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WORKING PAPER

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ASSEMBLY — 37TH SESSION

TECHNICAL COMMISSION

Agenda Item 26: Safety management and safety data

RISKS AND SAFETY OF COMPLEX AVIATION SYSTEMS

(Presented by the Interstate Aviation Committee[2])

EXECUTIVE SUMMARY

In the course of the implementation of Safety Management System (SMS) within the service providers in accordance with the Safety Management Manual, Doc 9859 (2009), problems have been identified due to the non-conformity of SMS terms and definitions, incompleteness of flight data analysis procedure for simple risks and J. Reason's risks assessment, and uncertainty of the expert databases needed for risk management.

Action: The Assembly is invited to:
a) instruct the ICAO Secretariat to set up a Study Group for developing the "Catalogue of SMS terms and definitions", in the form of an international standard;
b) develop recommendations for wide recognition and implementation of techniques and procedure of proactive (expert) aviation accidents risks forecasting, as well as to unify risk analysis matrix; and
c) consider the possibility of establishment of computerized systems (SMS-ACS) within the framework of future SMS implementation programmes.

Strategic Objectives:	This working paper relates to Strategic Objective A (Enhance of global civil aviation safety).
Financial implications:	Financing within the budget of ICAO Regular Programme
References:	Annex 6 — *Operation of Aircraft*, Part I — *International Commercial Air Transport — Aeroplanes* *Safety Management Manual (SMM),* Doc 9859

[1] Versions in Russian and English are presented by the Interstate Aviation Committee (IAC).
[2] Interstate Aviation Committee (IAC) is the executive body of the interstate Agreement on Civil Aviation and Airspace Use (international agreement, participants of which include Azerbaijan Republic, Republic of Armenia, Republic of Belarus, Georgia, Republic of Kazakhstan, Kyrgyz Republic, Republic of Moldova, the Russian Federation, Republic of Tajikistan, Turkmenistan, the Ukraine, Republic of Uzbekistan).

1. INTRODUCTION

1.1. In 2006 the International Civil Aviation Organization (ICAO) issued the first edition of the Safety Management Manual (SMM), Doc 9859.

1.2. In 2009 the new edition of the Safety Management Manual, Doc 9859, was issued (SMM 2009), where one of the major directions for the SMS implementation is the risk management.

1.3. Paragraph 3.3.3 of Amendment 33-B to Annex 6, Part I, to the Convention on International Civil Aviation provides that from 18 November 2010 States shall require an operator to implement a Safety Management System acceptable to the State of the Operator in accordance with the Safety Management Manual Doc 9859.

1.4. The above-mentioned suggestions were discussed at the International Global Aviation Safety Roadmap Summit (9 – 11 June 2009, Moscow, Russian Federation) and on the International Bishkek Seminar (20 – 23 August 2009, Bishkek, Kyrgyz Republic).

2. PROBLEMATIC ISSUES ARISING IN THE COURSE OF PROACTIVE FLIGHT SAFETY MANAGEMENT IMPLEMENTATION

2.1. In the course of practical implementation of Safety Management System (SMS) the following problems arise:

a) non-conformity of terms and definitions;
b) incompleteness of flight data analysis procedure for simple chains and J. Reason's chains;
c) non-correlation of national standards and ICAO Standards for flight safety;
d) uncertainty of the databases needed for risk management (in SMM the main recommended method is brainstorming); and
e) lack of certain rules for threats, hazards classification and schemes of risk identification.

3. PROACTIVE HAZARD FORECASTING

3.1. According to ICAO risk – is an assessment, expressed in terms of predicted probability and severity, of the consequence(s) of a hazard taking as reference the worst foreseeable situation (if there is probability of the hazardous or risk event). ICAO risk concept is "frequency and severity" or "measure of likelihood and harm (damage)" (in other words, likelihood is not probability in general).

3.1.1 Risk event (foreseeable hazardous that may not happen) has two features: likelihood and damage (harm). Indeterminacy occurs, and we cannot manage the indeterminacy so the term "risk management" loses its meaning.

3.1.2 On the basis of above-mentioned a new definition of the risk can be suggested: risk – is the assessment of hazard only in foreseeable hazardous condition with foreseeable event.

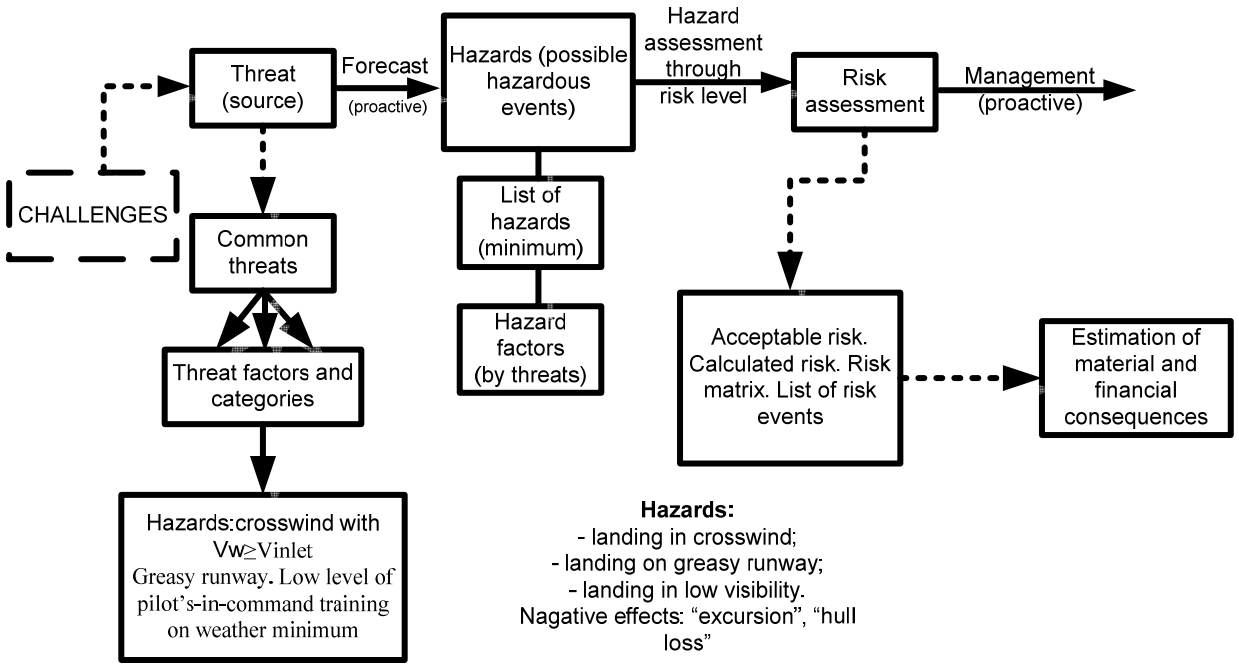
3.1.3 1A-type threats – source of danger (incidents detected and included in the airlines and aviation administrations databases or into the ICAO database).

3.1.4 1B-type threats – proactive sources of danger in the form of possible incidents, pilots' errors, emerging of environmental phenomena, dependence on selected factors.

3.1.5 Hazards – possible proactive foreseeable conditions and hazardous events related to the threats' factors.

3.1.6 Therefore, a safe system – is a dangerous system where a hazardous event may happen that would lead to damage or harm, but where the risk of negative effect is very low. Hazards identification and assessment – is a detection of sources of potential danger and corresponding factors in order to make a forecast of the possibility of dangerous risk event with a definite risk level.

3.2. As an example, a diagram is offered for the proactive assessment of significance of the foreseeable hazard risk.



3.2.1 According to the above diagram of proactive assessment, as an output we can get:

a) threats identification (list of hazards, events and factors);

b) risk events identification (risk assessment);

c) list of consequences (harm from the knowledge database);

d) determining the control inputs to the system in order to lessen risk (by risk management methods);

e) development of an ICAO Doc 9859 table (general threats, specific threats by threat factors, risks, chains risk management, risk value correction and their impact of SMS on the airline); and

f) estimation of costs for providing the risk level reduction to the airline acceptable risk level.

3.2.2 Unified matrix for risk analysis can help to clearly assess the risk level and in future to create computer software for risk assessment, as well as assess the costs related to the airline flight safety improvement, Safety Management System and even State Safety Programme (SSP).

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