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Civil/Military Cooperation in Air Traffic Management

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International Civil Aviation Organization

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FOREWORD

There are two major airspace users in the world today — civil and military. The civil aviation sector includes private, commercial and government-owned aircraft that are primarily transporting cargo and passengers, both nationally and internationally. Military aviation comprises State-owned aircraft engaged in transport, training, security and defence. Both aviation sectors are essential to global stability and economies. However, both usually cannot operate simultaneously within the same block of airspace, thus requiring the establishment of boundaries and segregation. States are therefore faced with the challenge of managing their limited airspace in a way that safeguards both civil and military aviation requirements.

In order for international aviation to operate as a safe and harmonious system, States have agreed to collaborate on a common regulatory infrastructure and, among others, have agreed on the air traffic services rendered, which includes the access and use of airspace. The Convention on International Civil Aviation was signed in Chicago in 1944 by 52 States. Pending ratification of the Convention by 26 States, the Provisional International Civil Aviation Organization (PICAO) was established to ensure the safe and orderly growth of international civil aviation throughout the world. Distinguishing civil aircraft operations from State aircraft operations was important enough to warrant the creation of Article 3, which excludes State aircraft used in military, customs and police services from ICAO's regulations. ICAO came into being on 4 April 1947 after the 26th ratification was received.

As airspace becomes more of a scarce and sought after resource, States need to take a balanced approach to airspace management in a way that harmonizes and meets the needs of international traffic flows and national security. This requires communication, collaboration and cooperation.

In October 2009, ICAO¹ hosted the Global Air Traffic Management Forum on Civil/Military Cooperation, which was attended by more than four hundred high-ranking civil and military participants from sixty-seven Member States, six air navigation service providers and forty-six industry organizations. Realizing that there was no existing international framework to bring civil and military authorities together, the Forum recommended that ICAO should play a pivotal role in improving the level of cooperation and coordination between civil and military authorities and should serve as the international facilitating platform.

Recognizing that the growing civil air traffic and mission-oriented military air traffic would benefit greatly from a more flexible use of airspace, the Forum recommended that civil and military experts should jointly develop advice and guidance on the best practices for civil/military cooperation.

This circular was prepared by civil and military experts and offers guidance on and examples of successful practices for civil and military cooperation. It acknowledges that successful cooperation requires collaboration that is based on communication, education, a shared relationship and trust.

1. In partnership with the Civil Air Navigation Services Organisation (CANSO), European Organisation for the Safety of Air Navigation (EUROCONTROL), International Air Transport Association (IATA), North Atlantic Treaty Organization (NATO) and supported by Air Traffic Control Association, Inc. (ATCA) and Unmanned Vehicle Systems (UVS) International.

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DEFINITIONS

Airspace management (ASM). The process by which airspace options are selected and applied to meet the needs of the airspace users.

Air-to-air refuelling (AAR). The process of transferring fuel from one aircraft to another in flight. This is an essential capability that increases the range, endurance, payload and flexibility of the receiving aircraft.

Air traffic flow management (ATFM). A service established with the objective of contributing to a safe, orderly and expeditious flow of air traffic by ensuring that ATC capacity is utilized to the maximum extent possible and that the traffic volume is compatible with the capacities declared by the appropriate ATS authority.

Air traffic management (ATM). The dynamic, integrated management of air traffic and airspace (including air traffic services, airspace management and air traffic flow management) — safely, economically and efficiently — through the provision of facilities and seamless services in collaboration with all parties and involving airborne and ground-based functions.

Air traffic service (ATS). A generic term meaning variously, flight information service, alerting service, air traffic advisory service, air traffic control service (area control service, approach control service or aerodrome control service).

Air traffic services units. A generic term meaning variously, air traffic control unit, flight information centre or air traffic services reporting office.

Air traffic management system. A system that provides ATM through the collaborative integration of humans, information, technology, facilities, and services, supported by air and ground- and/or space-based communications, navigation and surveillance.

ATM in crisis situation. Unforeseen or short-notice situations that occur outside the steady state of the routine global ATM system (for example: earthquakes, hurricanes, conflicts).

ATM security. The contribution of the ATM system to civil aviation security, national security and defence, and law enforcement; and the safeguarding of the ATM system from security threats and vulnerabilities.

All-purpose structured Eurocontrol surveillance information exchange (ASTERIX). ASTERIX is the Eurocontrol standard for the exchange of data between surveillance sensors and data processing systems, and also for the generalized exchange of surveillance data between systems.

Collaborative decision-making (CDM) process. The process whereby all ATM decisions, except tactical ATC decisions, are based on sharing of all information relevant to air traffic operation between all civil and military partners.

Conditional routes. A non-permanent ATS route or portion thereof which can be planned and used under specified conditions.

Cross-border area (CBA). An airspace reservation/segregation established for specific operational requirements over international boundaries.

Customs and border protection (CBP). Secures the State by preventing the illegal entry of people and goods while facilitating legitimate travel and trade.

Flexible use of airspace (FUA). An airspace management concept based on the principle that airspace should not be designated purely as civil or military, but rather as a continuum in which all user requirements are accommodated to the greatest possible extent.

Flight information region (FIR). An airspace of defined dimensions within which flight information service and alerting service are provided.

Global navigation satellite system (GNSS). A worldwide position and time determination system that includes one or more satellite constellations, aircraft receivers and system integrity monitoring, augmented as necessary to support the required navigation performance for the intended operation.

Global Plan initiatives (GPI). Global Plan initiatives are designed to support the planning and implementation of performance objectives in the ICAO regions.

Intelligence, surveillance and reconnaissance (ISR). ISR integrates, where appropriate, capabilities for all military components and some non-military platforms, in order to provide awareness essential to successful planning and conduct of operations, through collection, processing, exploitation and dissemination of accurate and timely information.

Next generation air transportation system (NextGen). NextGen is an umbrella term for the ongoing, wide-ranging transformation of the United States National Airspace System (NAS). At its most basic level, NextGen represents an evolution from a ground-based system of air traffic control to a satellite-based system of air traffic management.

Performance-based navigation (PBN). Area navigation based on performance requirements for aircraft operating along an ATS route, on an instrument approach procedure or in a designated airspace.

Procedures for Air Navigation Services (PANS). Procedures for Air Navigation Services are approved by the Council. They comprise, for the most part, operating procedures regarded as not yet having attained a sufficient degree of maturity for adoption as international Standards and Recommended Practices, or material of a more permanent character which is inappropriate or too detailed for incorporation in an Annex.

Regional Supplementary Procedures (SUPPS). Operating procedures supplementary to the Annexes and PANS developed for the greater part through the ICAO regional air navigation meetings to meet the needs of a specific ICAO Region. They deal with matters affecting the safety and regularity of international air navigation. They are published in a single document covering all Regions. The ICAO Regional Supplementary Procedures form part of the Air Navigation Plan developed by regional air navigation meetings to meet those needs of specific areas which are not covered in the worldwide provisions. They complement the statement of requirements for facilities and services contained in the Air Navigation Plan publications.

Remote pilot. The person who manipulates the flight controls of a remotely-piloted aircraft during flight time.

Remote pilot station (RPS). The station at which the remote pilot manages the flight of the unmanned aircraft.

Remotely-piloted aircraft (RPA). An aircraft where the flying pilot is not on board the aircraft.

Remotely-piloted aircraft system (RPAS). A set of configurable elements consisting of a remotely-piloted aircraft, its associated remote pilot station(s), the required command and control links and any other system elements as may be required, at any point during flight operation.

Segregated airspace. Airspace of specified dimensions allocated for exclusive use to a specific user(s).

Single European sky ATM research (SESAR). SESAR is the European air traffic management (EATM) modernization and restructuring programme.

Standards and Recommended Practices (SARPs). Standards and Recommended Practices are adopted by the Council in accordance with Articles 54, 37 and 90 of the Convention on International Civil Aviation and are defined as follows:

Standard. Any specification for physical characteristics, configuration, matériel, performance, personnel or procedure, the uniform application of which is recognized as necessary for the safety or regularity of international air navigation and to which ICAO Member States will conform in accordance with the Convention; in the event of impossibility of compliance, notification to the Council is compulsory under Article 38.

Recommended Practice. Any specification for physical characteristics, configuration, matériel, performance, personnel or procedure, the uniform application of which is recognized as desirable in the interests of safety, regularity of efficiency of international air navigation, and to which ICAO Member States will endeavour to conform in accordance with the Convention.

System-wide information management (SWIM). An advanced technology programme designed to facilitate greater sharing of air traffic management (ATM) system information such as airport operational status, weather information, flight data or status of special use airspace.

Temporary reserved area (TRA). An airspace temporarily reserved and allocated for the specific use of a particular user during a determined period of time and through which other traffic may be allowed to transit under air traffic control (ATC) clearance.

Temporary segregated area (TSA). An airspace temporarily segregated and allocated for the exclusive use of a particular user during a determined period of time and through which other traffic will not be allowed to transit.

Unmanned aircraft system (UAS). An aircraft and its associated elements which is operated with no pilot on board.

ACRONYMS AND ABBREVIATIONS

AAR	Air-to-air refuelling
ACAS	Airborne collision avoidance system
ADS	Automatic dependent surveillance
AMC	Airspace management cell
ANSP	Air navigation service provider
ASM	Airspace management
ASTERIX	All-purpose structured Eurocontrol surveillance information exchanger
ATC	Air traffic control
ATFM	Air traffic flow management
ATM	Air traffic management
ATS	Air traffic services
CBA	Cross-border area
CBP	Customs and border protection
CDM	Collaborative decision-making
CNS/ATM	Communications, navigation, and surveillance/air traffic management
FAA	Federal Aviation Administration (United States)
FIR	Flight information region
FUA	Flexible use of airspace
GAT	General air traffic
GNSS	Global navigation satellite system
GPI	Global plan initiatives
ISR	Intelligence, surveillance and reconnaissance
LOA	Letter of Agreement
MOA	Military operations area
MOU	Memorandum of Understanding
MSL	Mean sea level
NextGen	Next generation air transportation system
NOTAM	Notice to airmen
PANS	Procedures for air navigation services
PBN	Performance-based navigation
PIRG	Planning and implementation regional group (PIRG)
RPA	Remotely-piloted aircraft
RPAS	Remotely-piloted aircraft system
RPS	Remote pilot station
SAR	Search and rescue
SARPs	Standards and Recommended Practices
SESAR	Single European sky ATM research
SUA	Special use airspace
SUPPS	Regional supplementary procedures
SWIM	System-wide information management
TRA	Temporary reserved area
TSA	Temporary segregated area
UAS	Unmanned aircraft system
UIR	Upper flight information region

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Chapter 1

ICAO INSTITUTIONAL AND REGULATORY FRAMEWORK

1.1 INSTITUTIONAL FRAMEWORK

1.1.1 The aims and objectives of ICAO in accordance with Article 44 of the *Convention on International Civil Aviation* (Doc 7300) are to develop the principles and techniques of international air navigation and foster the planning and development of international air transport to, inter alia, ensure safe and orderly growth.

1.1.2 The Convention establishes the privileges and restrictions of all ICAO Member States and provides for the adoption of International Standards and Recommended Practices (SARPs) regulating international air transport. The Convention recognizes and accepts the principle that every State has complete and exclusive sovereignty over the airspace above its territory.

1.1.3 The ICAO Assembly and Council and their subsidiary bodies set the continuing direction of the work of the Organization. One of the major duties of the Council is to adopt SARPs, which are designated as Annexes to the Convention on International Civil Aviation.

1.1.4 Although the Council is responsible for the adoption of SARPs and the approval of Procedures for Air Navigation Services (PANS), the principal body concerned with their development is the ICAO Air Navigation Commission. The Commission is composed of qualified and experienced individuals in the science and practice of aeronautics, nominated by ICAO Member States and appointed by the Council.

1.1.5 Due to increased dialogue and a changing culture, civil/military cooperation is becoming a global topic because of the enormous positive effects for both civil and military air traffic management (ATM) systems and related aviation operations.

1.2 ARTICLE 3 OF THE CONVENTION

1.2.1 Article 3 (a) of the Convention expressly excludes State aircraft from its scope of applicability. Articles 3 (b), (c) and (d) further clarify the definition and scope of application of the Articles of the Convention:

- a) This Convention shall be applicable only to civil aircraft, and shall not be applicable to State aircraft.
- b) Aircraft used in military, customs and police services shall be deemed to be State aircraft.
- c) No State aircraft of a Contracting State shall fly over the territory of another State or land thereon without authorization by special agreement or otherwise, and in accordance with the terms thereof.
- d) The ICAO Contracting States undertake, when issuing regulations for their State aircraft, that they will have due regard for the safety of navigation of civil aircraft.

1.2.2 The foregoing notwithstanding, further references to civil/military coordination and cooperation matters are included in the Convention, the Resolutions of ICAO General Assemblies, ICAO Annexes, PANS, and a variety of documents and manuals.

1.2.3 As a consequence of Article 3, in particular subparagraph 3 (d), States are required to safeguard navigation of civil aircraft when setting rules for their State aircraft. This leaves it up to the individual State to regulate these operations and services, generating a wide diversity of military regulations. However, especially in congested airspace, harmonized regulation is a precondition for a safe, efficient and ecologically sustainable aviation system.

1.2.4 At the same time, States are aware of the limitations of ICAO SARPs and designated Annexes to the Convention, including PANS and regional supplementary procedures (SUPPs), as they relate to State/military aircraft and their services. Indeed, as seen above, Article 3 of the Convention specifically exempts State aircraft from compliance with articles of the Convention.

1.2.5 Annex 11 — *Air Traffic Services* allows States to delegate responsibility for the provision of ATS to another State. However, States retain sovereignty over the airspace so delegated, as confirmed by their adherence to the Convention. This factor may require additional effort or coordination in relation to civil/military cooperation and appropriate consideration in bilateral or multilateral agreements.

1.2.6 More and more multinational military operations that cross international boundaries require complex coordination and planning processes to avoid unnecessary segregation or restrictions and to achieve the required level of safety. In light of Article 3 (d) it should be the role of ICAO to support States in harmonizing their State aircraft operations and the respective services in a regional and, ideally, a global context.

1.3 ASSEMBLY RESOLUTIONS

1.3.1 The topic of civil/military coordination has been discussed over the years in the ICAO Assembly, and many resolutions referring to civil/military coordination have been formulated. At the 37th Session of the Assembly, 28 September to 8 October 2010, Resolution A37-15, Appendix O, "Coordination and cooperation of civil and military air traffic" was further articulated.

1.3.2 It was recognized that airspace is a resource common to both civil and military aviation and that many air navigation facilities and services are provided for and used by both civil and military aviation. Further, the shared use of airspace and certain facilities and services by civil and military aviation shall be arranged so as to ensure the safety, regularity and efficiency of international civil aviation as well as the requirements of military air traffic. As a consequence, ICAO Member States may include, when appropriate, representatives of military authorities in their delegations to ICAO meetings.

1.3.3 The 37th Assembly also concluded that ICAO should serve as an international platform to facilitate improved civil/military cooperation, collaboration and the sharing of best practices.

1.4 EXISTING REGULATORY FRAMEWORK

1.4.1 Obligations of ICAO Member States under the Chicago Convention germane to civil/military issues include:

- a) rule-making as regards aviation safety rules in compliance with ICAO SARPs contained in the Annexes to the Convention (Article 37); and
- b) carrying out tasks which pertain to, for instance, ATM and which are laid down in the Annexes to the Convention, such as the classification of airspace and coordination between civil and military air traffic.

1.4.2 Annex 2 — *Rules of the Air* contains rules relating to the flight and manoeuvre of aircraft within the meaning of Article 12 of the Convention. It includes provisions on the coordination with military authorities for reason of a

State's territorial integrity and sovereignty, namely for air defence reasons. To facilitate coordination with appropriate military units, a flight plan has to be submitted for any flight within or into designated areas or along designated routes. In those instances a flight plan is submitted to facilitate coordination and control of flights with transparent and real-time data exchange.

1.4.3 Annex 11 contains the SARPS that States use as reference for the provision of air traffic services (ATS). Currently, the Annex addresses only the need for coordination with military authorities or units, mainly the degree and level to which State aircraft activities may affect civilian operations or vice versa. Topics covered include activities that may directly affect flight safety, be potentially hazardous to civil aircraft, or require interception of civil aircraft or coordination due to unlawful interference of air traffic.

1.4.4 The *Procedures for Air Navigation Services — Air Traffic Management* (PANS-ATM, Doc 4444), together with the Standards in Annex 2 and the Regional SUPPS, govern the application of the rules of the air and ATS. The PANS-ATM contains procedures applicable to other in-flight contingencies, such as strayed or unidentified aircraft, that involve coordination with military authorities. Some miscellaneous procedures are detailed for the conduct of special military operations.

1.4.5 The *Manual Concerning Safety Measures Relating to Military Activities Potentially Hazardous to Civil Aircraft Operations* (Doc 9554) describes the coordination that should take place between military units and ATS units. It details the requirements to establish and maintain close cooperation with military authorities responsible for activities that may affect flights of civil aircraft.

1.4.6 The *Air Traffic Services Planning Manual* (Doc 9426), published in 1984, was one of the first manuals to provide ICAO guidance material on civil/military coordination and cooperation. Most of that guidance material remains valid today.

1.4.7 The *Global Air Navigation Plan* (Doc 9750) has as a final goal the achievement of an integrated, harmonized and globally interoperable ATM system. A global system can be described as a worldwide system that, on a global basis, achieves interoperability and seamlessness across regions for all users during all phases of flight. The Global Plan includes technical, operational, economic, environmental, financial, legal and institutional elements and also offers States practical guidance on implementation and funding strategies. In accordance with the Plan, States and regions will choose objectives and draft their guidance in support of the particular needs of a homogenous ATM system.

1.4.8 Doc 9750 aims to provide initial guidance on, and facilitate implementation of, the civil/military coordination measures and cooperation concepts embedded in the *Global Air Traffic Management Operational Concept* (Doc 9854). Achievements in the integration of the specified Global Plan initiatives (GPI) require the implementation of collaborative airspace design and management, performance-based navigation (PBN), the integration of ground and airborne systems or data link or communications. It is significant to note that the first of the twenty-three detailed GPIs of the Global Air Navigation Plan is GPI-1, "Flexible Use of Airspace".

1.4.9 Doc 9854 is a relatively new document that describes the services that will be required to operate the global air traffic system in the near future and beyond. The Operational Concept highlights the elements needed to increase user flexibility, maximize efficiencies and increase system capacity while at the same time improving safety. Consideration of the interoperability and operations of military systems is an integral part of these elements.

Chapter 2

CIVIL/MILITARY INTEROPERABILITY

2.1 INTRODUCTION

2.1.1 The ATM Operational Concept presents a vision of an integrated, harmonized and globally interoperable ATM system — a system that meets agreed levels of safety, provides for optimum economic operations, is environmentally sustainable and meets national security requirements for all users during all phases of flight. The vision does not discriminate or make any exceptions about the type of traffic it is designed to serve.

2.1.2 Communications, navigation and surveillance (CNS) systems, and advanced information management technology are to be used to functionally combine the ground-based and airborne system elements into a fully integrated, interoperable ATM system open to all users.

2.1.3 Interoperability can be considered as the ability of “systems” (not exclusively technical systems) to provide information and services to, and accept information and services from, other systems and to use the information and services so exchanged. Interoperability constitutes the driver of standardization, integration and cooperation.

2.1.4 Global standards, uniform principles and agreements are needed to ensure the technical and operational interoperability of the ATM system. However, ATM system interoperability needs to be considered in the broader context of governance, not just technology and procedures, while bearing in mind the requirements users place on the system. After all, ATM aims to enable all airspace users, including the military, to operate their preferred flight/mission profiles, cost-efficiently and effectively, without compromising flight safety or national security.

2.1.5 Interoperability specifics, however, are not always well-defined when considered in relation to the CNS/ATM field. They are often situation-dependent, come in various forms and degrees and can occur at various levels, i.e. strategic, operational and technical.

2.1.6 From the aforementioned, it can be concluded that civil/military coordination and interoperability are very similar. Interoperability can be identified as strategic/political or operational/technical as described in 2.2 and 2.3.

2.2 STRATEGIC AND/OR POLITICAL INTEROPERABILITY

2.2.1 At the strategic/political level, the concept of interoperability can be considered as an enabler for coalition building. It facilitates meaningful contributions by aviation coalition partners, both civil and military. At the highest level, interoperability of aviation issues centres on harmonizing global (e.g. ICAO) or regional (e.g. European Union) views, doctrines and, foremost, a regulatory framework. One main element at this level is the political willingness to cooperate and coordinate over the long term, to achieve and maintain shared interests in aviation safety, environment, efficiency and capacity.

2.2.2 The price of strategic and/or political interoperability at national as well as international levels can be high and finding a common ground can be difficult to achieve. National considerations and culture are potential disablers of affordable interoperability. Nevertheless one can assume that the aviation chain is as strong as its weakest link and that it is therefore in everyone's interest to cooperate and invest in order to achieve the highest level of interoperability.