it-pushes-for-defined-drone-regulations/.

[169] *Id.*

[170] AOUDE, *supra* note 92.

[171] *Id.*

This approach should not be applied to drones because drones are not similar to manned aircrafts in this respect. "There is little difference whether smaller drones are used for commercial or recreational purposes, as the risks they pose are similar. In both cases, the drones are unmanned, and the risk of damage to people, property, or manned aircraft is low."[172] "If safety is the primary factor, differences between commercial and hobbyist activity are arbitrary. For example, a hobbyist taking pictures with a drone presents no more risk than a professional photographer doing the same. The level of risk associated with drones does not depend on compensation."[173] It's important for the FAA to develop the risk-based regulatory framework for drone regulations in order to unleash the US market.[174]

This is why this Note proposes that the FAA should adopt the EASA's plan for drone regulation. Placing drones into either the open category or specific category will require drone operators to satisfy requirements based on the level of risk that their drone poses.[175] The open category should be further split into two sections. The first section will be for small UAS, and the second section will be for micro UAS. The certified category, described above, is not necessary because it deals with larger sized UAS.

Adopting this type of framework will ensure that safe operation of commercial drones is not restricted the way it is in the current system. However, even adopting the EASA's approach to drone regulations does not completely solve the problem. Some of the regulations set out by both the EASA and FAA restrict the drone industry and do not allow the industry to reach its full potential. If the FAA adopts the EASA's regulatory framework, it should then modify some particular EASA requirements to adjust to the changing drone industry.

B. The Open Category: Small UAS

The EASA uses the open category and specified category to classify drones. In my view, the open category should not require any certification. My proposed guidelines for small UASs, which would apply to drones weighing 4 pounds to 55 pounds, are: (1) the small unmanned aircraft must remain within visual line-of-sight of the operator or visual observer; (2) the small unmanned aircraft may fly above any person, but not above crowds of more than 20 people; (3) the operator must yield right-of-way to other aircraft, manned or unmanned; (4) the small unmanned aircraft may fly at a maximum speed of 100 mph at a maximum altitude of 200 feet above ground level; (5) the small unmanned aircraft must have geo-fencing technology; (6) the small unmanned aircraft may not be flown within 5 miles of an airport.

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[172] *Id.*

[173] Daniel Castro, *FAA Should Rethink Its Rules and Unlock Commercial Drone Innovation*, THE HILL (Apr. 22, 2015, 7:30 AM), http://thehill.com/blogs/pundits-blog/technology/239594-faa-should-rethink-its-rules-and-unlock-commercial-drone.

[174] AOUDE, *supra* note 92.

[175] EUROPEAN AVIATION SAFETY AGENCY, *supra* note 60.

1. Proposal One

The first NPRM restriction that needs to be changed in the proposal is the one prohibiting sUAS from operating over any persons not directly involved in the operation.[176] This prohibition basically restricts the flying of drones over urban environments.[177] I propose that this restriction be modified so that the sUAS may fly above any person, but not above crowds of more than 20 people.[178] The FAA has recently eased the current regulations and taken a step in this direction. A company, Cape Productions, uses drones to film skiers at select ski resorts and then edits the video for the skier.[179] The FAA made its first approval to allow this company to fly drones near "people participating in the intended purpose of the drones operation."[180]

> Previous decisions forbid drone operations closer than 500 feet to anyone other than the pilot and visual observer (aerial data collection) or persons on a closed set, all of whom have consented to be involved in and are necessary to the film production (closed set filming). Unlike those decisions, Cape's FAA grant explicitly allows us to fly drones in an area wider than a closed set and near people participating in the intended purpose of the drone's operation, including skiers, provided they are briefed beforehand on the operations and provide consent.[181]

The important takeaway from this is that easing these restrictions can help new businesses expand their operations. However, because flying over a crowded area puts more people at risk, such activity should still be limited.

2. Proposal Two

The maximum height for drone operation must be changed. Both the EASA's proposed regulations and the FAA's proposed regulations restrict drone operations to a maximum height of 500 feet.[182] This seems irrational because civil aircrafts can fly at 500 feet.[183] I propose that the air space from the ground floor to 400 feet be reserved exclusively for drone operations. This would leave the area from 400 feet to 500 feet as a 100-foot no fly

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[176] Operation and Certification of Small Unmanned Aircraft Systems, *supra* note 13, at 9546.

[177] Brooks Lindsay, *Drone Drain: How the FAA Can Avoid Draining (and Instead Spur) the American Drone Industry by Adding Nuance to Its Draft Small Uas Rules*, 10 WASH. J.L. TECH. & ARTS 343, 354 (2015).

[178] EUROPEAN AVIATION SAFETY AGENCY, CONCEPT OF OPERATIONS FOR DRONES, *supra* note 60.

[179] *How It Works*, CAPE, https://www.cape.com (last visited Jan. 30, 2015).

[180] *Regulatory Permissions*, CAPE, https://www.cape.com/regulations/ (last visited Jan. 30, 2015).

[181] *Id.*

[182] EUROPEAN AVIATION SAFETY AGENCY, CONCEPT OF OPERATIONS FOR DRONES, *supra* note 60; Operation and Certification of Small Unmanned Aircraft Systems, *supra* note 13, at 9546.

[183] Gaffey, *supra* note 91.

zone between drones and civil aircrafts.[184] Drones in the open category will be able to fly up to 200 feet within this proposed 400 feet of airspace.[185]

3. Proposal Three

Drone operators should then be required to stay within these set boundaries. I propose that all drones be required to have geo-fencing technology. Geo-fencing technology is "the concept of restricting drone access by designating specific areas where the drone's software and/or hardware is designed not to enter, even if the pilot, without intent, instructs the drone to go."[186] Geo-fencing technology would shut off drones if they flew near commercial airports or other restricted areas, including airspace above 200 feet.[187] Some drone manufacturing companies have already started incorporating this type of safety feature into their drones.[188] DJI is one such manufacturer.[189] The manufacturer is using a system called Geospatial Environment Online.[190] This system is powered by a company called AirMap, which will constantly be updated with new information on restrictions, which will "prevent drones from entering zones with shifting security needs, like stadium events or wildfire areas."[191] This type of technology will "help operators understand their local flight environment, and . . . make smart, educated decisions about when and where to fly their drones . . . ."[192] Drone operators, however, are able to bypass this system after creating a verified account with the company.[193] This technology should be put into every drone to ensure that all drone operators are following the law. We need a regulation for this.

4. Proposal Four

Additionally, one restriction should be repealed completely. Currently, operations may only take place during daylight, which is defined as official sunrise to official sunset, local time.[194] Flying a drone at night can actually improve safety. At night there is less air traffic and wind speeds are generally lower.[195] "Infrared sensors that are used to spot people

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[184] *Id.*

[185] *Revising the Airspace Model for the Safe Integration of Small Unmanned Aircraft Systems*, AMAZON (July 2015), https://images-na.ssl-images-amazon.com/images/G/01/112715/download/Amazon_Revising_the_Airspace_Model_for_the_Safe_Integration_of_sUAS.pdf.

[186] PROPOSAL TO CREATE COMMON RULES FOR OPERATING DRONES IN EUROPE, *supra* note 65.

[187] Keith Laing, *Schumer Moves to Require Geo-fencing on Drones*, THE HILL (Sept. 14, 2015, 1:46 PM), http://thehill.com/policy/transportation/253565-schumer-moves-to-require-geo-fencing-on-drones.

[188] Colin Lecher, *DJI is Updating its Drones So They Won't Fly in Restricted Airspace*, THE VERGE (Nov. 17, 2015, 6:30 PM), http://www.theverge.com/2015/11/17/9751484/dji-no-fly-zone-geofencing.

[189] *Id.*

[190] *Id.*

[191] *Id.*

[192] *Id.*

[193] *Id.*

[194] Operation and Certification of Small Unmanned Aircraft Systems, *supra* note 13, at 9546.

[195] Michal Addady, *Here's Where You Can Fly a Drone High, Both Day and Night*, FORTUNE.COM (Aug. 24, 2015, 12:05 PM), http://fortune.com/2015/08/24/drones-north-dakota/.

and animals also tend to work better in lower temperatures."[196] Drone flight operations should be permitted at night.

C. The Open Category: Micro UAS

My proposed guidelines for micro UASs, would apply to drones weighing below 4 pounds. These are: (1) the small unmanned aircraft must remain within visual line-of-sight of the operator or visual observer; (2) the small unmanned aircraft may fly above any person or group of people; (3) the operator must yield right-of-way to other aircraft, manned or unmanned; (4) the small unmanned aircraft may fly at a maximum speed of 40 mph at a maximum altitude of 200 feet above ground level; (5) the small unmanned aircraft must have geo-fencing technology; (6) the small unmanned aircraft may not be flown within 5 miles of an airport.

1. Differences Between Micro UAS and Small UAS

There are two differences between micro UAS and small UAS. First, the micro UAS can fly over any person because the risk of harm is less. The low weight makes it highly unlikely that it will cause any major property damage, serious injury or death.[197] Second, the maximum speed a micro drone may fly has been changed. A micro drone flying at high speed can be dangerous because it will make it harder to see a drone at high speeds.

D. The Specific Category

The specific category consists of drones that will be operated in situations with higher risk and will require an "Unmanned Aircraft Operator Certificate." My proposed guidelines for the Specific Category of small UASs are: (1) the small unmanned aircraft must remain within visual line-of-sight of the operator or visual observer unless it is equipped with First Person View (FPV) and Sense-And-Avoid (SAA) technology; (2) the small unmanned aircraft may fly above any person or group of people; (3) the operator must yield right-of-way to other aircraft, manned or unmanned; (4) the small unmanned aircraft may fly at a maximum speed of 100 mph at a maximum altitude of 400 feet above ground level; (5) the small unmanned aircraft must have geo-fencing technology; (6) the small unmanned aircraft may not be flown within 5 miles of an airport.

1. First Difference Between the Open Category and Specific Category

The distinction I make between the open category and specific category leads to a changed visual line-of-sight requirement. Both the FAA's proposed regulations and the EASA's proposed regulations state that a drone must be flown within the visual line of sight

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[196] *Id.*

[197] Lindsay, *supra* note 177, at 354, 355.

of its operator.[198] This requirement is stopping some companies from fully utilizing drone technology.[199]

The visual line-of-sight requirement should be the default requirement. However, the FAA should allow drones to fly outside the line of sight where pilots are certified and the drones they fly are equipped with FPV technology and SAA technology.[200] FPV is established when "a video camera is mounted on the vehicle and broadcasts the live video to the pilot on the ground so the pilot is flying the aircraft as if he/she was onboard the aircraft instead of looking at the craft from the pilot's actual ground position."[201] One of the FAA's concerns with FPV technology is that the field of view is too limited. The FAA argues that it makes the operator less capable of spotting surrounding aircrafts and hazards.[202] "Yet, current camera technologies such as 1080p high-definition fish-eye video actually offer a wider field of vision than the human eye[.]"[203] Additionally, virtual reality headsets have been created that allow an operator to "rotate his or her head to turn the on-board camera and look for surrounding aircraft or hazards."[204] This technology could actually provide a superior range of vision to that of a human pilot because multiple cameras could be placed on a drone.[205]

Sense-and-avoid (SAA) technology is a type of autonomy technology that allows a drone to sense other objects and undertake evasive maneuvers on its own.[206] "Autonomy technology is any kind of technology that can function without being told what to do by a person."[207] A combination of sensors and software has led to the development of this type of technology.[208] Sensors such as gyroscopes, accelerometers, altimeters, and GPS allow drones to sense altitude, acceleration, tilt, and position.[209] Software has been created that uses algorithms that can detect objects and build an accurate map of the surrounding environment in near real-time.[210] By using this map and sensory information, drones are able to fly around new environments without a human operator.[211] Drones can fly up to 30 mph while still navigating through trees and other obstacles.[212] This technology can also be used as a safety

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[198] EUROPEAN AVIATION SAFETY AGENCY, *supra* note 60; *Operation and Certification of Small Unmanned Aircraft Systems*, *supra* note 13, at 9546.

[199] Macpherson, *supra* note 157.

[200] Lindsay, *supra* note 177, at 346.

[201] *What is This FPV Stuff All About?*, DRONEFLYERS (Feb. 5, 2013), http://www.droneflyers.com/2013/02/what-is-this-fpv-stuff-all-about/.

[202] Lindsay, *supra* note 177, at 347.

[203] *Id.*

[204] *Id.*

[205] *Id.* at 348.

[206] Patrick Marshall, *The Tech That Will Make Drones Safe For Civilian Skies*, GCN.COM (July 12, 2013), https://gcn.com/Articles/2013/07/12/Drone-UAV-sense-and-avoid-technologies-civilian-airspace.aspx?Page=2.

[207] *What is Autonomy Technology?*, NW. UNIV., http://www.qrg.northwestern.edu/projects/vss/docs/mission/1-whatis-autonomy-tech.html (last visited Jan. 8, 2016).

[208] Lindsay, *supra* note 177, at 348.

[209] *Id.*

[210] Barb Darrow, *Fast-Flying Drone Avoids Obstacles: Here's How*, FORTUNE.COM (Nov. 3, 2015, 8:57 AM), http://fortune.com/2015/11/03/drone-avoids-obstacles-heres-how/.

[211] *Id.*

[212] *Id.*

precaution for situations where the drone stops responding to the operator. The drone could be programed to return home in this type of situation.[213]

2. Second Difference Between the Open Category and Specific Category

In my proposal, the open category and the specific category are also different in that a drone in the specific category may fly over any person, even crowds of people. This is allowed in the specific category because operation in this category requires an "Unmanned Aircraft Operator Certificate," which ensures the operator has the ability to fly in this situation, even though there is still a risk. To put this in perspective, "over 30,000 Americans are killed in car accidents each year, and yet we tolerate the risks in the interests of economic progress and broader freedoms." [214] There are risks associated with many existing technologies, but people still use them because as a society we believe the benefits outweigh the risks.

> By contrast, not a single fatality has been reported from civil or recreational UAS flight in the United States, despite accelerating use in recent years. The relatively low risks associated with mid-size UAS over non-operators are thus tolerable in light of the benefits they promise in services and economic development.[215]

3. Third Difference Between the Open Category and Specific Category

In my proposal, the open category and the specific category are also different in that a drone in the specific category may fly up to 400 feet.[216] This is a significant difference as I proposed that drones in the open category may only fly up to 200 feet. This distinction exists because flying at this height is more difficult and will require an "Unmanned Aircraft Operator Certificate." Having this certification will ensure that the operator has the ability to fly at high altitudes without increasing risk to himself or others.

V. CONCLUSION

The United States' approach to regulating drones is not working. These regulations differentiate between commercial drones and recreational drones, even though both may pose the same level of risk.[217] The European Union, on the other hand, has taken a strong pro-business approach.[218] The EASA has proposed a regulatory document outlining a risk-based

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[213] Lindsay, *supra* note 177, at 346.

[214] *Id.* at 354.

[215] *Id.* at 354, 355.

[216] *Revising the Airspace Model for the Safe Integration of Small Unmanned Aircraft Systems, supra* note 185.

[217] Lovells, *supra* note 8.

[218] *Id.*

regulatory framework for drone operations.[219] This type of framework is designed to allow businesses to thrive.[220]

Allowing businesses to thrive is indisputably important. There is a clear shift away from military drones towards commercial and recreational drones.[221] The global drone market could easily be worth billions of dollars in just a few years.[222] The drone industry has been growing faster outside the United States. Countries such as Japan, Canada, and the United Kingdom have been taking advantage of what drones have to offer.[223]

Despite all this, it is still not too late for the United States to enter and compete in this industry. Large American companies such as Amazon, Google, Wal-Mart, and Facebook have all begun to develop new services that they can offer to consumers by using drone technology.[224] American companies such as Measure, Fly4Me, Skycatch, and Gofor have begun brokering drone services to large companies.[225] American companies like 3D Robotics and GoPro are very successful drone manufacturers who would greatly benefit by creating less restrictive drone regulations.[226]

Drone regulations should increase safety and help promote businesses, but the FAA's drone regulations do neither. Many companies are choosing to leave the United States.[227] In order to stop this, we must follow an approach that allows businesses to grow. My proposed solution would be to break drones up into two categories. The first category is the open category. This would be broken up into two sub-categories, which would include micro UAS and small UAS. The second category is the specific category. This type of framework will allow businesses to use drones without having to acquire any type of certification. It will also allow companies to fly drones beyond the visual line-of-sight. By adopting this regulatory framework the drone industry in the United States will be able to flourish.

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[219] Marcus, *supra* note 59.

[220] *Id.*

[221] *THE DRONES REPORT: Market forecasts, regulatory barriers, top vendors, and leading commercial applications, supra* note 88.

[222] AOUDE, *supra* note 92.

[223] *Id.*

[224] *Amazon Prime Air, supra* note 96; Statt, *supra* note 103; Layne, *supra* note 109; Hern, *supra* note 113.

[225] Dillow, *supra* note 118.

[226] *James Trew, supra* note 137; Trew, *supra* note 140.

[227] McNeal, *supra* note 156.