



ATS SAFETY MANAGEMENT

International Civil Aviation Organization

North American Central American and Caribbean Regional Office

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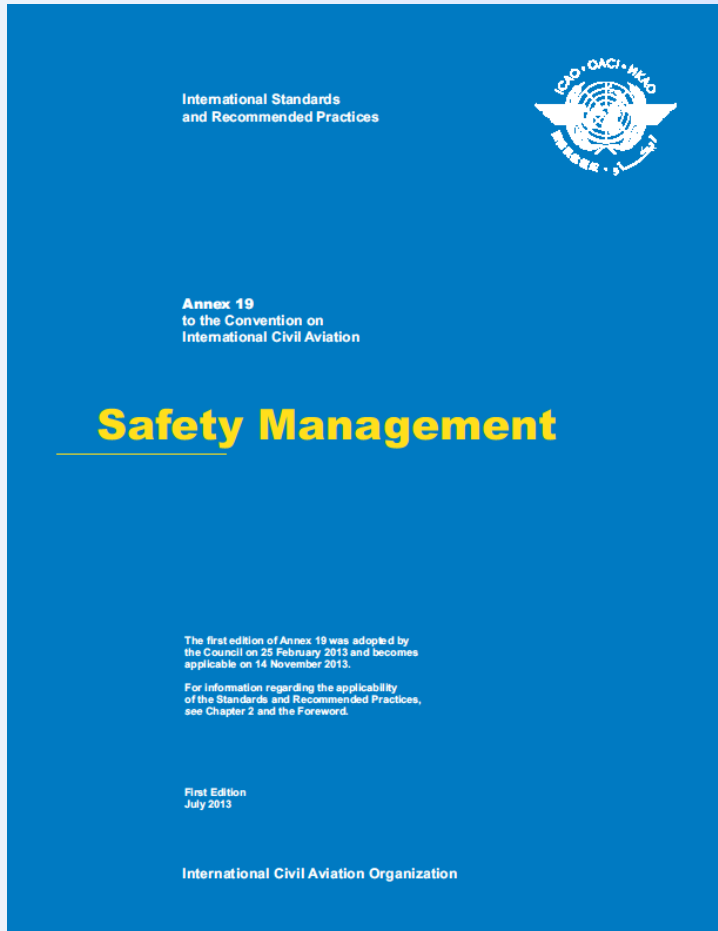
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VALIDATION & IMPLEMENTATION



- Monitor process
- Support OPS
 - Redundancy or contingency procedures
- Support controllers and pilots
- Keep LOG system
- Post Implementation Safety Assessment

Annex 19 – Safety Management



- ✓ CHAPTER 1 – Definitions
- ✓ CHAPTER 2 – Applicability
- ✓ CHAPTER 3 – State safety management (SSP)
 - State safety oversight system
- ✓ CHAPTER 4 – Safety management system (SMS)
- ✓ CHAPTER 5 – Safety data collection, analysis and exchange
 - Mandatory / Voluntary Notification

Annex 11 Provisions (3)

- Any significant safety-related change to the ATS system, such as the implementation of a reduced separation minimum or a new procedure, shall only be effected after a safety assessment has demonstrated that an acceptable level of safety will be met and users have been consulted.
- When appropriate, the responsible authority shall ensure that adequate provision is made for post-implementation monitoring to verify that the defined level of safety continues to be met.
 - *The acceptable level of safety cannot be expressed in quantitative terms, the safety assessment may rely on operational judgement*

PANS-ATM, Safety Provisions

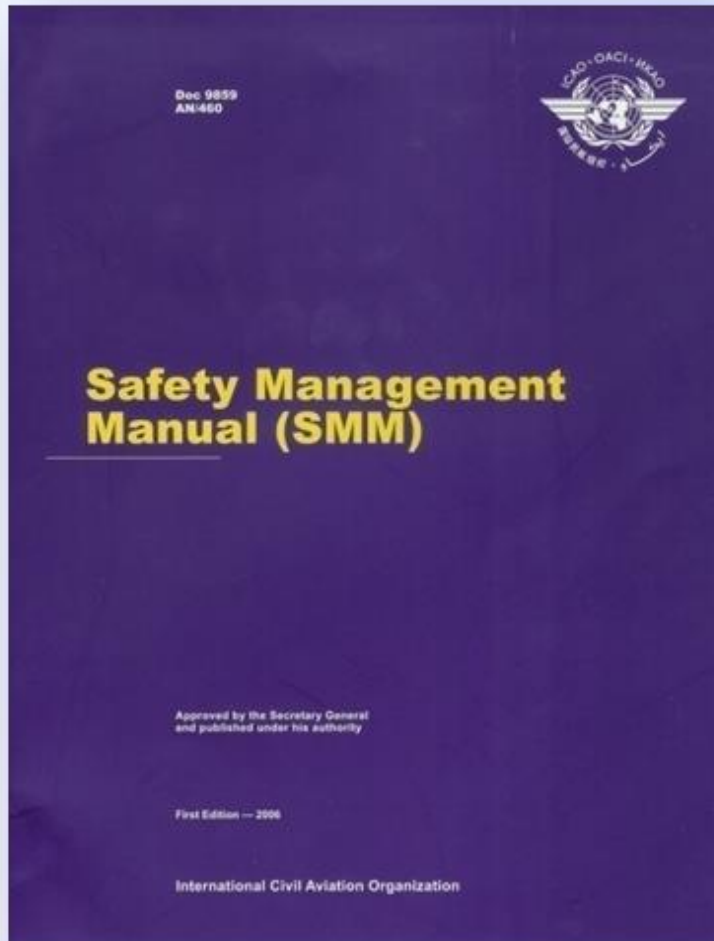
- States shall ensure that the level of ATS and CNS, as well as the ATS procedures applicable to the airspace or aerodrome concerned, are appropriate and adequate for maintaining an acceptable level of safety
- The requirements in respect of services, systems and procedures applicable to airspaces and aerodromes should be established on the basis of a regional air navigation agreement in order to facilitate the harmonization of ATS in adjacent airspaces
- **To ensure that safety the ATS provider shall implement SMS**

An ATS safety management programme should include

- Monitoring of overall safety levels and detection of any adverse trend
- Safety reviews of ATS units
- safety assessments in respect of the planned implementation of airspace reorganizations, the introduction of new equipment systems or facilities, and new or changed ATS procedures
- A mechanism for identifying the need for safety enhancing measures

- Safety reviews of ATS units shall be conducted on a regular and systematic basis by personnel qualified through training, experience and expertise and having a full understanding of relevant SARPs, PANS, safe operating practices and Human Factors principles





➤ Safety Management Manual - Doc 9859

- Update completed
- Restructured according to the SSP and SMS Frameworks
- Detailed guidance developed for SSP and SMS implementation

SMS Element 4.1 Training and education

- ✓ The service provider shall develop and maintain a safety training programme that ensures that personnel are trained and competent to perform their SMS duties.
- ✓ The scope of the safety training programme shall be appropriate to each individual's involvement in the SMS.

FLIGHT SIMULATOR



- High quality data
- Confirm design aspects
 - Fly-ability
 - Efficiency
 - Met impact
- Possible link to RTS

Live ATC trials



- Most accurate
- Real data
- Feedback from all users

But,

- Safety
- High detail required – large effort for a concept evaluation
- Limited scope
- Limited flexibility

Procedure Validation



- Ground Validation
 - Obstacle clearance
 - Charting
 - Coding
 - Flyability
- Flight Validation
 - Obstacle verification (optional)
 - Flyability (workload, charting, manoeuvring)
 - Infrastructure
- Database Validation

Ground Validation

- Obstacle clearance
 - Independent review by procedure designer
 - Charting
 - Independent review
 - Coding
 - Software tool (e.g. Smiths PDT) or
 - Expert review
 - Flyability – software tools (from PC-based to full flight simulator)
 - Not necessarily an issue with standard procedures (e.g. ‘T’ approaches), but critical for some aircraft types
 - Range of aircraft and MET conditions
- Independent review – can be part of same organisation

Ground Validation: Validate the Procedure



- Independent assessment
- Use of validation tools
- Use of aircraft simulators
 - more than one type
- Flight checks
- Initial operational checks

Flight Validation

- Obstacle verification
 - Necessary where full obstacle survey cannot be assured
- Flyability
 - Detailed workload and charting assessments, but
 - High level qualitative assessment of manoeuvring only (rely mainly on Ground Validation)
- Infrastructure assessment
 - Runway markings, lighting, communications, navigation etc

Flight Inspection

- Flight Inspection often confused with Validation
- Flight Inspection Addresses:
 - **Navaid performance** for DME/DME RNAV
 - **Unintentional interference** for GNSS
- Flight Validation does not address Navaid Infrastructure issues

- **POST IMPLEMENTATION ASSESSMENT**
 - Objectives met
 - Safety issues
 - Improvements
 - Quality process
- **PERFORMANCE METRICS**

ACCIDENT/SERIOUS INCIDENT/INCIDENT CLASSIFICATION



- Based on ICAO Annex 13 definitions.
- Occurrences that are classified as accidents or serious incidents may require independent investigations by the accident investigation authority.
- For incidents and other occurrences, including defects/malfunctions/service difficulties, the assigned CAA representative will liaise with the relevant party for necessary follow-up investigation and report submission as applicable.

REPORTING TIMELINES (e.g.)



	<i>Notification to the CAA and/or the accident investigation authority*</i>	<i>Mandatory Report (Form XYZ) submission to the CAA and/or the accident investigation authority**</i>	<i>Investigation Report to the CAA***</i>
Accident	Immediate/ASAP	Within 24 hours	90 days
Serious incident	Immediate/ASAP	Within 48 hours	60 days
Incident	N/A	Within 72 hours	30 days (where required)

* Telephone, facsimile or e-mail will in most cases constitute the most suitable and quickest means to send a notification.

** This column does not apply to members of the public.

*** This column does not apply to investigation reports from the State's accident investigation authority.

REPORTABLE OCCURRENCES



- any ANS/CNS-related equipment or system defect/malfunction/damage discovered during operation which could possibly lead to an aircraft operational accident or serious incident;
- unauthorized penetration of airspace;
- aircraft near CFIT;
- significant level bust incidents;
- loss of separation incidents;
- runway incursion (involving ATC communication);
- runway excursion/overshoot (involving ATC communication);
- any other ANS-related deficiency/defect/malfunction as reported to the ANS/CNS operator and which is deemed to have an impact on the safety of air navigation;
- Other incidents or occurrences deemed by the State as mandatory reporting system.

Safety risk probability



Probability of occurrence		
Qualitative definition	Meaning	Value
Frequent	Likely to occur many times (<i>has occurred frequently</i>)	5
Occasional	Likely to occur some times (<i>has occurred infrequently</i>)	4
Remote	Unlikely, but possible to occur (<i>has occurred rarely</i>)	3
Improbable	Very unlikely to occur (<i>not known to have occurred</i>)	2
Extremely improbable	Almost inconceivable that the event will occur	1

Safety risk severity



Severity of occurrences		
Aviation definition	Meaning	Value
Catastrophic	<ul style="list-style-type: none"> ➤ Equipment destroyed. ➤ Multiple deaths. 	A
Hazardous	<ul style="list-style-type: none"> ➤ A large reduction in safety margins, physical distress or a workload such that the operators cannot be relied upon to perform their tasks accurately or completely. ➤ Serious injury. ➤ Major equipment damage. 	B
Major	<ul style="list-style-type: none"> ➤ A significant reduction in safety margins, a reduction in the ability of the operators to cope with adverse operating conditions as a result of increase in workload, or as a result of conditions impairing their efficiency. ➤ Serious incident. ➤ Injury to persons. 	C
Minor	<ul style="list-style-type: none"> ➤ Nuisance. ➤ Operating limitations. ➤ Use of emergency procedures. ➤ Minor incident. 	D
Negligible	<ul style="list-style-type: none"> ➤ Little consequences 	E

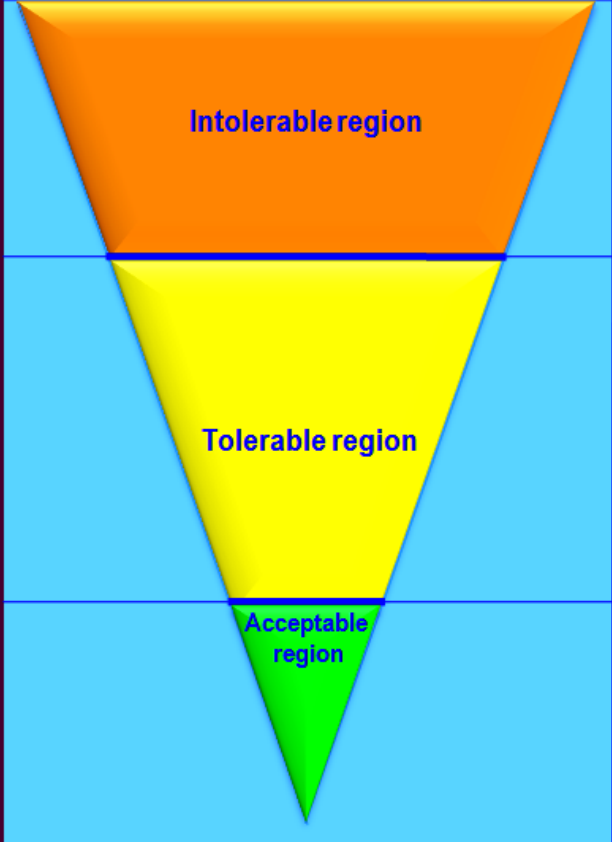
Safety risk index/tolerability



Risk probability	Risk severity				
	Catastrophic A	Hazardous B	Major C	Minor D	Negligible E
Frequent 5	5A	5B	5C	5D	5E
Occasional 4	4A	4B	4C	4D	4E
Remote 3	3A	3B	3C	3D	3E
Improbable 2	2A	2B	2C	2D	2E
Extremely improbable 1	1A	1B	1C	1D	1E

Safety risk index/tolerability



Risk management	Assessment risk index	Suggested criteria
 An inverted funnel diagram is overlaid on the table. The top, widest part of the funnel is orange and labeled 'Intolerable region'. The middle part is yellow and labeled 'Tolerable region'. The bottom, narrowest part is green and labeled 'Acceptable region'. <p data-bbox="247 586 484 615">Intolerable region</p>	<p data-bbox="819 539 1161 665">5A, 5B, 5C, 4A, 4B, 3A</p>	<p data-bbox="1340 554 1808 651">Unacceptable under the existing circumstances</p>
<p data-bbox="258 905 473 933">Tolerable region</p>	<p data-bbox="736 786 1205 983">5D, 5E, 4C, 4D, 4E, 3B, 3C, 3D, 2A, 2B, 2C</p>	<p data-bbox="1315 801 1837 951">Acceptable based on risk mitigation. It might require management decision</p>
<p data-bbox="301 1090 430 1143">Acceptable region</p>	<p data-bbox="755 1115 1213 1243">3E, 2D, 2E, 1A, 1B, 1C, 1D, 1E</p>	<p data-bbox="1464 1172 1692 1215">Acceptable</p>

