

ESARR ADVISORY MATERIAL/GUIDANCE MATERIAL
(EAM/GUI)

EAM 3/GUI 1

**ESARR 3 GUIDANCE TO ATM
SAFETY REGULATORS**

**Explanatory Material on ESARR 3
Requirements**

Edition	:	1.0
Edition Date	:	01-06-2001
Status	:	Released Issue
Class	:	General Public

DOCUMENT IDENTIFICATION SHEET

DOCUMENT DESCRIPTION

Document Title
 ESARR 3 Guidance to ATM Safety Regulators
 Explanatory Material on ESARR 3 Requirements

REFERENCE: EAM 3 / GUI 1	EDITION :	1.0
	EDITION DATE :	01-06-2001

Abstract

This guidance material has been prepared by the Safety Regulation Commission to provide guidance for ATM safety regulators and support the implementation of ESARR 3.

The main purpose of this document is to provide guidance about the provisions established in ESARR 3, Section 5 'Safety Requirements'. Each requirement is illustrated by giving explanatory material that includes a rationale, the most significant implications for both Regulator and Provider, and information about further development.

This is the first deliverable of a series of guidance documents to be developed by SRC.

Keywords

ESARR 3	SMS	Safety Management	Safety Achievement
Safety Assurance	Safety Promotion		

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DOCUMENT STATUS AND TYPE

STATUS		CATEGORY		CLASSIFICATION
Working Draft	<input type="checkbox"/>	Safety Regulatory Requirement	<input type="checkbox"/>	General Public <input checked="" type="checkbox"/>
Draft	<input type="checkbox"/>	Comment/Response Document	<input type="checkbox"/>	Restricted EUROCONTROL <input type="checkbox"/>
Proposed Issue	<input type="checkbox"/>	ESARR Advisory Material	<input checked="" type="checkbox"/>	Restricted SRC <input type="checkbox"/>
Released Issue	<input checked="" type="checkbox"/>	Policy Document	<input type="checkbox"/>	Restricted SRU <input type="checkbox"/>
		Document	<input type="checkbox"/>	

ELECTRONIC BACKUP

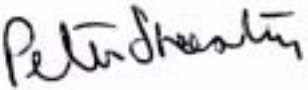
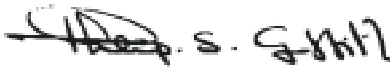
INTERNAL REFERENCE NAME : SRC\REG.\SRC OFF. PUBL.\EAM\EAM 3\GUI
 1\eam3gui3e10ri.doc

HOST SYSTEM	MEDIA	SOFTWARE(S)
EUROCONTROL Network Printing date:20/02/02	Type : Hard disk	MS Office Word 7.0
	Media Identification :	MS WINDOWS NT4.0

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DOCUMENT APPROVAL

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DOCUMENT CHANGE RECORD

The following table records the complete history of the successive editions of the present document.

EDITION	DATE	REASON FOR CHANGE	SECTIONS PAGES AFFECTED
0.01	10 Jan. 2000	Creation – First working draft 0.01 from SRU. Distributed to RTF and SRU for review and comment.	All
0.02	03 May 2000	New working draft incorporating comments from RTF and SRU. Submitted to SRC for formal consultation.	All
0.1	27 Nov. 2000	New draft incorporating comments received from RTF review and formal SRC consultation. Previous document transformed into the two first deliverables of a series of documents	All
0.2	05 April 2001	New version incorporating comments received through EUROCONTROL-wide consultation. Submitted as a Proposed Issue for SRC approval by correspondence.	All
1.0	01 June 2001	Released Edition after SRC approval by correspondence. Minor modification to update the guidance on Safety Surveys	Section 5.2

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EXECUTIVE SUMMARY

This guidance material has been prepared by the Safety Regulation Commission to provide guidance for ATM Safety Regulators and support the implementation of ESARR 3.

Within the overall management of their ATM services, ATM service-providers shall have in place safety management systems (SMS) in accordance to ESARR 3. In order to deal with that new scenario, ATM safety regulators may need to re-consider their regulatory approach.

The main purpose of this document is to provide guidance about the provisions established in ESARR 3, Section 5 'Safety Requirements'. Each requirement is illustrated by giving explanatory material that includes a rationale, the most significant implications for both Regulator and Provider, and information about further development.

This is the first deliverable of a series of guidance documents to be developed by SRC.

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ESARR 3 GUIDANCE TO ATM SAFETY REGULATORS

Explanatory Material on ESARR 3 Requirements

1. INTRODUCTION

A standardised approach to the formatting of EUROCONTROL Safety Regulatory Requirements is used to referencing, and to clarify the status of information contained in the documents.

The requirements template includes a Section 5, '*Safety Requirements*,' to provide a statement of precise actions which are considered necessary to achieve the stated safety objectives. This section includes all applicable mandatory requirements (expressed using the word "shall"), including those relating to implementation.

The main purpose of this document is to illustrate the provisions of Section 5 '*Safety Requirements*' established by ESARR 3 and facilitate its interpretation.

After a brief overview of ESARR 3 Section 5, each requirement is illustrated by providing explanatory material that includes a rationale, the most significant implications for both Regulator and Provider, and information about further development.

2. SECTION 5 – SAFETY REQUIREMENTS OVERVIEW

ESARR 3, Section 5 ‘*Safety Requirements*’, is formed by four sub-sections:

- 5.1. General requirement
- 5.2. Requirements for Safety Achievement
- 5.3. Requirements for Safety Assurance
- 5.4. Requirements for Safety Promotion

2.1 General Requirement

It requires the implementation of safety management systems by ATM service providers, as an integral part of the management of ATM services.

This sub-section defines the minimum principles of any SMS and provides a definition for the SMS concept:

SMS is a systematic and explicit safety management approach,

- ▶ Implemented in each ATM service-provider organisation;
- ▶ Covering not only its ATM services, but also those supporting services (such as CNS) that are under its managerial control;
- ▶ Arising from a safety policy;
- ▶ Allocating safety responsibilities within the organisation;
- ▶ Defining safety objectives aimed to minimise the ATM contribution to the risk of an aircraft accident; and
- ▶ Identifying safety as the highest priority of the ATM service-provider organisation.

The General Requirement should be considered by each service-providers to define the safety policy from which a complete SMS is to be derived and deployed.

2.2 Requirements for Safety Achievement

This sub-section requires specific processes and arrangements by which the safety performance of the organisation is to meet high safety standards.

Two different categories of requirements may be identified:

- Requirements defining the minimum organisational arrangements needed for the management of safety. Four basic features have been identified:
 - a) **Competency:** personnel competency has to be ensured;
 - b) **SMS Documentation:** the SMS is to be developed as a documented system deployed from a safety policy in form of safety management manuals or equivalent documentation;
 - c) **Safety Management Function:** a safety managerial function has to be defined and allocated within the organisation; and
 - d) **External Services:** processes have to ensure that external inputs do not erode the safety levels of the organisation.
- Requirements defining systematic actions needed to meet high safety standards. These actions are key tools to achieve the organisation's safety objectives:
 - a) **Quantitative Safety Levels:** safety levels are defined and a quantitative approach is used whenever possible.
 - b) **Risk Assessment and Mitigation:** processes are established to provide risk assessment and mitigation for new systems and significant changes.
 - c) **Safety Occurrences:** investigation of safety occurrences is carried out internally in order to avoid their recurrence.



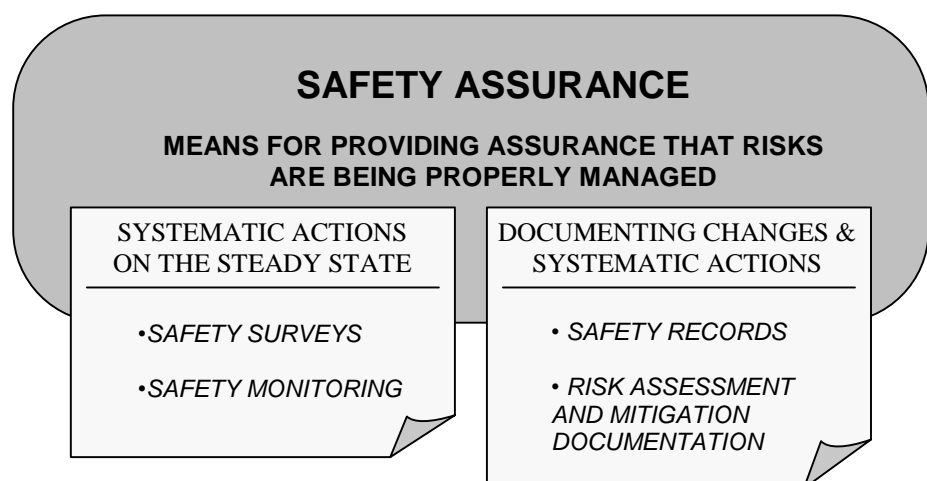
(Figure 2.1 – Safety Achievement Requirements)

2.3 Requirements for Safety Assurance

This sub-section requires specific processes to provide assurance that risks are being properly managed.

Two different categories of requirements may be identified:

- Requirements defining systematic surveillance actions conducted as a matter of routine to provide safety assurance for the steady state of the ATM system:
 - a) **Safety Surveys** to verify safety internally in on-going activities, provide assurance and confirm conformance with the safety management system.
 - b) **Safety Monitoring**, carried out by means of methods to detect and recognise undesirable trends in safety performance.
- Requirements concerning processes to document actions and changes. This category concerns:
 - a) **Safety records** that have to be produced and maintained throughout the operation of all SMS processes; and the
 - b) **Risk Assessment and Mitigation Documentation** specifically produced and maintained to provide safety assurance for the introduction of new systems and changes into operational service.



(Figure 2.2 – Safety Assurance Requirements)

2.4 Requirements for Safety Promotion

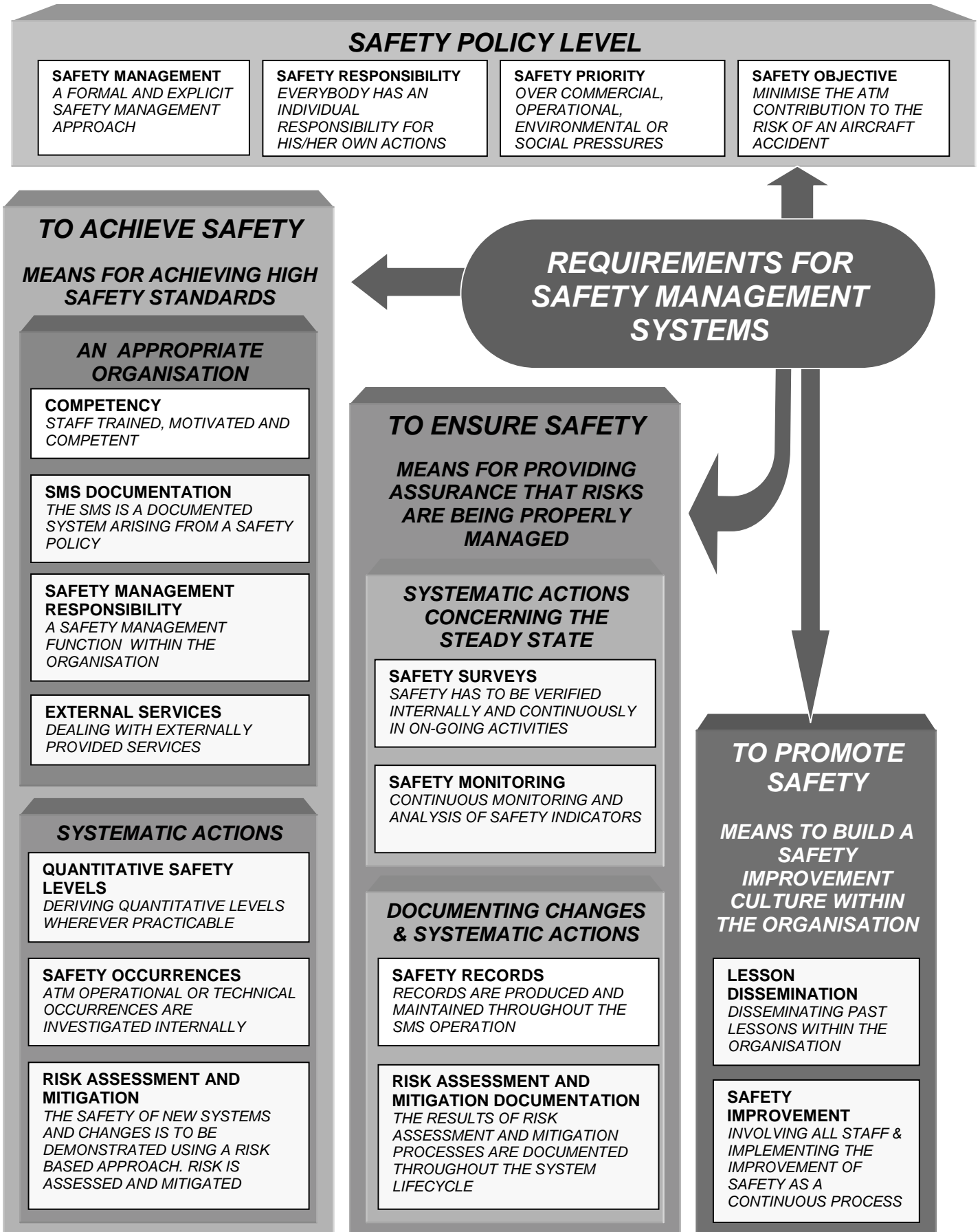
This sub-section requires specific SMS processes to provide the means by which a safety improvement culture is built and the safety issues are communicated to eliminate unnecessary risks and avoid repeat errors or risks.

An essential factor in managing successfully safety is the establishment of a safety improvement culture by running the organisation in such a way that safety and its continuous improvement are seen as the primary goals, with consciousness of safety evident in every activity. Moreover, the organisation and its management and personnel should realise that managing safety is a way of meeting business objectives.

It is essential that lessons learned from past experiences are implemented within the organisation to reduce the chances of recurrence. Moreover, all staff should be actively involved in improving safety, developing an internal safety culture to encourage safety improvement.



(Figure 2.3 – Safety Promotion Requirements)



3. GENERAL REQUIREMENT

3.1 General Considerations

ATM service-providers shall have in place a SMS arising from a safety policy which, as a minimum, should include, or derive statements in accordance with the requirements on 'Safety Management', 'Safety Responsibility', 'Safety Priority' and 'Safety Objective of the ATM Service'.

Before an ATM service-provider is regulated on the basis of its safety management system, the Regulator should accept the system and associated processes to be employed.

Although no specific approval processes are required by ESARR 3, normally a sort of organisational approval process should be used.

The review and acceptance of the organisation's safety policy will generally be the first step in any regulatory process developed to accept a safety management system. The safety policy constitutes the foundation on which a safety management documented system will be built.

The safety policy should be a short document that defines the organisation's policy and commitment to safety. The policy needs to be widely communicated throughout the organisation.

3.2. Safety Management

3.2.1 Requirement:

The requirement states that an ATM service-provider shall, as an integral part of the ATM service, have in place a SMS which:

"Ensures a formalised, explicit and pro-active approach to systematic safety management in meeting its safety responsibilities within the provision of ATM services;"

"Operates in respect of all ATM and supporting services which are under its managerial control;"

"Includes, as its foundation, a statement of safety policy defining the organisation's fundamental approach to managing safety."

3.2.2 Rationale and Implications:

Safety management is that part of the overall management function, which determines and implements the safety policy of an organisation.

Providers shall adopt an explicit, pro-active and systematic approach. Neither implicit methods embedded within operational functions, nor intuitive and ad hoc approaches, are enough. Safety must be addressed explicitly. Its management should be treated like any other organisation's managerial function, with a manager, planning, targets, budgets and results.

In accordance to this requirement, safety policy statements –a safety policy– shall define the organisation's fundamental approach to the management of safety. The safety policy identifies the overall objectives and practices of an organisation as regards safety. It commits the organisation at all levels to the fulfilment of its statements.

The safety policy should be internally approved by the most senior level of management within the organisation.

The SMS scope is also determined by this requirement. Within each organisation providing ATM services, the SMS has to cover not only ATM services but also other supporting services, such as CNS services and functions, which are under the managerial control of the organisation.

3.3 Safety Responsibility

3.3.1 Requirement:

The requirement states that an ATM service-provider shall, as an integral part of the ATM service, have in place a SMS which:

“Ensures that everyone involved in the safety aspects of ATM service-provision has an individual safety responsibility for their own actions, and that managers are responsible for the safety performance of their own organisations”.

3.3.2 Rationale and Implications:

The rationale is that the safety management system depends upon individual understandings and accepting their delegated responsibility within the organisation. Accountability for safety belongs to all levels of management and the achievement of satisfactory performances requires the commitment and participation of all the members of the organisation. Management should foster this basic motivation within members of an organisation so that everybody accepts their responsibility for safety.

ATM service providers should make a safety policy statement to confirm that everybody has an individual responsibility for the safety of their own actions and that managers are accountable for the safety performance of the activities for which they have responsibility. Additionally, the organisation should identify who is ultimately accountable for safety and how that accountability is delegated.

3.4 Safety Priority

3.4.1 Requirement:

The requirement states that an ATM service-provider shall, as an integral part of the ATM service, have in place a SMS which:

“Ensures that the achievement of satisfactory safety in ATM shall be afforded the highest priority over commercial, operational, environmental or social pressures”.

3.4.2 Rationale and implications:

The SMS should address and resist conflicting business pressures. Conversely, the SMS should ensure that safety is not used to support commercial, financial or other decisions inappropriately. If the term safety is abused in this way, the SMS can not be focussed on controlling real hazards.

ATM service providers should make a safety policy statement committing them to ensuring that the consideration of safety is given the highest priority when assessing commercial, operational, environmental or social pressures.

3.5 Safety Objective of the ATM Service

3.5.1 Requirement:

The requirement states that an ATM service-provider shall, as an integral part of the ATM service, have in place a SMS which:

“Ensures that while providing an ATM service, the principal safety objective is to minimise the ATM contribution to the risk of an aircraft accident as far as reasonably practicable.”

3.5.2 Rationale and Implications:

That should be an essential policy statement defining what the organisation is striving to achieve from its SMS. Note that risks are the subject as there is no such thing as absolute safety. The meaning of “as far as reasonably practicable” is that risks must be balanced against time, trouble, costs and difficulty of taking measures to avoid them. The greater the risk to safety, the more likely it is that it is reasonable to go to substantial effort to reduce it.

ATM service providers should adopt a safety policy statement committing them to a business objective for safety that minimises its contribution to aviation accident risk to as low as reasonably practicable.

3.6 Conclusions

The General Requirement identifies four minimum elements to be considered by ATM service-providers in the definition of the basic principles for their SMS. It also determines the SMS scope. These aspects should be addressed in form of specific safety policy statements or as basic principles directly derived from a Safety Policy.

Clear policy statements should cover the four policy elements and establish a clear commitment of the organisation with them as identified by ESARR 3.

Regulatory processes should ensure that these four elements, or equivalent ones, are properly considered throughout the complete safety management documented system arising from high level safety policy statements.

4. REQUIREMENTS FOR SAFETY ACHIEVEMENT

4.1 General Considerations

ATM service providers shall implement organisational arrangements and systematic processes to ensure within the operation of SMS:

- Appropriate organisational capabilities in accordance with the requirements on ‘Competency’, ‘Safety Management Responsibility’, ‘SMS Documentation’ and ‘External Services’.
- Systematic safety achievement actions to meet the requirements on ‘Quantitative Safety Levels’, ‘Safety Occurrences’ and ‘Risk Assessment and Mitigation’.

Regulators should review and formally accept those organisational arrangements and systematic processes as parts of a complete documented safety management system. Further amendments and changes to the safety management documented system should also be reviewed and accepted.

In addition, regulatory processes should regularly evaluate the effective implementation of organisational arrangements and processes through external safety regulatory auditing and other oversight methodologies.

4.2 Competency

4.2.1 Requirement:

The requirement states that, within the operation of the SMS, the service provider:

“Shall ensure that staff are adequately trained, motivated and competent for the job they are required to do, in addition to being properly licensed if so required.”

4.2.2 Rationale and Implications:

All persons involved in any related activity, including management activities, shall have the appropriated education, training, technical and/or operational knowledge, experience and qualification relevant to the specific duties they have to perform.

4.2.3 Conclusions:

This requirement means that ATM service providers should normally establish processes to:

- Define job descriptions for safety related functions, to specify the minimum level of education for the job, the amount, type and diversity of required experience;
- Set up staff selection criteria derived from those job descriptions;
- Implement associated training programmes, encompassing safety management issues.

Regulators should consider these elements, or equivalent ones, as important aspects to be ensured by ATM providers in accordance with appropriate regulations.

4.2.4 Further Development:

ESARR 5 provides further safety regulatory requirements on ATM personnel.

4.3 Safety Management Responsibility

4.3.1 Requirement:

The requirement states that, within the operation of the SMS, the service provider:

“Shall ensure that a safety management function is identified with organisational responsibility for development and maintenance of the safety management system;”

“Shall ensure that this point of responsibility is, wherever possible, independent of line management, and accountable directly to the highest organisational level;”

“Shall ensure that, in the case of small organisations where combination of responsibilities may prevent sufficient independence in this regard, the arrangements for safety assurance are supplemented by additional independent means;”

“Shall ensure that the highest level of the service provider organisation plays a general role in ensuring safety management.”

4.3.2 *Rationale and Implications:*

In the short term, a well-designed SMS should run itself, or more accurately, be operated by staff without specific safety management responsibilities. This is because nearly all the day-to-day activities required by the SMS procedures should be the responsibility of staff carrying out their 'normal' duties and work. However, this is the short-term situation and after some time entropy –the tendency for any system to become disorganised- will inevitably set in. The consequences in the SMS will be that it ceases to be effective and will eventually cease to produce any benefits. To avoid these results, responsibilities for the management of the SMS need to be clearly defined and understood.

Assigning responsibilities for managing the SMS can prevent those problems, and in large organisations one person –the safety manager- will usually shoulder these. However, it is essential to recognise that there is a key distinction between responsibility *'for managing the SMS'* and responsibility *'for the SMS'*. As mentioned above, a SMS involves staff carrying out procedures in their normal work. The SMS is, therefore, owned by and the responsibility of the organisation as a whole and its success or failure cannot be offloaded onto the safety manager. However, the *'organisation as a whole'* is an abstraction and responsibility for the system must be recognised and taken on by all staff involved in the activities covered by the SMS. Above all, this must involve the organisation's senior management.

The separation of responsibility for the management of the SMS from the responsibility for the SMS also sets limits to the role of a safety manager. Even if he or she has the time available, the safety manager should not take on tasks which properly lie with line management and their staff. Nevertheless, in the case of small organisations this could imply difficulties. In those situations, alternative arrangements involving external support can be acceptable to fulfil ESARR 3.

It should be noted that the responsibility *'for managing the SMS'* implies that the safety management function has a safety responsibility in accordance with ESARR 3, Section 5.1.2 *'Safety Responsibility'*. In the light of that requirement, everyone has an individual safety responsibility for his/her own actions. This principle also concerns the safety management function.

However, the safety management function is by no means responsible for safety as a whole within the organisation, but only for safety within the management tasks of the SMS.

4.3.3 *Conclusions:*

The requirement means that ATM service providers should normally:

- Define responsibilities for the management of the SMS, and identify a safety management function within the organisation;
- Ensure, wherever possible, independence of line management and direct accountability to the highest organisational level;
- Consider, define and arrange -in case of small organisations- additional external and independent support to balance situations where combination of responsibilities within the organisation does not ensure sufficient independence of line management.
- Appoint a safety manager to be part of the team responsible for the overall management function of the organisation;

Regulators should consider these elements, or equivalent ones, as important aspects to be ensured by ATM providers in accordance to appropriate regulations.

4.4 Quantitative Safety Levels

4.4.1 Requirement:

The requirement states that, within the operation of the SMS, the service provider:

“Shall ensure that, wherever practicable, quantitative safety levels are derived and are maintained for all systems;”

4.4.2 Rationale and Implications:

The level of safety that the organisation seeks to achieve should be defined. Levels of safety are usually expressed in terms of risk. The purpose of specifying safety levels in terms of risk level for a specific hazard is to state what is deemed reasonable with respect to both the frequency (or probability) of the hazardous event and its specific consequence. Levels of safety may be specified either quantitatively or qualitatively.

Risk classification schemes could be used to derive safety levels. They could also be defined by:

- ICAO Standard and Recommended Practices (SARPS)
- EUROCONTROL Safety Regulatory Requirements (e.g. ESARR 4)
- National and international safety regulatory requirements.

- International agreement on best practices

4.4.3 *Conclusions:*

This requirement means that ATM service providers should normally establish processes to:

- Specify levels of safety for all systems, using a quantitative approach wherever possible;
- Plan all management and technical activities, which are necessary to achieve the specified level of safety;

Regulators should consider these elements, or equivalent ones, as important aspects to be ensured by ATM providers in accordance to appropriate regulations.

4.4.4 *Further Development:*

An additional EUROCONTROL Safety Regulatory Requirement (ESARR 4) and associated guidance material has been developed by SRC. ESARR 4 provides specific requirements for risk assessment and mitigation in ATM as well as requirements on the development of national risk classification schemes.

4.5 **Risk Assessment and Mitigation**

4.5.1 *Requirement:*

The requirement states that, within the operation of the SMS, the service provider:

“Shall ensure that risk assessment and mitigation is conducted to an appropriate level to ensure that due consideration is given to all aspects of ATM;”

“Shall ensure that changes to the ATM system are assessed for their safety significance, and ATM system functions are classified according to their safety severity;”

“Shall ensure appropriate mitigation of risks where assessment has shown this to be necessary due to the safety significance of the change;”

4.5.2 *Rationale and Implications:*

Risk assessment and mitigation is an analytical activity, which supports the complete system life cycle activities. In general terms, this process involves:

- The identification of potential failure conditions and their classification according to their severity,
- The identification and validation of the means used to eliminate or mitigate the effects of these failure conditions,
- The verification that specific implementations satisfy the means.

The scope of risk assessment and mitigation activities will usually be dependent on the safety significance of the system. Other factors, such as the complexity of the system, may also influence the scope of the assessment.

Since equipment, people and procedures form systems where different levels or sub-systems can be identified; system levels to be addressed should be identified by taking into account combinations of equipment, people and procedures, which may have an impact on the operation.

Risk assessment and mitigation processes should primarily be focussed on system levels where all the elements and functions are actually integrated to provide a complete service; that is to say, on operational units. ACC or TWR are examples of operational units to deal with. In addition, significant equipment in operational units may be specifically considered through further risk assessment and mitigation actions.

4.5.3 *Conclusions:*

This requirement means that ATM service providers should normally establish processes:

- Ensuring that hazard identification and risk management is systematically conducted for any changes to those parts of the ATM System within his operational responsibility, in a manner which:
- Covers the complete lifecycle of the constituent part of the ATM System under consideration, from initial planning and definition to post-implementation operations and maintenance;
- Addresses the three different types of ATM elements forming systems (human, procedures and equipment), the interactions between these three elements and the interactions between the constituent part under consideration and the remainder of the ATM system; and
- Addresses systems by taking into account any combination of equipment, people and procedures, which can have an impact on the operation; primarily focussing processes on operational units.

Regulators should consider these elements, or equivalent ones, as important aspects to be ensured by ATM providers in accordance to appropriate regulations.

4.5.4 *Further Development:*

To develop ESARR 3 requirements on '*Risk Assessment and Mitigation*' and '*Risk Assessment and Mitigation Documentation*' and identify specific methodologies to be used, ESARR 4 ('*Risk Assessment and Mitigation in ATM*') has been approved by EUROCONTROL.

As part of the EATMP safety management approach, the Air Navigation System Safety Assessment Methodology (SAF ET1.ST03.1000-MAN, Edition 1.0) is considered as a useful guidance when implementing risk assessment and mitigation in accordance with ESARR 4.

4.6 **SMS Documentation**

4.6.1 *Requirement:*

The requirement states that, within the operation of the SMS, the service provider:

“Shall ensure that the SMS is systematically documented in a manner, which provides a clear linkage to the organisation’s safety policy.”

4.6.2 *Rationale and Implications:*

ESARR 3 requires SMS to be systematically documented and specifically refers to a need for a safety policy.

Different acceptable formats might be suggested but, in any case, a top-down approach should be followed. The documented system could be represented in pyramid form with the safety policy at its top. The documents layers higher up will be more general and shorter than those shown nearer the base.

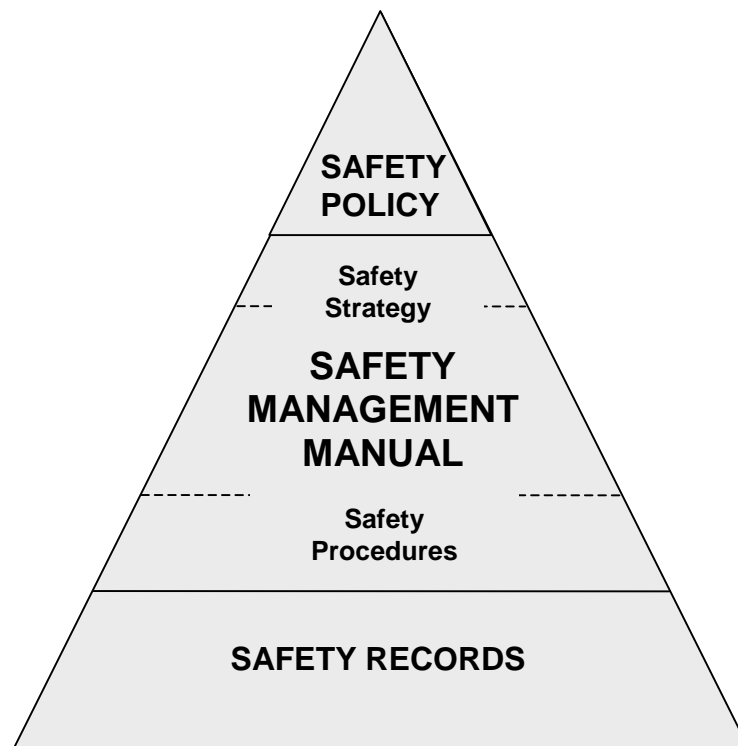
All staff should need to be aware of and understand the safety policy of the organisation this could be helped by making copies widely available.

Normally, a safety management manual (or manuals) will play an essential role within the documented system. The safety management manual will usually document:

- The organisation policy statements; and the derived safety management strategy,

- The definition of safety responsibilities, as well as the terms of reference of the safety organisation;
- The specification of safety procedures and instructions, covering as a minimum all the processes required by ESARR 3.

The safety management manual is a major means to communicating the organisation's approach to safety to all employees. It should not be a static document. It has to be regularly reviewed to reflect changes in the organisation, procedures, equipment, etc.



(Figure 4.1 – SMS Documentation: Example of SMS Documented System)

Safety procedures should describe in practical and actionable terms what has to be done to comply with the SMS. Each safety procedure should be understandable, actionable, auditable and mandatory. All the SMS safety procedures can be bound together and all staff given access to the complete set, forming a safety procedures manual. An alternative approach is for departments to have available just those procedures, which are relevant to their own work and this may be the better approach in a larger organisation.

Different safety records and deliverables are created throughout SMS operation and safety procedures will determine their format and whose responsibility it is to produce them.

4.6.3 *Conclusions:*

This requirement means that ATM service providers should normally:

- Document the SMS by making use of a top-down approach deriving from the safety policy statements;
- Define a useful format for the SMS documented system; in accordance with ESARR 3;
- Define safety procedures (procedures, instructions or similar) covering, as a minimum, all the processes required by ESARR 3; involving the wider range of staff in this definition process;
- Ensure that safety procedures are understandable, actionable, auditable and mandatory;
- Establish documentation control procedures and methods to manage SMS documents and other safety-related documents;
- Link the SMS documentation control system to the safety management function within the organisation.

Regulators should consider these elements, or equivalent ones, as important aspects to be ensured by ATM providers in accordance to appropriate regulations.

4.7 **External Services**

4.7.1 *Requirement:*

The requirement states that, within the operation of the SMS, the service provider:

“Shall ensure adequate and satisfactory justification of the safety of the externally provided services, having regard to their safety significance within the provision of the ATM service.”

4.7.2 *Rationale and Implications:*

The SMS scope will define the boundaries of a sort of “*safety universe*” in which the elements covered by SMS may be assumed as safe enough.

It should be noted that inputs coming from outside could erode safety levels in our “universe” if we do not manage them properly. External inputs, whether these are goods or services, should be identified and assessed to ensure appropriate safety levels within the organisation.

Ideally, safety and quality assurance processes used by external suppliers should satisfy our internal safety management standards and applicable safety requirements. In some cases, ATM providers can effectively choose between different suppliers. Good procurement procedures may be enough to meet the requirement in those situations.

However, situations exist where there are no options and the input has to be accepted as the only possible one. In these cases, actions have to be defined to identify possible safety problems and mitigate risks. This means that external inputs (products, services, information, etc) have to be assessed in terms of safety in order to identify hazards and implement appropriate mitigation measures (monitoring, redundancy, operational procedures, etc).

4.7.3 *Conclusions:*

This requirement means that ATM service providers should normally establish processes in respect of external services having a significant influence on safety:

- To assess external services from a safety point of view and define mitigation measures ensuring that inputs from outside do not erode the safety of ATM services;
- Whenever possible, to select suppliers on the basis of their ability to meet safety standards and requirements, evaluate them systematically, and take appropriate action on the basis of periodical evaluations ensuring that the provision of external services is restricted to evaluated suppliers;
- To agree on special arrangements with suppliers to ensure safety whenever possible and necessary;
- To monitor the externally supplied goods and services having a significant influence on safety, providing data for supplier performance assessment.

Regulators should consider these elements, or equivalent ones, as important aspects to be ensured by ATM providers in accordance to appropriate regulations.
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4.8 Safety Occurrences

4.8.1 Requirement:

The requirement states that, within the operation of the SMS, the service provider:

“Shall ensure that ATM operational or technical occurrences which are considered to have significant safety implications are investigated immediately, and any necessary corrective action is taken.”

4.8.2 Rationale and Implications:

An immediate response to observed safety deficiencies may prevent their repetition. Internal incident investigation may provide an appropriate response to safety occurrences at both operational and technical level.

Investigations performed by external bodies may take a large amount of time before its conclusion is known. The primary purpose of internal investigation is therefore to respond to identified safety deficiencies by short-term, and complement international and/or national mandatory investigation regulations on occurrences, incidents or accidents.

Different steps could be considered in the definition of an internal investigation process, but it is always important:

- To identify the criteria to initiate an occurrence investigation.
- To identify corrective actions with respect to the potential consequence of the identified hazards and its probability of reoccurrence
- To define follow up of corrective actions
- To deliver an investigation report.

Internal investigation processes should take into account the implementation of national occurrence reporting and assessment schemes for ATM-related occurrences in accordance with ESARR 2. That requirement includes harmonised terminology and a list of ATM-related occurrences which shall, as a minimum, be reported and assessed by States.

4.8.3 Conclusions:

This requirement means that ATM service providers should normally establish processes:

- To investigate safety occurrences, internally and systematically, in order to prevent accidents and incidents without apportioning blaming or liability;
- To ensure traceability with causal factors and safety consequences;
- To identify corrective actions and their associated follow up; and
- To consider links with national safety occurrence reporting schemes established in accordance with ESARR 2;

Regulators should consider these elements, or equivalent ones, as important aspects to be ensured by ATM providers in accordance to appropriate regulations.

5. REQUIREMENTS FOR SAFETY ASSURANCE

5.1 General Considerations

In order to provide assurance that risks are being properly managed, ATM service providers shall implement organisational arrangements and systematic processes to ensure, within the operation of the SMS:

- Continuous surveillance to provide safety assurance on the steady state of the ATM system in accordance with the requirements on ‘*Safety Surveys*’ and ‘*Safety Monitoring*’;
- ‘*Safety Records*’ to document and demonstrate the results of processes;
- ‘*Risk Assessment and Mitigation Documentation*’ to provide safety assurance on changes in the ATM system and present the results of risk assessment and mitigation processes.

Regulators should review and formally accept those organisational arrangements and systematic processes as parts of a complete safety management documented system, as well as further amendments to the safety management documented system.

Regulatory processes should continuously evaluate the implemented organisational arrangements and processes by means of external regulatory auditing and other oversight methodologies.

5.2 Safety Surveys

5.2.1 Requirement:

The requirement states that, within the operation of the SMS, the service provider:

“Shall ensure that safety surveys are carried out as a matter of routine, to recommend improvements where needed, to provide assurance to managers of the safety of activities within their areas and to confirm conformance with applicable parts of their Safety Management Systems;”

5.2.2 Rationale and Implications:

A safety survey is a preventive activity which main purpose is to confirm that an existing situation is satisfactory. It is a “routine” activity to identify problems and facilitate the definition of remedial actions when problems are identified or

suspected. Surveys are complementary to incident investigation, since they examine systems under normal conditions to identify weaknesses that have not yet been seen to contribute directly or indirectly to an occurrence.

The role of a safety survey is quite similar to the one performed by quality audits in QMS. Both activities are conducted to check compliance with standards (or targets) and procedures, detect problems and facilitate the identification of solutions and improvements. Quality auditing methodologies can therefore be used for designing safety survey processes. In particular, quality auditing as proposed by ISO-9001:2000 may provide an approach aimed at prevention in line with the safety survey concept.

Safety surveys should follow a pro-active approach beyond the checking for conformance of working practices against procedures. By checking processes against procedures and products against specifications, compliance with safety procedures can be verified, and this may take care of one aspect of safety surveying, but complementary actions should improve that approach in a safety management system.

A review in the form of risk assessment of areas of activity or grouped topics may complement methodologies based on the use of checklists drawn up from local procedures and instructions. Fixed checklists assume that all potential hazards have been previously identified. Interviews and risk assessment reviews would provide additional ways of detecting safety problems, focussing attention on issues of specific concern and leaving more to the initiative and experience of the survey team.

Safety surveys should be internally carried out conducted by independent and adequately trained personnel. Since 'independent' would normally mean independent of the area being surveyed, different ways might be suggested to achieve independence. The most common options would be using specific personnel, cross-auditing and external support. The safety manager should head up safety surveys and be responsible for the recruitment, training and review of the personnel conducting this activity.

The surveys can review operational units, particular operational and engineering activities or facilities. Surveys should also be performed to review SMS processes established to meet ESARR 3 requirements. The objectives are to assess factors affecting safety in operational units, significant activities and SMS safety processes, and facilitate the identification of corrective actions wherever necessary.

5.2.3 *Conclusions:*

This requirement means that ATM service providers should normally establish processes:

- To carry out safety surveys as a matter of routine to review operational units and significant areas of activity; and

- To carry out safety surveys as a matter of routine to audit SMS safety processes; in a manner which:
- Ensures independence of the area being surveyed; and
- Ensures systematic planning, assessment of all factors affecting safety, identification of corrective actions, record of results, initiation and follow up of corrective actions, as the key elements of safety surveys.

Regulators should consider these elements, or equivalent ones, as important aspects to be primarily ensured by ATM providers in accordance to appropriate regulations.

5.3 Safety Monitoring

5.3.1 Requirement:

The requirement states that, within the operation of the SMS, the service provider:

"Shall ensure that methods are in place to detect changes in systems or operations which may suggest any element is approaching a point at which acceptable standards of safety can no longer be met, and that corrective action is taken."

5.3.2 Rationale and Implications:

To ensure that specified safety levels are maintained, systematic safety monitoring processes should evaluate, as a matter of routine, performance in both operational and engineering activities.

Performance can be evaluated by means of monitoring safety indicators to be defined in accordance to specified safety levels (see 'Quantitative Safety Levels'). Normally the evolution of these indicators would be used to analyse trends and detect unwanted degradation of safety levels. Information should be analysed to compare safety indicators with quantitative safety levels. Consequently, corrective actions should be identified after detecting any deterioration of specified safety levels.

5.3.3 Conclusions:

This requirement means that ATM service providers should normally establish processes:

- To monitor safety performances in operational and engineering activities as a matter of routine; in a manner which

- Makes use of safety indicators to analyse their evolution with time so as to evaluate trends and detect deterioration;
- Identifies and initiates corrective actions where deterioration is detected, ensuring follow-up of actions.

Regulators should consider these elements, or equivalent ones, as important aspects to be ensured by ATM providers in accordance to appropriate regulations.

5.4 Safety Records

5.4.1 Requirement:

The requirement states that, within the operation of the SMS, the service provider:

“Shall ensure that safety records are maintained throughout the SMS operation as a basis for providing safety assurance to all associated with, responsible for or dependent upon the services provided, and to the safety regulatory authority;”

5.4.2 Rationale and Implications:

Providing documented safety assurance is one of the SMS objectives. Documentation is produced to demonstrate results and record processes.

Safety records are created throughout the SMS operation. Appropriate procedures should determine their format and, in each case, specify the form in which records have to be made and who is responsible for ensuring that this is done.

Safety records could be perceived as a negative and bureaucratic element. In this view, records would be kept just because the Requirement demands it. However, safety records are needed not only to demonstrate that SMS is operating but also to provide data and traceability which can be used to identify and solve actual safety problems.

ESARR 3 requires specific records in relation to the introduction of new systems and changes (*‘Risk Assessment and Mitigation Documentation’*).

Apart from that, ESARR 3 only provides very generic principles on safety record-keeping activities: records have to be maintained throughout SMS operations; that is to say, in relation to the fulfilment of all SMS processes. Accordingly, there is a need to identify the safety records to be kept for each

SMS process, ensuring that only those critical to safety are to be maintained. The effort that goes into record keeping should, therefore, be balanced against the value of data. In particular, a special effort should be made to ensure proper records documenting safety assurance processes (safety surveys, safety monitoring, etc)

Other international or national regulations and standards may require specific safety records as a basis for providing regulators with safety assurance to facilitate regulatory safety oversight functions.

5.4.3 *Conclusions:*

This requirement means that ATM service providers should normally establish processes:

- To specify, in each case, the form in which safety records are to be made and who is responsible for ensuring that this is done.
- To identify the safety records to be maintained in relation with all SMS processes to provide data and traceability and facilitate the identification and solution of safety problems;
- To ensure appropriate safety records and documentation for internal safety assurance processes, such as ‘*Safety Surveys*’ and ‘*Safety Monitoring*’.
- To maintain safety records required by different international and national safety regulatory requirements and standards.

Regulators should consider these elements, or equivalent ones, as important aspects to be ensured by ATM providers in accordance to appropriate regulations.

In order to facilitate regulatory oversight processes, appropriate regulations should identify safety records which may provide safety assurance for the safety regulatory authority.

5.5 Risk Assessment and Mitigation Documentation

5.5.1 *Requirement:*

The requirement states that, within the operation of the SMS, the service provider:

“Shall ensure that the results and conclusions of the risk assessment and mitigation process of a new or changed safety significant system are specifically documented, and that this documentation is maintained throughout the life of the system.”

5.5.2 *Rationale and Implications:*

ESARR 3 devotes particular attention to risk assessment and mitigation processes that support decision-making on the introduction of new systems and changes. Risk Assessment and Mitigation Documentation is specifically required. This complements the ‘*Safety Records*’ requirement in that particular case on the strength of its safety significance.

ATM providers should document the results of risk assessment and mitigation processes in order to provide arguments and evidence that a system under consideration meets or exceeds appropriate standards of safety. The results of risk assessment and mitigation processes should be recorded in a living document to be systematically maintained throughout the complete operational lifecycle of the system.

Risk Assessment and Mitigation Documentation should prove that hazards have been identified and controlled in both engineering and operational areas and that qualitative and quantitative specified safety levels have been achieved.

5.5.3 *Conclusions:*

This requirement means that ATM service providers should normally establish processes:

- To record and document specifically the results of risk assessment and mitigation processes, to provide argument and evidence that systems are safe to be operated, in a manner which:
- Provides demonstration that hazards have been identified and eliminated or mitigated;
- Covers the complete lifecycle of the constituent part of the ATM System under consideration, from initial planning and definition to post-implementation operations and maintenance; and
- Addresses systems consisting of any combination of equipment, people and procedures, which can have an impact on the operation.

Regulators should consider these elements, or equivalent ones, as important aspects to be ensured by ATM providers in accordance with appropriate regulations.

Regulators should ensure the assessment of new systems and changes to the ATM system in the light of risk assessment and mitigation processes carried out by the Provider.

The regulatory approach adopted may depend on the significance of systems and other factors. Safety regulators may decide:

- To establish formal regulatory acceptance processes based on the results of SMS risk assessment and mitigation or,
- To focus special safety oversight (audits, inspection, monitoring) on the provider's processes to introduce new systems and changes.

5.5.4 *Further Development:*

To develop ESARR 3 requirements on '*Risk Assessment and Mitigation*' and '*Risk Assessment and Mitigation Documentation*', and identify methodologies to be used, ESARR 4 ('*Risk Assessment and Mitigation in ATM*') has been developed by SRC.

As part of the EATMP safety management approach, the Air Navigation System Safety Assessment Methodology (SAF ET1.ST03.1000-MAN, Edition 1.0) is considered as a useful guidance when implementing risk assessment and mitigation in accordance with ESARR 4.

6. REQUIREMENTS FOR SAFETY PROMOTION

6.1 Lesson Dissemination

6.1.1 Requirement:

The requirement states that, within the operation of the SMS, the service provider:

“Shall ensure that the lessons arising from safety occurrence investigations and other safety activities are disseminated widely within the organisation at management and operational levels.”

6.1.2 Rationale and Implications:

It is essential to disseminate lessons arising from past experience with the purpose of eliminating factors known to induce safety occurrences.

Different sources of useful lessons can be identified in a SMS. The outcome of safety occurrence investigation is the most important ones, since it provides lessons on problems, which have already contributed to actual occurrences in the ATM service.

Safety surveys may also provide important lessons, since they examine systems operating under normal conditions to identify weaknesses that have not yet been seen to contribute directly or indirectly to an occurrence.

As a minimum, lessons should be disseminated to all the concerned staff in the units with involvement or interest in the issue. Where appropriate, information can also be passed to safety regulatory bodies or international organisations.

6.1.3 Conclusions:

This requirement means that ATM service providers should normally establish processes:

- To collect lessons from safety recommendations resulting from safety occurrences investigation processes, safety surveys and other SMS processes and sources of information; and
- Ensure to pass information to all concerned staff in the directly involved units and other units with an interest in the issue;

- Whenever possible, make use of various dissemination methods to support lesson dissemination processes, such as presentations, reports, audio-visual tools; and
- To ensure that the information is used to improve training activities.

Regulators should consider these elements, or equivalent ones, as important aspects to be ensured by ATM providers in accordance to appropriate regulations.

6.2 Safety Improvement

6.2.1 Requirement:

The requirement states that, within the operation of the SMS, the service provider:

“Shall ensure that all staff are actively encouraged to propose solutions to identified hazards, ”

“Shall ensure that changes are made to improve safety where they appear needed.”

6.2.2 Rationale and Implications:

The improvement of safety should be implemented as a continuous process involving the organisation as a whole. Personnel should be encouraged to propose safety improvements, on the grounds that staff can make a significant contribution in order to improve safety.

Processes and methods should be introduced to facilitate reporting and submission of proposals. A systematic way to deal with proposals should also be defined. The originator should have feedback on the decision and actions taken on the proposals that have been brought to the management attention.

To propose solutions to identified hazards, staff must be aware of them and the existing remedial already taken. This could be achieved by means of the lesson dissemination processes.

In addition, the use of self-assessment techniques involving the whole organisation (e.g. using the EFQM Excellence Model) may also provide SMS with means to identify areas in which safety improvements can be made and plan safety improvement actions.

Indeed, the requirement includes a second statement about the implementation of changes where they appear to be needed. To achieve that goal, there should be a tangible form of commitment of the organisation's

management to safety improvement. Processes should be defined to establish management review mechanisms for translating intentions into positive action. In fact, a sort of management review is essential for the simple reason that the safety manager cannot shoulder the whole responsibility for the SMS. The whole point is to involve the organisation's management team as a whole.

Three essential objectives could be identified to define SMS management review processes:

- Review the SMS operation to determine: first, whether the SMS is working in its own terms and especially whether safety procedures are being followed; secondly, whether the SMS is continuing to meet ESARR 3. And finally, but most important of all, to know whether the safety objectives of the organisation are being achieved;
- Consider problems, suggestions and proposals identified through the SMS operation; and
- Agree and authorise changes in the SMS, as well as other modifications which may be appropriate.

Management review meetings should represent, if not include, all senior management of the organisation.

A2.5.1.3 *Conclusions:*

This requirement means that ATM service providers should normally establish processes:

- To encourage personnel to propose solutions to identified hazards as well as safety improvements; dealing with proposals systematically and ensuring feedback to the originator;
- To identify areas in which safety improvements can be made and plan safety improvement actions, involving the organisation as a whole;
- To establish a SMS management review mechanism to involve the organisation's management team as a whole in the continuous improvement of safety; making use of this mechanism to review the working of the SMS and consider problems and proposals identified through it; and
- To use SMS management review mechanisms to agree and authorise changes in the SMS.

Regulators should consider these elements, or equivalent ones, as important aspects to be ensured by ATM providers in accordance to appropriate regulations.

Appendix A

Glossary – Terms and Definitions

Definitions for specific terms used in this document are given in the EUROCONTROL Safety Regulatory Requirements Framework, and repeated for ease of reference in this appendix.

Approval Process	A process of formal recognition that a product, process, service or organisation conforms to applicable safety regulatory requirements.
Airspace Management (ASM)	Is a generic term covering any management activity provided for the purpose of achieving the most efficient use of airspace based on actual needs and, where possible, avoiding permanent airspace segregation
Assessment	An evaluation based on engineering, operational judgement and/or analysis methods.
ATC Service	A service provided for the purpose of preventing collisions between aircraft and, on the manoeuvring area, between aircraft and obstructions; and expediting and maintaining an orderly flow of air traffic
Air Traffic Flow Management (ATFM)	Is a generic term covering any management activity provided for the purpose of ensuring an optimum flow of traffic to or through areas during times when demand exceeds the available capacity of ATC system
ATM	The aggregation of ground based (comprising variously ATS, ASM, ATFM) and airborne functions required to ensure the safe and efficient movement of aircraft during all appropriate phases of operations

ATM Service	A service for the purpose of ATM
ATM Service-Provider	An organisation responsible and authorised to provide ATM service(s)
Air Traffic Services (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).
EFQM	European Foundation for Quality Management. The EFQM Excellence Model provides a recognised framework for undertaking self-assessment processes in an organisation.
ESARR	EUROCONTROL Safety Regulatory Requirement (see Safety Regulatory Requirement)
External Services	All material and non-material supplies and services, which are delivered by any organisation not covered by the ATM Service-Provider's Safety Management System.
Hazard	Any condition, event or circumstances which could induce an accident.
Incident	An occurrence, other than an accident, associated with the operation of an aircraft, which affects or could affect the safety of operation.
Level of Safety	A level of how far safety is to be pursued in a given context, assessed with reference to an acceptable or tolerable risk
Mitigation or Risk Mitigation	Steps taken to control or prevent a hazard from causing harm and reduce risk to a tolerable or acceptable level.

National ATM Safety Regulatory Body	The competent body designated by State authority, responsible for the safety regulation of civil aviation.
Occurrences	Accidents, serious incidents and incidents as well as other defects or malfunctioning of an aircraft, its equipment and any element of the Air Navigation System which is used or intended to be used for the purpose or in connection with the operation of an aircraft or with the provision of an air traffic management service or navigational aid to an aircraft.
QMS	Quality Management System
Quantitative Safety Levels	Numerical expression to define levels of safety (see Level of Safety)
Regulation	The adoption, enactment and implementation of rules for the achievement of stated objectives by those to whom the regulatory process applies.
Risk	The combination of the overall probability or frequency of occurrence of a harmful effect induced by a hazard and the severity of that effect.
Risk Assessment	Assessment to establish that the achieved or perceived risk is acceptable or tolerable
Risk Mitigation	See mitigation
Safety	Freedom from unacceptable risk of harm.
Safety Achievement	The result of processes and/or methods applied to attain acceptable or tolerable safety

Safety Assurance	All planned and systematic actions necessary to provide adequate confidence that a product, a service, an organisation or a system achieves acceptable or tolerable safety
Safety Management	The management of activities to secure high standards of safety performance which meet, as a minimum, the provisions of safety regulatory requirements.
Safety Management Function	A managerial function with organisational responsibility for development and maintenance of an effective safety management system.
Safety Management System (SMS)	A systematic and explicit approach defining the activities by which safety management is undertaken by an organisation in order to achieve acceptable or tolerable safety
Safety Monitoring	A systematic action conducted to detect changes affecting the ATM System with the specific objective of identifying that acceptable or tolerable safety can be met.
Safety Performance	The measurement of achieved safety within the overall ATM system performance measurement.
Safety Policy	A statement of the organisation's fundamental approach to achieve acceptable or tolerable safety
Safety Promotion	Specification of the means by which safety issues are communicated to ensure a safety culture of safe working within the organisation.
Safety Regulatory Requirement	The formal stipulation by the regulator of a safety related specification which, if complied with, will lead to acknowledgement of safety competence in that respect.

Safety Survey

A systematic review, to recommend improvements where needed, to provide assurance of the safety of current activities, and to confirm conformance with applicable parts of the Safety Management System.

SRC

Safety Regulation Commission

SMS Documentation

The set of documents, arising from the organisation's safety policy statements, to develop and document the SMS in order to achieve its safety objectives.

System

A combination of physical components, procedures and human resources organised to perform a function.

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Appendix B

Applicability of ESARR 3

The Requirement includes a Section 3, '*Applicability*' to specify the scope of applicability of its provisions in term of categories of organisations that are subject to the requirements. The scope of the SMS to be implemented by those organisations is determined in Section 5.1.1 b). This appendix is intended to provide guidance on these aspects.

B1 - Applicability to EUROCONTROL Member States

The Safety Regulation Commission (SRC) is responsible for the development of harmonised safety regulatory objectives and requirements for the ATM System, which will be implemented and enforced by Member States after being approved by EUROCONTROL.

The requirements are known as ESARR (EUROCONTROL Safety Regulatory Requirements). In practical terms, each ESARR is developed by the SRC, approved by the EUROCONTROL Permanent Commission through the Provisional Council, and implemented and enforced by the Member States.

Member States are bound by decisions taken under either the current or revised EUROCONTROL Convention, and consequently have to implement and enforce within their national legal order the safety regulatory requirements contained in such decisions.

This also concerns those ESARR that apply to ATM service-providers, such as ESARR 3. Member States will have to ensure through appropriate safety regulation that ATM service-providers meet these requirements.

B2 - Applicability to ATM providers

ESARR 3 is applicable to all providers of ATM services that fall under the jurisdiction of the national ATM safety regulatory body.

Accordingly, the implementation concerns all organisations providing not only ATS services (encompassing ATC, FIS, and alerting and advisory services), but also other ATM services such as Air Traffic Flow Management (ATFM) and Airspace Management (ASM). That scope is consistent with ICAO and EUROCONTROL definitions for Air Traffic Management.



(Figure B.1 – Applicability of ESARR 3 to ATM Service-Providers)

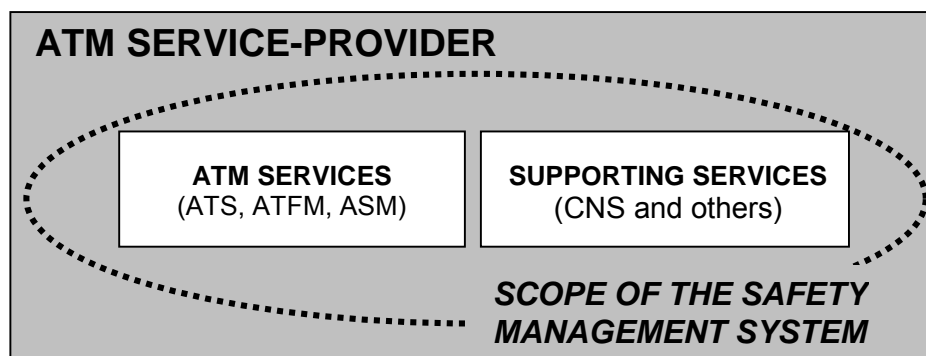
Situations exist where different organisations provide these services separately. Requirements will apply to all of them. As an example, we may consider a context where ATS services are delivered by an organisation, while airspace design (an ASM function) is provided by a completely different body. Both organisations will have to define, implement and use safety management systems.

ATM services can be provided simultaneously by different organisations operating within specific geographical regions or having responsibilities for parts of the navigable airspace associated with a flight phase. For instance, we may conceive situations where a national organisation is responsible for en-route ATM, while TWR or AFIS services are delivered by organisations owning local airports. Again, we may say that all those organisations will have to meet ESARR 3 requirements.

Different examples and combinations are possible depending on local circumstances, but the principle is always the same: ESARR 3 shall apply to all providers of ATM services that fall under the jurisdiction of the national ATM safety regulatory body.

B3 - The SMS Scope

The SMS operated by each ATM service-provider will have to cover not only its ATM services, but also any supporting service (including CNS functions and services) which are under the managerial control of the organisation.



(Figure B.2 – Scope of the SMS required by ESARR 3)

Supporting services include systems, services and arrangements, including Communication, Navigation and Surveillance services, which support the provision of an ATM service. Any supporting service under the managerial control of the organisation has to be covered by the SMS.

Supporting services outside the managerial control of the organisation should be considered as external inputs and addressed in accordance with the External Services requirement (ESARR 3, Section 5.2.6).

