International Civil Aviation Organization

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WORKING PAPER

ASSEMBLY — 39TH SESSION

TECHNICAL COMMISSION

Agenda Item 33: Aviation safety and air navigation monitoring and analysis

PRIORITIZE UNMANNED AIRCRAFT SYSTEMS INTEGRATION

(Presented by the United States)

EXECUTIVE SUMMARY

By 2020, the United States will have integrated unmanned aircraft systems (UAS)[1] into the National Airspace System (NAS). There will be routine civil UAS operations in the NAS including night flights, operations beyond visual line-of-sight, over assemblies of people, and near other aircraft. Such operations will not require policy exceptions or unique authorizations.

The proliferation and commercial promise shown by UAS has made their safe and successful integration with manned aircraft a high-profile issue for regulators, air navigation service providers and manufacturers around the world. UAS are inherently different from manned aviation. Unlike manned aviation, UAS are generally accessible to everyone; they can fly anywhere and everywhere; they are enormously versatile; they come in many sizes, they don't require a lot of training to operate, and they are low cost.

Some UAS are consumer and information technology products as well as aircraft. The market for UAS is developing very rapidly and is expected to continue to grow significantly. Worldwide, this market growth is spurring thousands of new entrants to aviation and a multitude of new products and services that need to be incorporated into the global aviation framework.

ICAO needs to be poised to incorporate these new non-traditional entrants into the global aviation framework. To do this, ICAO will need to adopt an innovative and more flexible approach to encourage standardization of requirements around the world and to facilitate the flow of UAS operations, products and services across international borders.

Action: The Assembly is invited to recommend that ICAO provide leadership to the international community and address UAS integration as a matter of priority in the coming triennium by:

a) modifying the ICAO institutional construct and practices to address the needs of the new entrants to aviation;
b) determining the steps necessary for maintaining the flow of UAS-related operations, products, and services across international borders; and
c) developing a new approach to encourage standardization of UAS requirements around the world.

[1] For this paper, the term "unmanned aircraft system (UAS)" is used in the broad sense of "an aircraft and its associated elements which are operated with no pilot on board". This encompasses remotely-piloted aircraft system (RPAS) defined as "a set of configurable elements consisting of a remotely-piloted aircraft, its associated remote pilot station(s), the required command and control links and any other system elements as maybe required, at any point during flight operation." See ICAO *Manual on Remotely Piloted Aircraft Systems (RPAS)* (Doc 10019) (2015).

Strategic Objectives:	This working paper relates to the Safety and Air Navigation Capacity and Efficiency Strategic Objectives.
Financial implications:	The actions proposed in this paper will be undertaken subject to the resources available in 2017-1019 Regular Programme Budget.
References:	A39-WP/82, Integration of unmanned aircraft systems (UAS) Federal Aviation Administration. (n.d.). *FAA Aerospace Forecast, Fiscal Years 2016-2036.* Retrieved from Aviation Forecasts: http://www.faa.gov/data_research/aviation/aerospace_forecasts/media/FY2016-36_FAA_Aerospace_Forecast.pdf

1. INTRODUCTION

1.1 The proliferation and commercial promise shown by UAS has made their safe and successful integration with manned aircraft a high profile issue for regulators, air navigation service providers and manufacturers around the world. The sale, maintenance and operation of UAS across national boundaries and, therefore, their successful integration are dependent on an internationally cohesive framework. ICAO is uniquely positioned to provide the leadership necessary to successfully integrate UAS into the global framework and should do so in a manner that promotes harmonization and interoperability across national borders.

1.2 The intent of this working paper is to gain consensus from the Assembly that ICAO should provide leadership to the international community and address safe UAS integration as a matter of priority in the coming triennium.

2. DISCUSSION

2.1 UAS are inherently different from manned aircraft. They are accessible to everyone; they can fly anywhere and everywhere; they are enormously versatile; they come in many sizes; many of the highly automated UAS do not require a lot of training to operate; and they are often low cost; while manned aircraft require substantial training and their design, production and operation are strictly regulated. Consequently, UAS present different risks to people on the ground and to other aircraft than manned aircraft.

2.2 Some UAS are consumer and information technology products as well as aircraft. The market for UAS is developing quickly and is expected to continue to grow significantly. In the United States alone there are more operators of UAS registered than there are registered manned aircraft. In the first six months of the registration requirement, nearly 500,000 people registered their hobby and commercial UAS with the U.S. civil aviation registry. By the end of 2016, the FAA expects that the sales of commercial small UAS requiring registration could be as high as 600,000, growing to 2.7 million by 2020. Worldwide, this market is spurring thousands of new entrants to aviation and a multitude of new products and services that need to be incorporated into our global aviation framework.

2.3 The United States has steadily moved toward the integration of UAS into its National Airspace System (NAS). Even though some UAS operations will not require air traffic control services, full integration requires the Federal Aviation Administration (FAA) as the air traffic service provider to have the infrastructure, procedures and policies established to maintain the safety and efficiency of the NAS for all manned and unmanned aircraft. As operational concepts expand, new technology will evolve and when mature, allow UAS to be safely and efficiently introduced into the airspace system through

performance-based regulations and risk-based decision making. By 2020, the United States will establish and implement its vision for integration of UAS. There will be routine civil UAS operations in the NAS including flights at night, beyond visual line-of-sight, over assemblies of people, and near other aircraft. Such operations will not require exceptions or unique authorizations. For more information on the status of U.S. regulatory and outreach efforts regarding UAS, please see the U.S. information paper entitled "Integration of Unmanned Aircraft Systems" (A39-WP/82 refers).

2.4 The United States is not alone in seeking to capitalize on the full potential of UAS integration. Around the world, UAS are being used for aircraft inspections, meteorological observations, bird control at airports, photography, surveying, infrastructure inspection (including rail and energy sectors), agriculture, logistics, geo-mapping, search and rescue, law enforcement, and maritime operations. Many of these activities will have international implications as they may involve UAS designed, manufactured and operated by individuals or companies from a multitude of States. As a result, the rules that govern these activities need to be standardized as appropriate and performance-based. Regulators and ICAO must create an environment where there is a shared expectation of operational norms for UAS. Such an approach should begin with communication and collaboration at ICAO.

2.5 In April 2016, ICAO convened the first meeting of the Small Unmanned Aircraft Systems Advisory Group and charged it with developing guidance and training material for routine small UAS operations while maintaining the existing level of safety of manned aircraft operations and people and property on the ground. These materials are intended to support harmonization across States by providing best practices from amongst existing national regulations. The creation of this group is a positive development, but represents only a fraction of the work needed to be done. ICAO, with the help of Member States and stakeholders, must develop a framework that more fully captures the comprehensive steps necessary to integrate UAS worldwide.

2.6 ICAO's current institutional construct and practices are mostly centered on the idea that UAS international activities will be certified, licensed and operated in a manner similar to manned aircraft. To better manage global UAS integration, ICAO may consider changes to the traditional approach to development of Standards and Recommended Practices (SARPs) and guidance material. Such changes could include increased cooperation and coordination with international industry organizations such as the ASTM International, Radio Technical Commission for Aeronautics (RTCA), European Organisation for Civil Aviation Equipment (EUROCAE) and other standards bodies; amending standing rules of procedures to allow a more nimble and adaptive development process; and increasing reliance on alternative workload management tools such as teleconferencing, work between meetings and email coordination. ICAO and Member States should work collaboratively to determine the steps necessary to implement an adaptive approach quickly, so the organization is prepared to address the needs of the new entrants and UAS community by the end of 2017.

2.7 There is a lot to be done by the international community as the movement of UAS across international borders will only increase. This includes:

a) enabling UAS operations by various communities of users and providing operational services where needed;

b) standardizing design features, operating criteria, operational procedures, human injury criteria, operational risk assessment methods, etc.;

c) developing safety Standards for UAS including design features, operating criteria, human injury criteria, operational risk assessment methods, etc., using risk-based decision making;

d) developing harmonized oversight processes to ensure compliance with required standards and regulations;

e) coordinating research and development activities of civil aviation authorities; and

f) educating the public through community outreach.

2.8 The high demand for the public and commercial applications of UAS means the industry will not wait for an orchestrated approach. ICAO and Member States must act now; otherwise, industry will develop concepts of operations in isolation, which in turn will force national authorities to develop divergent solutions.

3. CONCLUSION

3.1 To address this rapidly developing sector, ICAO should begin making the adjustments in the global framework that are needed not just to accommodate these new entrants, but to capitalize on the opportunities they present.

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