AN-Conf/11-WP/84
24/7/03
English, French, Spanish and Russian only*

ELEVENTH AIR NAVIGATION CONFERENCE

Montreal, 22 September to 3 October 2003

Agenda Item 2: Safety and security in air traffic management (ATM)
2.3 Safety regulation
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INTERNATIONAL AND NATIONAL ATM SAFETY ASSESSMENT ACTIVITIES

(Presented by European Organisation for the Safety of Air Navigation (EUROCONTROL) on behalf of its Member States and those of ECAC[1])

SUMMARY

In order to support States in complying with ICAO Annex 11 Requirement 2.26.5, ICAO should adopt, in so far as practicable, a formal and structured *safety assessment approach* to the development of SARPs related to CNS/ATM. ICAO should also ensure that regional supplementary procedures related to ATM/CNS have also been subject to some *safety validation* before their promulgation.

Such a formal process should lead to an explicit identification of the safety assumptions made by ICAO when developing and validating those SARPs and procedures, together with any limitations in the safety assessment activities conducted.

States would then be in a better position to identify those complementary safety assessment activities, which would remain to be conducted at national level in order to verify that the implementation of ICAO SARPs in the national environment of operations can take place within tolerable safety levels.

Suggested action by the Conference is in paragraph 5.

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[1] The ECAC Member States are: **Albania**, Armenia, **Austria**, Azerbaijan, **Belgium**, Bosnia and Herzegovina, **Bulgaria**, **Croatia**, **Cyprus**, **the Czech Republic**, **Denmark**, Estonia, **Finland**, **France**, **Germany**, **Greece**, **Hungary**, Iceland, **Ireland**, **Italy**, Latvia, Lithuania, **Luxembourg**, **Malta**, **Moldova**, **Monaco**, **the Netherlands**, **Norway**, Poland, **Portugal**, **Romania**, Serbia and Montenegro, **the Slovak Republic**, **Slovenia**, **Spain**, **Sweden**, **Switzerland**, **The former Yugoslav Republic of Macedonia**, **Turkey**, Ukraine **and the United Kingdom**).

The 31 Member States of EUROCONTROL appear in **bold**

*French, Spanish and Russian versions provided by EUROCONTROL.

1. INTRODUCTION

1.1 States are expected to set up Target Levels of Safety for the provision of air traffic services (ATS) in the national airspace and at aerodromes in order to meet the provisions of ICAO Annex 11[2].

1.2 In addition, States are expected to ensure that any safety significant change to the air traffic control (ATC) system, including the implementation of a reduced separation minimum or a new procedure, are effected only after its safety impact has been demonstrated to remain within tolerable safety levels.

1.3 This paper aims at highlighting the need for ICAO to adopt, in so far as practicable, a formal *safety assessment approach*[3] to the development of ICAO Standards and Recommended Practices (SARPs) in ATM/CNS. Similarly, this paper aim at confirming the need for ICAO to also ensure that regional supplementary procedures related to ATM/CNS have also been subject to some *safety validation* before their promulgation.

1.4 This Paper also is intended to confirm that States ought to implement ICAO Annex 11 2.26.5, including those changes to ATC[4], which are to be implemented in accordance with ICAO Standard and Recommended Practices and /or regional supplementary procedures.

1.5 This Paper confirms that when ICAO has adopted a formal *safety assessment approach*[5] to the development of ICAO Standards and Recommended Practices or regional supplementary procedures, States will usually find it sufficient to verify that related safety assumptions made by ICAO when developing such material are valid in the national environment of operations.

2. ICAO STANDARDISATION PROCESS

2.1 It is recognised that until recently and except in a limited number of countries, no rules/codes existed for ATM and aerodromes specifically requiring formal safety assessment of changes to their ATM system. The use of formal safety approaches to the determination of safety requirements and associated standards in ATM is, indeed, a recent concept.

2.2 Until now, ICAO has specified in SARPs a number of safety requirements related to ATS and its underlying infrastructure, such as communication and navigation systems, without always explicitly

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[2] Amendment 40- ICAO Annex 11 Section 2.26

[3] Or a system safety approach according to the ICAO ATMCP terminology

[4] Shown to be safety significant through a preliminary safety assessment process

[5] Or a system safety approach according to the ICAO ATMCP terminology

stating the target level of safety to which they intended to relate and/or without demonstrating that the implementation of those SARPs would meet a stated target level of safety.

2.3 It should indeed be noted that, for most of the ICAO SARPs related to ATS, with the exception[6] of separation minima related to collision risk models and landing requirements, ICAO SARPs and regional supplementary procedures have usually been developed on the basis of operational/expert judgement and improved over the years mainly as a result of feedback from experience.

2.4 As such, ICAO SARPs and procedures, including regional supplementary procedures, can be considered as having been validated from a safety perspective over the years through direct application and continuous improvement.

2.5 Even if, in some instances, States have been filing differences to ICAO Annexes, most States have generally not implemented any formal safety assessment processes to verify that the implementation of SARPs and regional procedures in their national environment of operations would meet tolerable safety levels.

3. USE OF SAFETY ASSESSMENT PROCESSES

3.1 The approaches adopted so far by ICAO and States may benefit from a number of improvements for new ATM/CNS developments, implementations and associated standardisation processes.

3.2 The increasingly integrated nature of aviation, and more specifically of ATM/CNS systems, means that today, adherence to newly developed ICAO provisions to support implementation of new ATM/CNS concepts may not always be enough to ensure aviation safety in all national environments of operations.

3.3 This limitation is reinforced with the adoption of a total system approach to the design and operations of ATM/CNS. Indeed, for a given traffic density, trade off may be explicitly required between the CNS infrastructure, the airspace design (separation minima, route spacing, sectorisation), aerodrome layout, topography and obstacles, instrument procedures and ATC intervention capability, in order to achieve a pre-determined level of airspace safety.

3.4 With integrated, distributed and complex ATM/CNS systems, there is an increasing need to place assumptions upon the environment of operations being considered in ICAO SARPs and regional procedures, as well as on the other elements of the aviation system with which ATM interfaces.

3.5 Those assumptions may well vary depending on the environment of operations and on the types of ATM services being provided, and must be reflected in an explicit manner in appropriate ICAO SARPs and regional procedures.

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[6] The only instances where a formal approach to risk assessment has been undertaken was with the setting of TLS for specific operations (refer to ICAO, RGCSP, AWOP and OCP) and related collision risk modelling

3.6 There appears, therefore, to be a need for ICAO to adopt a more formal safety approach to the development of SARPs with regard to new ATM/CNS developments. ICAO should also ensure that regional supplementary procedures related to ATM/CNS have also been subject to some *safety validation* before their promulgation.

3.7 With time, and if the safety assumptions made by ICAO in ICAO SARPs are not made explicit, the overall logic and limitations of the SARPs as specified originally by ICAO may be forgotten and those SARPs and regional procedures may be applied beyond their original intent and scope. This may represent a safety risk if States implement the provisions of ICAO SARPs and regional procedures without verifying that those provisions can be implemented within tolerable safety levels in the national environment of operations.

3.8 As a general rule, and according to ICAO[7], before any change to the ATC system[8] is effected at national level, the safety impact of the proposed change must therefore be assessed and shown to meet tolerable safety levels. This should, as a minimum[9] include verification that the safety assumptions made in ICAO when developing SARPs and regional supplementary procedures for new ATM/CNS concepts, are valid in the national environment of operations.

3.9 This may involve some States filing differences with ICAO for safety reasons, and may also involve additional defences being implemented into national ATM systems to ensure tolerable safety levels set for the national airspace are met.

4. CONCLUSIONS

4.1 In order to support States in complying with ICAO Annex 11 Requirement 2.26.5, ICAO should adopt, in so far as practicable, a formal and structured *safety assessment approach* to the development of SARPs related to new ATM/CNS developments.

4.2 Similarly, ICAO should also ensure that regional supplementary procedures related to ATM/CNS have also been subject to some *safety validation* before their promulgation.

4.3 Such a formal standardisation process should lead to an explicit identification of the safety assumptions made by ICAO when developing and validating those SARPs and procedures together with any limitations in the *safety assessment activities* conducted by ICAO.

4.4 Those assumptions should be documented in a clear and unambiguous manner so that they can be validated by those having the responsibility of implementing them.

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[7] As well as EUROCONTROL

[8] Referring back to Annex 11 and PANS-ATM, Requirement 2.26.5 also applies to changes in procedures, airspace design and equipment.

[9] Typically in the case of changes being implemented in a manner fully compliant with ICAO SARPs and/or Regional procedures.

4.5 States would then be in a better position to identify those complementary *safety assessment activities*, which would remain to be conducted at national level in order to verify that the implementation of ICAO SARPs in the national environment of operations can be undertaken within tolerable safety levels.

5. ACTION BY THE CONFERENCE

5.1 The Conference is invited to:

a) request ICAO to adopt a *safety assessment approach* to the development of ICAO SARPs, in so far as practicable;

b) request ICAO to ensure, for specific regional implementation, that ICAO regional supplementary procedures have been subject to a formal safety validation prior to their promulgation, in so far as practicable;

c) request ICAO to document, for the benefit of States, any safety assumptions made in the development of SARPs and regional supplementary procedures; and

d) encourage States to rely on ICAO SARPs and associated safety assumptions, when ensuring that significant safety-related changes to the air traffic management system can be effected within tolerable level of safety in the national environment of operation.

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