



# CREATION OF A STATE SYSTEM FOR CONTINUOUS MONITORING OF AVIATION SECURITY IN COMPLIANCE WITH THE INTERNATIONAL REQUIREMENTS

**G. Glukhov**

The State Scientific Research Institute of Civil Aviation,  
22-2 St. Planernaja, Moscow, 125481, Russia

**I. Kirpichev**

Moscow State Technical University of Civil Aviation,  
20 Kronshtadtsky blvd, Moscow, GSP-3, 125993, Russia

**V. Nikonov**

Moscow State Technical University of Civil Aviation,  
20 Kronshtadtsky blvd, Moscow, GSP-3, 125993, Russia

**G. Maslennikova**

The State Scientific Research Institute of Civil Aviation,  
22-2 St. Planernaja, Moscow, 125481, Russia

**E. Konyaev**

Moscow State Technical University of Civil Aviation,  
20 Kronshtadtsky blvd, Moscow, GSP-3, 125993, Russia

## ABSTRACT

*The article presents the review of the problems in aviation security, as well as the steps that the International Civil Aviation Organization and the Russian Federation are making on the way to the effective provision of aviation security. Comparison of the statistics on acts of unlawful interference is given on the example of world statistics and those of the Russian Federation. Conclusions are drawn on the need to create theoretical and practical bases for the implementation of an effective system for continuous monitoring of the compliance of the requirements of the regulatory documents of the Russian Federation in aviation security control with ICAO standards and recommended practices under The Universal Security Audit Programme Continuous Monitoring Approach. The main ICAO documents in the field of aviation security were analyzed and a table was created with indication of their applicability for the ICAO audit areas for aviation security and other critical parameters. Additionally, the level of applicability of the analyzed documents is indicated for the specified ICAO Audit Programme objectives. Also, measures are proposed to be taken*

*to create a system for continuous monitoring of aviation security in accordance with the ICAO requirements. Considering the complex multilevel structure used in the Russian Federation in aviation security, some proposals are presented on the membership of the expert community of the system for continuous monitoring of the compliance of the requirements of the regulatory documents of the Russian Federation in aviation security control with ICAO standards and recommended practices.*

**Key words:** civil aviation, acts of unlawful interference, aviation security, creation of a system for effective provision of aviation security, continuous monitoring approach..

**Cite this Article:** G. Glukhov, I. Kirpichev, V. Nikonov, G. Maslennikova, E. Konyaev, Creation of a State System for Continuous Monitoring of Aviation Security in Compliance with the International Requirements. *International Journal of Civil Engineering and Technology*, 8(11), 2017, pp. 695–713.

<http://www.iaeme.com/IJCIET/issues.asp?JType=IJCIET&VType=8&IType=11>

---

## 1. INTRODUCTION

Aviation security is an important factor in the growth and sustainable development of the global aviation industry. Considering that by 2030 the international passenger traffic will almost double the value of 6 billion people in comparison with 2016, and the volume of air cargo traffic is expected to increase more than twice to 125 million tons [1], the development of the aviation industry will have significant consequences regarding the level of risks for aviation security (AS).

Recently, the current world situation associated with the increasing threat of committing acts of unlawful interference with civil aviation, taking into account recent terrorist acts at civil aviation facilities (the explosion at Domodedovo airport in 2011, the explosion of the A-321 over the Sinai Peninsula in 2015, the series of explosions in Brussels in 2016, the explosions at Istanbul airport in 2016) and the increasing terrorist threat worldwide, the world requires strengthening regulatory actions aimed at increasing the aviation security, both at the global and regional levels.

An indicator of effective aviation security is the low level of acts of unlawful interference with civil aviation, especially the reduction of the number of deaths and injuries to zero.

Ensuring aviation security in civil aviation is one of the most important components of the process of state regulation of aviation activities of the state. The Universal Aviation Security Audit Programme in ICAO [2, 3] mandates that ICAO Member States, in order to ensure continuous monitoring, establish and implement systems the organizational infrastructure of which provides for timely provision of up-to-date data on the implementation of ICAO international standards and recommended practices in aviation security.

The existing systems for assessing the quality and control of aviation security are more reactionary in nature, i.e., the control effect in this system is formed when some contingency situation occurs. This control effect is formed on the basis of the assessment of a particular accident and the possible causes of it, and cannot take into account the full range of possible factors directly or indirectly affecting the development of events leading to that contingency situation.

To solve this problem, it is necessary to develop a continuous monitoring system to check the compliance of ICAO standards and recommended practices for the aviation security control with the requirements of the regulations of the Russian Federation that can

accumulate, store and analyze the data related to the implementation of measures aimed at enhancing aviation security. This system should be based on the existing structure of the federal executive bodies of the Russian Federation, and also meet the ICAO requirements for Member States regarding the implementation of the USAP-CMA; moreover, this system should provide an approach based on aviation security risk assessment.

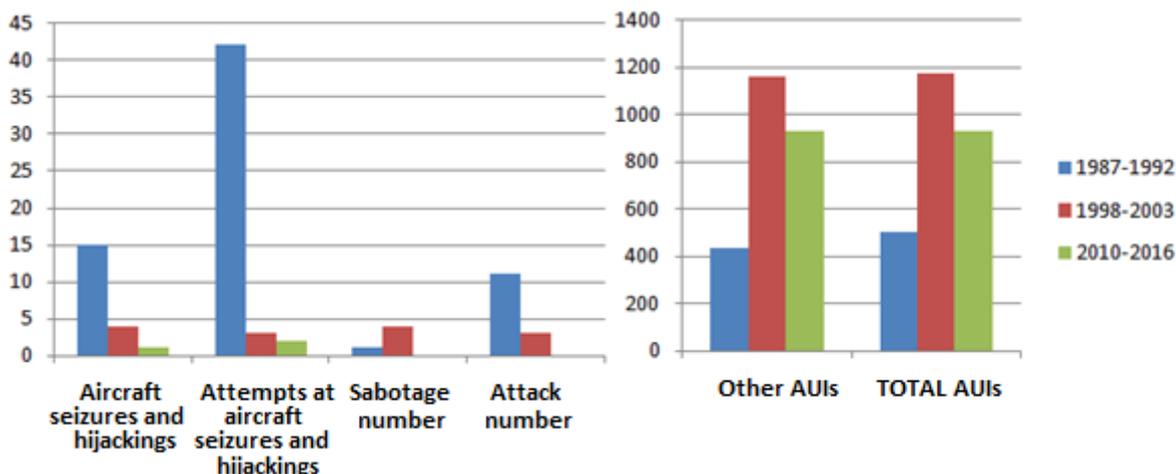
The creation of such a system will make it possible to perform both internal audit of the compliance of documents governing the functions of the state in providing aviation security with ICAO standards and recommended practices and external obligations to implement the Memorandum of Understanding between the Russian Federation and ICAO with respect to the USAP-CMA.

## 2. STATISTICS REGARDING ACTS OF UNLAWFUL INTERFERENCE IN THE WORLD AND IN RUSSIA

The number of acts of unlawful interference (AUIs) in the Russian Federation over 30 years has been at a high level (Table 1, Figure 1). However, their severity is decreasing; for example, for the period of 1987-1992 there were 15 aircraft seizures and hijackings, for the same period in 1998-2003 the number decreased to 4, and for the last 6 years this value has decreased to 1 [4-11].

**Table 1** AUIs number in 1987-2016

AUI type	Periods		
	1987-1992	1998-2003	2010-2016
Aircraft seizures and hijackings	15	4	1
Attempts at aircraft seizures and hijackings	42	3	2
Sabotage number	1	4	-
Attack number	11	3	-
Other AUIs	433	1159	924
TOTAL AUIs	502	1173	927



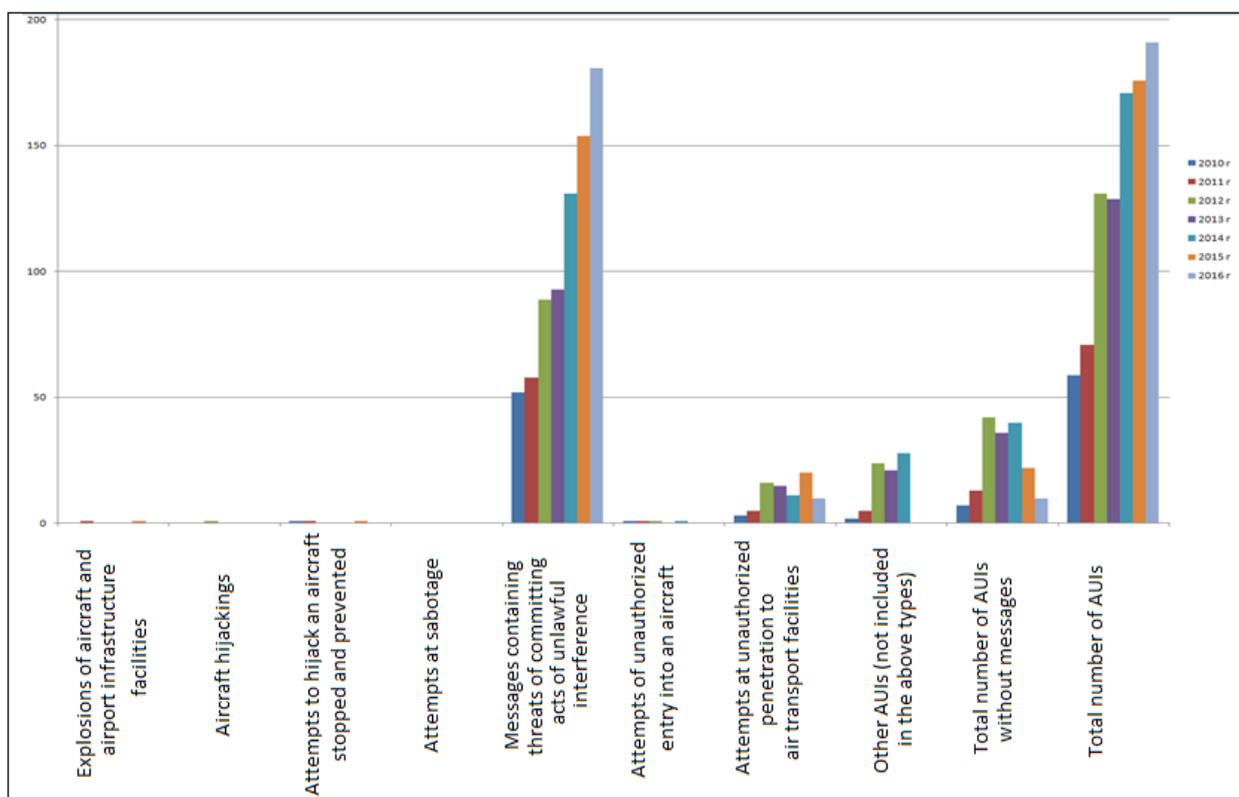
**Figure 1** Number of AUIs in 1987-2016

If one looks more closely at the statistics of the last six years [4-10] (Table 2), one can conclude that the number of AUIs increases due to the increase in messages containing threats of committing AUIs. Also, the number of attempts at unauthorized penetration to air transport facilities is very high.

Creation of a State System for Continuous Monitoring of Aviation Security in Compliance with the International Requirements

**Table 2** Number of AUIs committed during the period from 2010 to 2016

AUI type	2010	2011	2012	2013	2014	2015	2016
Explosions of aircraft and airport infrastructure facilities	-	1	-	-	-	1	-
Attempts to hijack an aircraft stopped and prevented	1	1	-	-	-	1	-
Attempts at sabotage	-	-	-	-	-	-	-
Messages containing threats of committing acts of unlawful interference	52	58	89	93	131	154	181
Attempts of unauthorized entry into an aircraft	1	1	1	-	1	-	-
Attempts at unauthorized penetration to air transport facilities	3	5	16	15	11	20	10
Other AUIs (not included in the above types)	2	5	24	21	28	-	-
Total number of AUIs	59	71	130	129	171	176	191

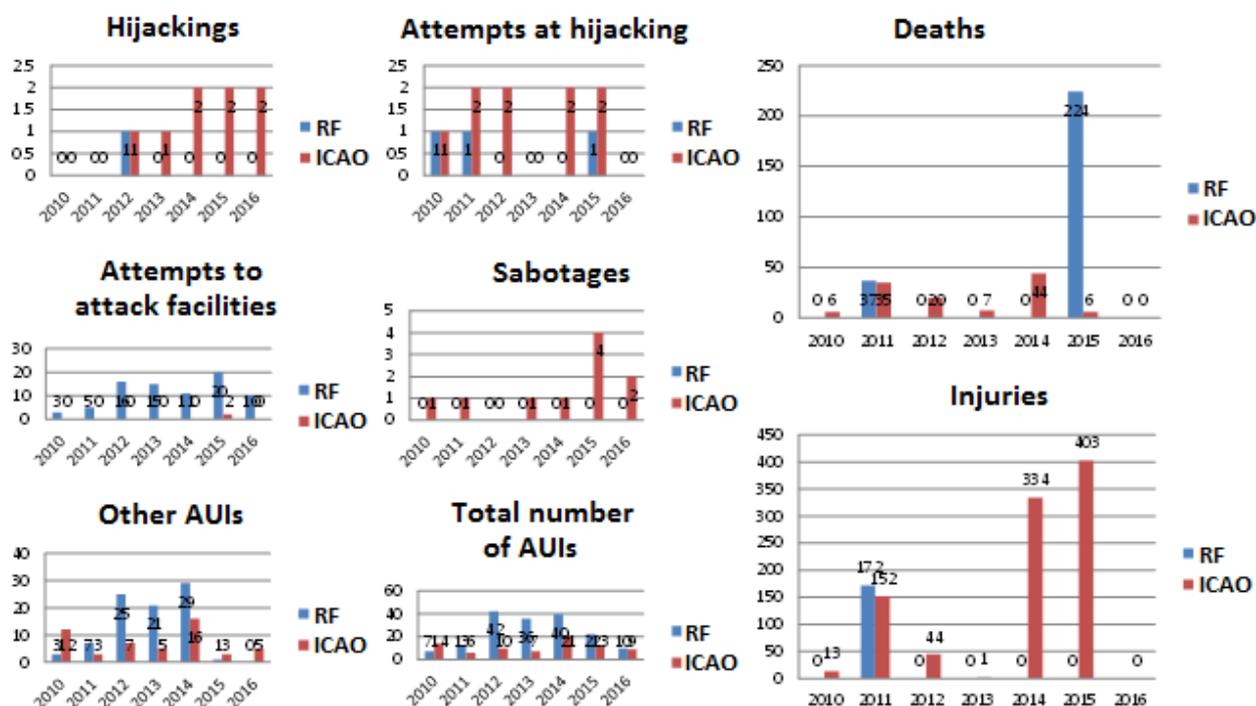


**Figure 2** Number of AUIs committed in 2010-2016

Since the concept of AUI in international law does not fully correspond to a similar concept in national legislation [12], the Russian indicators can be compared with international indicators over a few types only [4-10, 13-16] (Table 3, Figure 3).

**Table 3** Number of AUIs in RF and ICAO compared for the period 2010-2016

RF/ICAO	2010	2011	2012	2013	2014	2015	2016	2010-2016
Hijackings	0/0	1/0	0/1	0/1	0/2	0/2	0/2	1/8
Attempts at hijacking	1/1	1/2	0/2	0/0	0/2	1/2	0/0	3/9
Sabotages	0/1	0/1	0/0	0/1	0/1	0/4	0/2	0/10
Attempts to attack facilities	3/0	5/0	16/0	15/0	11/0	20/2	10/0	80/2
Other AUIs (not included in the above types)	3/12	7/3	25/7	21/5	29/16	1/3	0/5	86/51
Number of AUIs	7/14	13/6	42/10	36/7	40/21	22/13	10/9	170/80
Deaths	0/6	37/35	0/20	0/7	0/44	224/6	0/0	261/118
Injuries	0/13	172/15	2	0/44	0/1	0/334	0/0	172/947



**Figure 3** Numbers of AUIs in RF and ICAO compared for 2010-2016

As can be seen from Figure 3, the total number of registered AUIs in the Russian Federation over 6 years exceeds the ICAO value by more than two times. However, since 2014, the total number of AUIs in Russia has been decreasing and is approaching the average world level.

The analysis of the effective provision of aviation security in the Russian Federation suggests that it is necessary to pay special attention to aviation security, as well as to meet the requirements of the ICAO standards and recommended practices. In addition, it is necessary

to develop a system that will continuously monitor changes in aviation security requirements and identify any inconsistencies with the existing international standards. The development of such a system was commenced in 2015 by FSUE GosNII GA; currently the theoretical development is being completed within the research “Development of scientifically grounded approaches to the creation of a system for continuous monitoring of the compliance of the requirements of the regulations of the Russian Federation in aviation security control with ICAO standards and recommended practices under the Universal Security Audit Programme – Continuous Monitoring Approach in the field of aviation security”. In the course of this research work, some results should be obtained, aimed, among other things, at improving the system for monitoring the state of the transport system in Russia, improving the legal basis for its operation; as well as maintaining an acceptable level of integration of the Russian transport system into the world transportation system.

### **3. ENHANCING THE EFFECTIVENESS OF AVIATION SECURITY AT THE GLOBAL LEVEL**

Throughout its existence, ICAO has developed a sufficiently large number of Standards and Recommended Practices (SARPs) contained in the Annexes to the Convention, in addition to Annex 17: “Security - Safeguarding International Civil Aviation Against Acts of Unlawful Interference”, which, together with some supporting guidance material cover the aviation security issues. Even before the events of September 11, 2001, most of the Annexes contained Standards and Recommended Practices concerning some aspects of aviation security. However, among other things, the above-mentioned event prompted the ICAO Council to conduct an in-depth review of aviation security requirements, which led to certain steps towards the evolutionary development in enhancement of aviation security effectiveness (Figure 4).

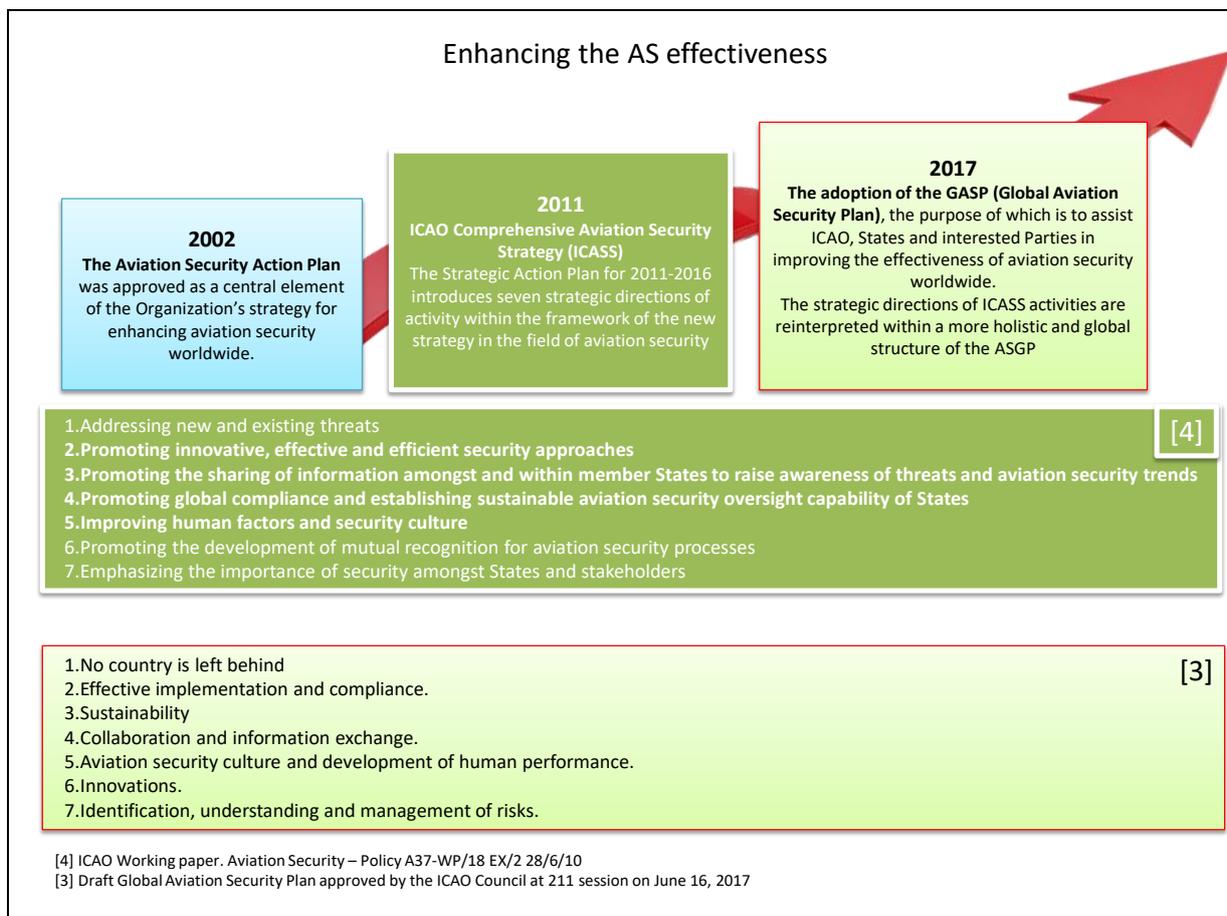
After the events of September 11, 2001, the 33<sup>rd</sup> Session of the Assembly adopted Resolution A33-1 “Declaration on misuse of civil aircraft as weapons of destruction and other terrorist acts involving civil aviation”. The Resolution instructed the Council to convene an international conference on aviation security at the ministerial level to prevent and eradicate acts of terrorism involving civil aviation [17].

Such international conference was held at ICAO Headquarters in 2002. The Conference adopted the Declaration on Aviation Security, which was designed to help restore confidence in international air transport and enhance its activities.

In accordance with Resolution A33-1 and the Declaration on Aviation Security, the Council, at its meeting on June 14, 2002, approved the ICAO Aviation Security Plan of Action aimed at enhancing aviation security, which includes regular mandatory inspections to assess the level of aviation security in all Contracting States, for which ICAO developed the Universal Security Audit Programme (USAP) [2, 3].

In 2010, at the 37<sup>th</sup> Session of the ICAO Assembly, an important event took place in the course of the development and implementation of the policy in global aviation security. Key instruments in aviation security were adopted – the Declaration on Aviation Security and the ICAO Comprehensive Aviation Security Strategy (ICASS). The Declaration sets out the obligations of States to strengthen aviation security in key areas, and the ICASS focuses on the direction and capacity of the ICAO capabilities and potential to effectively implement its program in aviation security.

The draft of the Global Aviation Security Plan was developed and approved at the 211<sup>st</sup> Session on June 16, 2017 by the Council of ICAO; this Plan, as expected by ICAO, should replace the ICASS [18, 19].



**Figure 4** Enhancing aviation security effectiveness

The transition from discretionary inspections to continuous monitoring of Member States (the continuous monitoring approach of the ICAO Universal Security Audit Programme (USAP-CMA)) has become one of the key priorities in enhancing aviation security effectiveness. Such an innovative decision of the ICAO Council was made, in particular, on the basis of the successful results of the current USOAP CMA safety monitoring system operation [20]. In 2015, the Russian Federation developed and put into operation a system for the monitoring of aviation security built using technologies on the basis of the Information and Analytical System for Aircraft Airworthiness Monitoring [21, 22] aimed at effectively addressing the challenges associated with ICAO audits on civil aviation safety [23-25].

At the state level, the USAP-CMA is used as a means of identifying system problems in aviation security, with the subsequent development and implementation of corrective action plans and, as a result, the improvement (change) of national aviation security quality control systems. USAP CMA contributes to the strengthening of aviation security around the world through continuous audit and monitoring of the activities of the aviation security authorities of the Member States. This is achieved through regular and continuous collection and analysis of information on aviation security activities of Member States.

After collecting information, ICAO identifies certain deficiencies in aviation security activities and assesses the risks they cause. The risk assessment is one of the new elements

## Creation of a State System for Continuous Monitoring of Aviation Security in Compliance with the International Requirements

that ICAO has introduced into the continuous monitoring approach of the Universal Security Audit Programme [26]. Following this assessment, ICAO provides guidance to Member States to remedy the deficiencies identified. These recommendations are binding. Further, ICAO performs additional checks on how effectively the recommendations for deficiencies are implemented. Consequently, the process of assessing the activities of Member States to improve control over compliance with the ICAO standards is a cyclical, continuous and regular process. The authors of the paper will prepare an appropriate review article on the USAP-CMA.

The ICAO Integrated Regional Network (ICAO Regional Offices) takes direct participation in the effective implementation of the USAP-CMA. The ICAO regional offices involved carry out the following main activities in aviation security [27]:

- a) assisting ICAO Member States in the implementation of the ICAO Standards and Recommended Practices contained in Annex 17 “Security - Safeguarding International Civil Aviation Against Acts of Unlawful Interference” and related provisions on aviation security issues of Annex 9 “Facilitation of formalities”;
- b) assistance in the implementation of the continuous monitoring approach of the ICAO Universal Security Audit Programme (USAP-CMA) in the region;
- c) assisting ICAO Member States of the region in their preparation for USAP-CMA audits;
- d) assistance to the states of the region in the preparation of plans for the elimination of deficiencies, as well as addressing issues of significant concern in aviation security (SSeC) identified as a result of audit activities within the USAP-CMA;
- e) assistance in the holding of ICAO training courses, seminars and workshops in the region;
- f) assistance within the regional network of ICAO Aviation Security Training Centers;

For example, in December 2016 in Moscow, an ICAO Regional Workshop was held on the implementation of the continuous monitoring approach under the ICAO Universal Security Audit Programme in aviation security. This ICAO workshop was already held in 2014 during the previous audit. The purpose of the workshop is to provide information on the USAP-CMA for deliberate preparation for the planned (June 5-13, 2017) audit. The workshop was attended by representatives of the civil aviation authorities and organizations, airlines and airports of the Russian Federation and other countries of the European and North Atlantic region of ICAO.

In the period from 2013 to 2016, 11 regional workshops were held; some regions have already hosted more than one workshop. In the European and North Atlantic region, the third workshop is being held – one in Paris and two in Moscow. For effective audits, ICAO conducts audit training to train experts from ICAO Member States and certify auditors involved in ICAO audits. ICAO has 126 certified auditors from 59 ICAO Member States [28].

Thus, in order to strengthen the measures to ensure global aviation security, the ICAO Declaration on Aviation Security and the ICAO Comprehensive Aviation Security Strategy (ICASS) have been developed and adopted, the Global Aviation Security Plan is currently being approved, the continuous monitoring approach of the ICAO’s Universal Security Audit Programme is being implemented.

#### **4. PROPOSALS FOR THE CREATION OF AN EFFECTIVE AVIATION SECURITY SYSTEM IN THE RUSSIAN FEDERATION UNDER THE USAP-CMA**

The Russian Federation supported the innovative transition under the Universal Security Audit Programme from periodic audits to the continuous monitoring approach. To effectively implement these activities, as noted above, the Russian Federation financed the conduct of relevant research; the authors of this paper are also being involved. The aim of the work is the development of scientifically grounded approaches to the creation of a System for the continuous monitoring of compliance of the requirements of the regulations of the Russian Federation in aviation security control to ICAO standards and recommended practices, as well as improving the system for monitoring the state of the transport system in Russia.

To achieve this goal, it is necessary to solve the following tasks:

1. Assess the compliance of ICAO standards and recommended practices in creation and operation of the aviation security control system for the needs of the USAP-CMA to the Russian regulatory framework in aviation security control regarding the tasks of the USAP-CMA.

2. Prepare scientifically grounded proposals on the creation in the Russian Federation of a System for continuous monitoring of the compliance of ICAO standards and recommended practices with the requirements of the regulations of the Russian Federation in aviation security control.

3. Formulate proposals on the structure and content of the draft regulations on working groups for constant monitoring of the compliance of ICAO standards and recommended practices with the requirements of the regulations of the Russian Federation in aviation security control.

4. Assess the possibility of automating the functionality of the system for continuous monitoring of the compliance of ICAO standards and recommended practices in aviation security control with the requirements of the regulations of the Russian Federation, with modern telecommunication technologies being taken into account.

One of the stages of this scientific work is to analyze the current membership in the organization of works on the USAP-CMA and to determine the content of the information necessary for the functioning of the system. This paper includes such an analysis and provides the required information.

#### **5. ANALYSIS AND PROPOSALS REGARDING THE MEMBERSHIP**

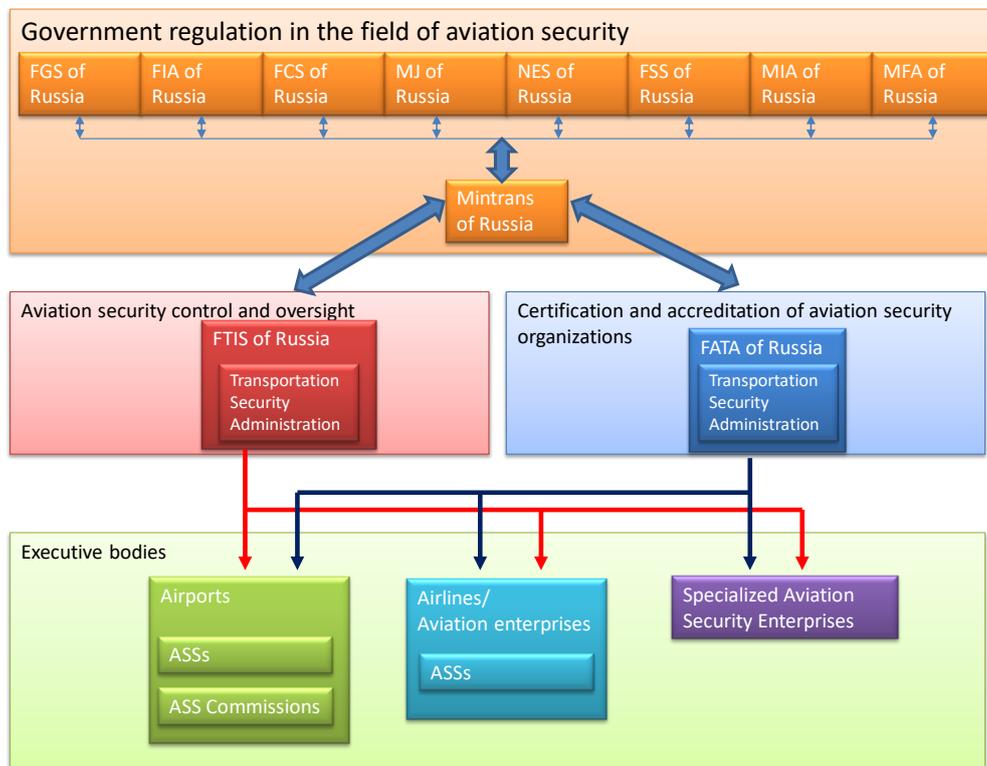
The ICAO audit for the Russian Federation is planned for 2018. In preparation for the ICAO audit under the USAP-CMA appointed in 2018 by the decree of the Minister of Transport of the Russian Federation of 9.02.2017 No. MC-24-p, ICAO audit working groups were established, that included more than 15 various entities, including ministries and their subordinate organizations. However, having analyzed the group membership, the authors of the paper came to the opinion that it is necessary to expand this membership.

The system of aviation security in Russia is a complex multi-level structure with many executive bodies and organizations, which can be represented as a system with participants divided into 3 groups:

1. bodies of state regulation in AS;
2. bodies of control over the activities and control of compliance with the state requirements in AS;
3. organizations that fulfill the state's requirements in AS within their own economic activities (executive structures).

## Creation of a State System for Continuous Monitoring of Aviation Security in Compliance with the International Requirements

The interaction diagram and the membership of the above groups within the modern system of aviation security in the Russian Federation are shown in Figure 5.



**Figure 5** Structure of the modern system of aviation security in the Russian Federation

Judging from the presented structure, one can formulate proposals on the membership in the expert community of the system of continuous monitoring of the compliance of the regulations of the Russian Federation in aviation security control with the requirements of ICAO standards and recommended practices within the USAP-CMA for each organization and department.

In relation to the existing structures of the organizations involved in the system, the following proposals are provided:

1. The following representatives are required from the executive structures:

- a) representatives of the Airport Security Services ASSs of the Russian Federation where international commercial flights arrive to and depart from.
- b) representatives of the commissions on aviation security in the airports of the Russian Federation where international commercial flights arrive to and depart from.
- c) representatives of the ASSs of the airlines registered in the register of airlines of the Russian Federation that perform international flights.
- d) representatives of organizations that are not members of a) and b), but are certified and accredited by the FATA of Russia to carry out AS activities and conduct their activities at airports specified in a).

2. From the FATA of Russia, representatives of the Transportation Security Administration from each management department.

3. From the Federal transport inspection service, representatives of the Department for Aviation Security Supervision of the Transportation Security Administration, as well as a representative of the Legal and Regulatory Administration of the Legal Department.

4. On the part of the Ministry of Transport of the Russian Federation:

- Representatives of the Department of State Policy in the field of civil aviation (DSP)
- Representatives of the Department of International Cooperation (DIC)
- Representatives of the Department of Legal Support and Legislative Drafting Activities (DLS).

5. From other departments providing state regulation in AS, it is proposed to form a working group on the basis of the interdepartmental commission for ensuring aviation security and flight safety in civil aviation, the members of which representing their departments, will become members of the expert community of the system.

The proposed membership will ensure the formation of the expert community within the system that is capable of prompt and competent monitoring of the AS requirements existing in the Russian Federation, both for their effectiveness and for compliance with the international ICAO standards and recommendations within the USAP-CMA operating in the Russian Federation.

## **6. CONTENT OF INFORMATION NECESSARY FOR THE SYSTEM OPERATION**

To provide the System operation, the maximum amount of objective information is required on the state of the National Aviation Security System (NASS) as defined by the National Aviation Security Program. These conditions, in accordance with the ICAO requirements, are defined in the main documents of ICAO:

- “Universal Security Audit Programme Continuous Monitoring Manual” (Doc. 9807, ed.2, 2016);
- “Aviation Security Oversight Manual. The Establishment and Management of a State’s Safety Oversight System” (Doc. 10047, ed.1, 2015),
- “Memorandum of Understanding (MOU) between the International Civil Aviation Organization and the Russian Federation on the continuous monitoring approach under the Universal Security Audit Programme” (to be signed).

These documents, in addition to the list of types of information required, also contain clear functional areas and criteria for detailing information that allow for effective audit of the NASS operation (nine audit areas and eight critical elements). This approach allows fulfilling both the requirements for informing ICAO about the NASS state, as well as conducting own audits by the appropriate authorized bodies of the Russian Federation (the Federal Transportation Inspection Service (Rostransnadzor), the Federal Air Transport Agency (Rosaviatsia)).

Additional documents defining the requirements for this information also include Questionnaires developed by the ICAO Aviation Security Section, which conduct USAP-CMA audits. These questionnaires make it possible for ICAO to analyze the information received from Member States, to develop appropriate recommendations and decisions, as well as to carry out continuous monitoring of the NASS functioning.

## Creation of a State System for Continuous Monitoring of Aviation Security in Compliance with the International Requirements

In order to increase the objectivity of the definition of ICAO requirements relating to various areas of civil aviation in the Russian Federation (aviation security issues), the following were used to develop the System:

- regulatory documents of Rostransnadzor (ICAO and RF documents) concerning aviation and transport security);
- normative documents of the Central Normative and Methodological Library of Civil Aviation of GosNII GA (ICAO, EASA, FAA, RF documents);
- Recommendations of the ICAO Aviation Security Section related to various aspects of aviation security requirements (for example, training aviation personnel that takes into account the implementation of the new ICAO Global Training Program).

Also, the underlying ICAO documents in USAP-CMA were analyzed (Table 4); and the basic content of information for the System operation was determined:

- PQ – Protocol Questions, the main means for carrying out activities under the USAP-CMA aimed at assessing the level of implementation of the state system critical elements (CEs) for aviation security control and the degree to which the states comply with the Standards of Annex 17 and the provisions of Annex 9 related to aviation security.
- SASAQ – Questionnaire “State Aviation Security Activity” includes specific information on the activities of each state in aviation security, including detailed information of legislative, regulatory, organizational, operational, technical and administrative nature;
- CC – Questionnaire “Compliance Checklists” contains information on States’ compliance with the Standards and Recommended Practices (SARPs) of Annex 17 and the relevant provisions of Annex 9 to the ICAO Convention on International Civil Aviation.

**Table 4** Basic ICAO documents defining the content of information for creating the System

Document title	Summary	Applicability to the USAP-CMA
Conventions and Annexes		
Convention on International Civil Aviation (Doc.7300, ed.9, 2006)	Outlines the principles and measures (Chicago, 1944), which ensure the development of international aviation in a safe and orderly manner on the basis of equality of opportunity, rationally and economically	Used as a basic document for determining the fundamental basis for AS issues using the relevant Annexes, and Protocols
Annex 17. Security - Safeguarding International Civil Aviation Against Acts of Unlawful Interference (ed.10, 2017)	Outlines ICAO Standards and Recommended Practices for Aviation Security. The Annex includes aspects of aviation security that are provisions of a number of Annexes 2,6,8,9 (Chapters 4-6), 10 (v. 4), 11,13,14 (v.1), 18	Is the main ICAO document for the states on the organization and control of the national aviation security system
Annex 9. Facilitation (ed. 14, 2015)	Outlines ICAO Standards and Recommended Practices for Facilitation of Formalities. The Annex includes aspects of aviation security that are articles of the Convention 10,11,13,14,22-24,29,35	Is the main ICAO document for States on the organization and control of the national aviation security system relating to facilitation issues
Convention on Offences and Certain Other Acts Committed on	Outlines jurisdiction issues of the state, the powers of the aircraft pilot	Used as a supporting document for AS inspections and control

Board Aircraft (Doc.8364, Tokyo, 1963)	in command, the rights and obligations of states	
Convention for the Suppression of Unlawful Seizure of Aircraft (Doc.8920, the Hague, 1970)	Provides definitions of “offences” related to aircraft seizures, the conditions for the applicability of the Convention to the aircraft, the jurisdiction and measures taken by the state when in case of an aircraft seizure	Used as a supporting document for AS inspections and control
Convention for the suppression of Unlawful Acts against the safety of Civil Aviation (Doc.8966, Montreal, 1971)	Details and refines definitions of “offences” related to aircraft seizures, the conditions for the applicability of the Convention to the aircraft, the jurisdiction and measures taken by the state when in case of an aircraft seizure	Used as a supporting document for AS inspections and control
Protocol for the Suppression of Unlawful Acts of Violence at Airports Serving International Civil Aviation, Supplementary to the Convention for the Suppression of Unlawful Acts against the Safety of Civil Aviation (Doc.9518, Montreal, 1988)	Provisions are added regarding offences committed at an airport serving international civil aviation, the relevant jurisdiction and the rights of the state where the offence was committed	Used as a supporting document for AS inspections and control
Convention for the unification of certain rules for international carriage by air (Doc.9740, Montreal, 1999)	In essence, this Convention summarizes all changes to previous Conventions	Used as a supporting document for AS inspections and control
Protocol Relating to an Amendment to the Convention on International Civil Aviation (Article 3 bis) (Doc.9436, Montreal, 1984)	Art.3bis of the Convention (Chicago, 1944) was replaced. The provisions on the use of weapons against civil aircraft in flight are detailed; as well as measures undertaken by the when flight rules are violated by a civil aircraft over the territory of that state.	Used as a supporting document for AS inspections and control
Convention on the Marking of Plastic Explosives for the Purpose of Detection (Doc. 9571, Montreal, 1991)	Clear definitions are given for the terms: marking, manufacture of explosives, the responsibility of the state to prohibit and prevent the production of unmarked explosives in its territory; the approval of the International Technical Commission for explosives including experts from states	Used as a supporting document for AS inspections and control
Consolidated Text of the Convention on International Interests in Mobile Equipment, (Doc.9795, Capetown, 2001)	The provisions of the Convention reflect the protection of property rights including the seller (the lessor), international guarantees and related requirements; international registration system, etc.	Used as a supporting document for AS inspections and control
Convention on the Suppression of Unlawful Acts Relating to International Civil Aviation (Doc. 9960, Beijing, 2010)	Refines articles of the Convention on the methods offences are committed, as well as objects and facilities (aircraft, air navigation aids, etc.); definitions of the types of weapons used to commit offences (biological, nuclear,	Used as a supporting document for AS inspections and control

Creation of a State System for Continuous Monitoring of Aviation Security in Compliance with  
the International Requirements

	chemical). This Convention takes precedence over the documents: Convention, Montreal 1971; Protocol, Montreal 1988	
Protocol Supplementary to the Convention for the Suppression of Unlawful Seizure of Aircraft (Doc.9959, Beijing, 2010)	The provisions of the Protocol clarify and update the articles of the Convention for the Suppression of Unlawful Seizure of Aircraft (Doc.8920, The Hague, 1970)	Used as a supporting document for AS inspections and control
Convention on Damage Caused by Foreign Aircraft to Third Parties on the Surface (Multilateral Agreement №3007, 1982)	The Agreement defines the principles and the extent of the responsibility of States for damage, the requirements for ensuring the liability of the operator, the procedural rules, limitations of actions and the scope of application of the Convention	Can be used as a reference material when addressing issues indicated in the document, taking into account that this document was signed by the Supreme Soviet of the USSR and the unconfirmed current status of the document
Convention on the International Recognition of Rights of Aircraft (Doc.7620, Geneva, 1948)	The Convention defines the main issues of aircraft possession and lease, the procedure of sale and settlement of disputes in the event of the arrest or sale of an aircraft	Can be used in the case of an accident involving an aircraft
The Protocol to amend the Convention on offences and certain other acts committed on board aircraft Montreal,2014	The Protocol contains the updated provisions of the Convention on offenses and certain other acts committed on board aircraft, signed in Tokyo, 1963	Used as a supporting document for AS inspections and control
<b>Manuals</b>		
Aviation Security Manual (Doc.8973/9 Restricted, ed. 9, 2014)	The manual contains processes and procedures to assist States in preventing acts of unlawful interference and, if necessary, in response by developing the following elements: - legal framework and control over ensuring security; - airport design, infrastructure and equipment; - recruitment, selection, preparation and certification of labour resources; - procedures and application of security measures.	Contains guidelines for the implementation of the provisions of Annex 17, therefore it is one of the main documents for the preparation, implementation and maintenance of the USAP-CMA
Facilitation Manual (Doc.9957, ed.1, 2011)	The manual contains information on procedures designed to develop and maintain national laws on the movement of persons and goods across the border, according to which specific monitoring procedures and practices are adopted to provide the necessary means and capabilities to the border control authorities	The manual is a guidance material for the states to implement the standards and recommended practices of Annex 9, as well as one of the main documents for the preparation, implementation and maintenance of the USAP-CMA
Security Audit Reference Manual (Doc. 9807, ed.2, 2016)	Contains procedures, information and guidelines for the management and conduct of program activities under the USAP-CMA	Is one of the main documents containing the standardized USAP-CMA processes and procedures to ensure the systematic, uniform, objective and

		orderly preparation and conduct of activities and reporting on them
Aviation Security Oversight Manual. The Establishment and Management of a State's Safety Oversight System (Doc. 10047, ed.1, 2015)	Outlines obligations and responsibility of states regarding the creation and organization of the work of the national civil aviation security system	Can be used as a supporting document for the USAP-CMA procedures, especially with regard to critical elements of the aviation security control system, which include: - the basic legislation in aviation security; - programs and rules for aviation security; - the relevant state authority for aviation security and its responsibilities; - personnel qualification and training; - providing technical advice, means and information critical to security; - obligations for certification and approval; - commitment to quality control; - solving problems in the field of aviation security
Manual Of Procedures For Operations Inspection And Certification (Doc.8335-AN/879, ed.5, 2010)	The document contains recommendations on the organizational, administrative and procedural aspects of inspection, certification and continuous safety oversight in civil aviation	Can be used as a supporting document for inspections and control of civil aviation activities, taking into account the ICAO's tendency to obtain an integrated assessment of the state's activities in the field of aviation security
Additional ICAO documents		
Reference Manual on the ICAO Statistics Programme (Doc.9060/5, ed.5, 2013)	The document contains information on the types and volume of information on the national civil aviation activities, which should be provided by the state to ICAO	Can be used as a reference material in the preparation of State reports to ICAO
Heliport Manual (Doc.9261-AN/903, ed.3, 1995)	The document contains materials related to the planning, construction and operation of heliports of various types in accordance with the requirements of Annex 14, Volume 3	Can be used as a reference material for inspections and control of aviation security activities of national heliports. If necessary, the more stringent requirements of Annex 6, Part 3 (International Civil Aviation, Helicopters) may apply
Manual on Certification of Aerodromes (Doc.9774-AN/969, ed.1, 2001)	The document contains guidance material for States on the establishment of a regulatory framework for the certification of international civil aviation aerodromes that meet the requirements of Annex 14, 17 (aviation security)	Can be used as an auxiliary document for checks, inspections and control of aviation security provision. The document defines clear procedures for standard airport security management for international air transport, but can also be used for airfields that provide domestic flights. These aspects are reflected in the USAP-CMA Questionnaire

The intermediate analysis of the above sources of information (requirements) is formalized in the form of the "Table of ICAO Aviation Security Documents" indicating their

applicability to audit areas and critical parameters. Since the number of analyzed documents exceeds 100, the volume of the table is quite large, therefore, only a small part of the performed analysis is provided in the paper. In addition, the level of document applicability is provided for the specified objectives of the USAP-CMA program implementation (color gradation) is indicated: green – the document is fully applicable; yellow – the document is partially applicable; gray – the document is applicable as a reference material for inspections and control of aviation security provision by the relevant authorized bodies of the Russian Federation.

To create an information system and ensure the operation of the USAP-CMA program, the Russian Federation has to use the ICAO “Aviation Security Oversight Manual” (Doc.10047), ICAO Questionnaires: PQ, SASAQ and CC as basic documents. In order to detail some aspects (ICAO requirements and recommendations) for aviation security in the Russian Federation (the NAS program), it is advisable to apply other ICAO documents (Table 4), taking into account the information status of the documents regarding the USAP-CMA program objectives.

## 7. CONCLUSIONS

1. The aviation security metrics indicate that it is necessary to take measures to strengthen aviation security. The current problem requires that issues of aviation security remain among the highest priorities for States and the international community, and therefore the need increased significantly to strengthen coordination of activities to enhance aviation security measures between ICAO and the signatories to the Convention on International Civil Aviation.

2. The Russian Federation that signed the Convention on International Civil Aviation fulfills the ICAO requirements and recommendations. Considering the forecasts made by the State Scientific Research Institute of Civil Aviation [29-32], Russian civil aviation will develop until 2030 at a sustained pace far exceeding the world trends. It is necessary to strengthen measures for the effective implementation of international requirements; therefore, the Russian Federation is currently developing the theoretical base for the creation of a system for continuous monitoring of the compliance of the requirements of the regulations of the Russian Federation in the area of aviation security control with ICAO standards and recommended practices, taking into account the complex multilevel structure and many executive authorities and organizations involved. The creation of such a system will enable both internal audits of the compliance of regulations governing the functions of the state in providing aviation security with ICAO standards and recommended practices, and external obligations to implement the Memorandum of Understanding between the Russian Federation and ICAO with respect to the USAP-CMA.

3. FSUE GosNII GA is one of the main contractors in the creation of the system for continuous monitoring of the compliance of the ICAO standards and recommended practices with the requirements of the regulations of the Russian Federation in aviation security control under the Universal Security Audit Programme – Continuous Monitoring Approach in aviation security. In the course of the scientific work it will be necessary to:

a) determine the possibility of integrating certain provisions of ICAO standards and recommended practices into national regulations and legal documents within the provision of regulatory and legal support for the system operation under the USAP-CMA objectives.

b) analyze the regulatory and legal framework of the Russian Federation in aviation security control with a view to identifying any inconsistencies with ICAO standards and recommended practices in the USAP-CMA objectives and present them in analytical conclusions.

c) develop scientifically grounded proposals based on the analysis of the national regulatory and legal framework and ICAO standards and recommendations on the following:

- creation and operation of a system for continuous monitoring of the compliance of ICAO standards and recommended practices for the aviation security control with the requirements of the regulations of the Russian Federation;
- the list of functions of the system participants, regarding both the task of internal audits of the compliance of regulations governing the functions of the State in providing aviation security with ICAO standards and recommended practices, and the task of interaction with ICAO in the framework of the USAP-CMA;
- provide, within the proposed functions the system participants, proposals on the organization of participants' interaction within the system;
- organization of information support for the functioning of the system and working groups for the continuous monitoring of the compliance of ICAO standards and recommended practices with the requirements of the regulations of the Russian Federation in aviation security control;
- possibilities of automating the operation of the system for the continuous monitoring of the compliance of ICAO standards and recommended practices with the requirements of the regulations of the Russian Federation in aviation security control as a description of the organizational and informational environment (structure, algorithms, input/output data) capable of ensuring the operation of the system as a whole and its participants in particular in order to improve the monitoring system for the state of the transport system in Russia.

d) scientifically justify and develop proposals for the structure and content of the draft regulations on working groups for the continuous monitoring of the compliance of ICAO standards and recommended practices with the requirements of the regulations of the Russian Federation in aviation security control.

## REFERENCES

- [1] ICAO Working Paper. A39-WP/14 EX/2 30/5/16. ICAO Comprehensive Aviation Security Strategy (ICASS).  
[https://www.icao.int/Meetings/a39/Documents/WP/wp\\_014\\_en.pdf](https://www.icao.int/Meetings/a39/Documents/WP/wp_014_en.pdf)
- [2] ICAO Working Paper HLCAS-WP/25 17/7/12 Evolution of the Universal Security Audit Programme.  
<https://www.icao.int/Meetings/avsecconf/Documents/WP%2025/EVOLUTION%20OF%20THE%20USAP.en.pdf>
- [3] ICAO Working Paper NACC/DCA/5 - WP/11 08/04/14 Results of the second cycle of the Universal Security Audit Programme (USAP) and transition to a continuous monitoring approach (CMA).
- [4] Resolutions of the Collegium "On the results of work of the Federal Air Transport Agency in 2010-16 and the main tasks for 2011-17 and the medium term".
- [5] Resolution of the Collegium meeting No. 1 of 11.03. 2011 "On the results of the work of the Federal Air Transport Agency in 2010 and the main tasks for 2011".  
<http://www.favt.ru/public/materials//3/7/b/3/5/37b351d67c78bf45d2cde9a3e30d6916.pdf>
- [6] Resolution of the Collegium meeting No. 1 of 12.03.2012 "On the results of the work of the Federal Air Transport Agency in 2011 and the main tasks for 2012".  
<http://www.favt.ru/public/materials//f/f/b/d/f/ffbdf93eaf8504bfb74deabbb24809d3.pdf>

Creation of a State System for Continuous Monitoring of Aviation Security in Compliance with the International Requirements

- [7] Resolution of the Collegium meeting No. 1 of 04.03.2013 "On the results of the work of the Federal Air Transport Agency in 2012 and the main tasks for 2013". <http://www.favt.ru/public/materials//1/3/3/2/0/133203b54763e0a987a4a09863f3d453.pdf>
- [8] Resolution of the Collegium meeting No. 1-k of 27.03.2014 "On the results of the work of the Federal Air Transport Agency in 2013 and the main tasks for 2014 and the medium term". <http://www.favt.ru/public/materials//6/7/c/0/d/67c0df77e4972f4ef68fd9eb8672d4e3.pdf>
- [9] Resolution of the Collegium meeting No. 1-13-1-K of 26.02.2015 "On the results of the work of the Federal Air Transport Agency in 2014 and the main tasks for 2015 and medium term". <http://www.favt.ru/public/materials//6/4/3/c/6/643c6552591fe44c00e5050dc762a8ee.pdf>
- [10] Resolution of the Collegium meeting No. 1-Kol of 03.05.2017 "On the results of the work of the Federal Air Transport Agency in 2016 and the main tasks for 2017 and medium term". <http://www.favt.ru/public/materials//d/b/a/4/f/dba4faff5acca98d93dc0eb3428c394f.pdf>.
- [11] The concept of an act of unlawful interference in the activities of the Civil Aviation. The site of PJSC Aeroflot. <http://lms.aeroflot.ru/data/Aviation%20Safety/LESSON1/intr1.htm>.
- [12] Konyukhova, A.S. Acts of unlawful interference in the activities of civil aviation: a system of concepts and the legal nature of acts (international legal aspect). *Bulletin of the Moscow University, Series 11, Pravo [Law]*, **4**, 2013, pp. 107-117.
- [13] Annual report of the Council of ICAO - 2015. Appendix 1. Tables for the "The World of Air Transport in 2015" [www.icao.int/annual-report-2015/Documents/Appendix\\_1.html](http://www.icao.int/annual-report-2015/Documents/Appendix_1.html).
- [14] **The World of Air Transport in 2016.** <https://www.icao.int/annual-report-2016/Pages/RU/the-world-of-air-transport-in-2016.aspx>
- [15] **The World of Air Transport in 2015.** [https://www.icao.int/annual-report-2015/Pages/RU/the-world-of-air-transport-in-2015\\_RU.aspx](https://www.icao.int/annual-report-2015/Pages/RU/the-world-of-air-transport-in-2015_RU.aspx)
- [16] Annual report of the Council of ICAO - 2015. Appendix 2 "TECHNICAL COOPERATION PROJECTS" [https://www.icao.int/annual-report-2015/Documents/Appendix\\_2\\_en.pdf](https://www.icao.int/annual-report-2015/Documents/Appendix_2_en.pdf).
- [17] ICAO Working Paper A35-WP/49 EX/15. Developments since the 33rd Session of the Assembly (06/08/04).
- [18] ICAO Letter No. AS 8 / 1.10-17 / 84 of 11/07/2017.
- [19] ICAO Working Paper HLSC/15-WP/14 3/12/14 Second high-level safety conference 2015 (HLSC 2015) Planning for global aviation safety improvement.
- [20] Doc 9735AN/960 Universal Safety Oversight Audit Programme Continuous Monitoring Manual. [http://www.aviadocs.net/icaodocs/Docs/9735\\_cons\\_ru.pdf](http://www.aviadocs.net/icaodocs/Docs/9735_cons_ru.pdf)
- [21] Glukhov, G.E. and Kirpichev, I.G. Information and Analytical System for Aircraft Airworthiness Monitoring in the creation of a modern safety management system. Bulletin of SSAU. Symposium with international participation "Aircraft manufacturing in Russia. Problems and prospects", 2012, pp. 138-140.
- [22] Blagorazumov, A.K., Glukhov, G.E. and Kirpichev, I.G. Cloud-based application for registering aircraft component life cycle. *Scientific Bulletin of GosNII GA*, **3**, 2013, pp. 91-97.
- [23] Blagorazumov, A.K., Glukhov, G.E. and Kirpichev, I.G. On some aspects and trends in introduction of information systems for aviation activity safety monitoring. *Scientific Bulletin of GosNII GA*, **10**, 2015, pp. 57-65.

- [24] Glukhov, G.E., Kirpichev, I.G. and Chernikov, P.E. Regulatory support and functionality of the information system for aviation activity safety monitoring. *Scientific Bulletin of MSTU CA*, **218**, 2015, pp. 34-38.
- [25] Glukhov, G.E., Kirpichev, I.G. and Chernikov, P.E. Development of an information system for aviation activity safety monitoring. *Scientific Bulletin of MSTU CA*, **218**, 2015, pp. 67-70.
- [26] ICAO Working Paper A38-WP/14 EX/9 31/5/13 Consolidated statement on the continuing ICAO policies related to the safeguarding of international civil aviation against acts of unlawful interference.
- [27] ICAO Working Paper A35-WP/258 Revision No.1 EX/102 STATUS OF THE AVSEC STAFF IN THE EUR-NAT REGIONAL OFFICE (22/09/2016).
- [28] Materials of the ICAO Regional Seminar USAP-CMA. Moscow, Russian Federation, 7 to 9 December 2016.
- [29] Samoylov, I.A., Stradomsky, O.Yu. and Shapkin, V.S. Development of aircraft fleet of Russian airlines. *Scientific Bulletin of GosNII GA*, **2(313)**, 2012, pp. 7-15.
- [30] Shapkin, V.S., Samoilo, I.A. and Lesnichy, I.V. Modern Approaches to the Assessment of the Aircraft Competitiveness. *Scientific Bulletin of GosNII GA*, **3(314)**, 2013, pp. 7-15.
- [31] Samoilo, I.A., Lesnichy, I.V., Samoilo, V.I. and Kipcharsky, D.A. Current state and prospects for the development of the civil aircraft fleet in Russia. *Scientific Bulletin of GosNII GA*, **4(315)**, 2014, pp. 9-16.
- [32] Shapkin, V.S. and Abramov, B.A. Problems in development of the scientific support system for maintaining the civil aircraft airworthiness. *Scientific Bulletin of GosNII GA*, **4(315)**, 2014, pp. 5-8.
- [33] G. Chiatti, O. Chiavola, E. Recco , Combustion Monitoring Through Vibrational Data in a Turbocharged City Car Engine . *International Journal of Mechanical Engineering and Technology* , 8(3), 2017 , pp. 197–208.
- [34] Sajani J and Dr. S. Manikandan, Analysing and Monitoring of Network IDS Using Intrusion Detection. *International Journal of Computer Engineering & Technology* , 8(3), 2017, pp. 20–27.