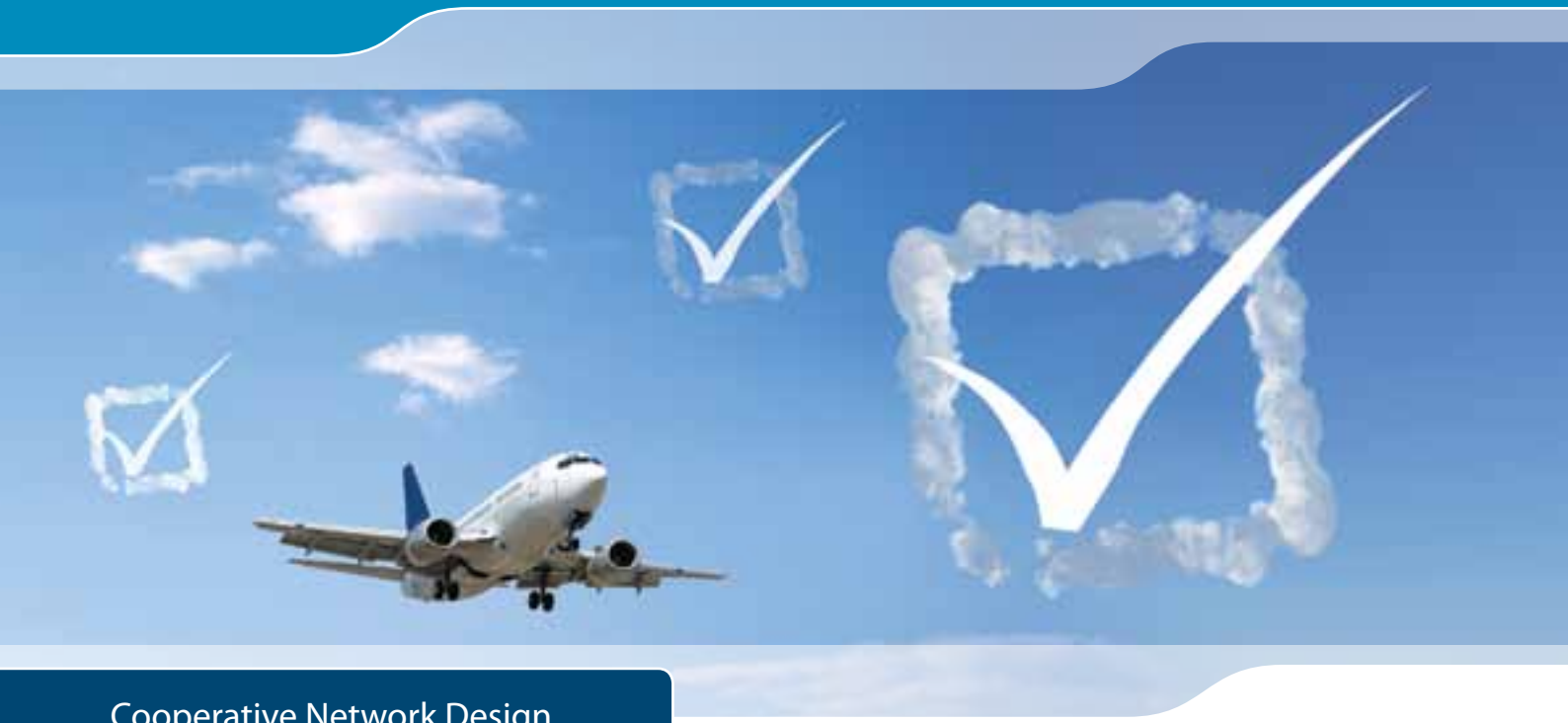

Cooperative Network Design

ATM Safety Framework Maturity Survey

Methodology for ANSPs

EUROCONTROL

AUTHORISATION SHEET

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EXECUTIVE SUMMARY

This document provides an overview of the ATM Safety Maturity Methodology for Air Navigation Service Providers applicable from 2010 onwards.

Following the serious accidents at Linate and Überlingen in 2001 and 2002 respectively, and in answer to a request from the European Commission, in 2002 EUROCONTROL commissioned an independent survey of ECAC States' ATM Safety Regulators and Air Navigation Service Providers (ANSPs), to identify how well ATM safety requirements were being met. The objective was to provide a reference point for future development and measurement. In particular the survey sought to identify areas that would provide the most benefit if States and Service Providers were given support to enable them to meet the necessary requirements. The surveys were not intended to be audits, but to provide an overview of how regulators and service providers saw their own system development.

The 2002 survey proved an extremely useful tool in understanding how well State Regulators and ANSPs thought they were implementing ATM Safety Requirements and it clearly identified the areas where support was required. It was therefore decided by the EUROCONTROL Provisional Council (PC) to continue this form of "self-assessment" measurement.

Further surveys were subsequently conducted in 2004, 2006, 2007 and 2008 with the 2002 study being used as the benchmark against which the later studies were compared. Reports have been published for the ECAC area since 2002, and from 2007 an additional report has been published for the whole ICAO EUR Region.

In EUROCONTROL, at the request of the Provisional Council, the Safety Data Reporting and Data Flow Task Force (SAFREP TF) developed a 'Roadmap for the Development of the Safety Key Performance Indicators in ATM'. This Roadmap was subsequently approved by the PC in November 2007. The roadmap confirmed the ATM safety framework maturity study to be a good example of a 'leading' indicator, i.e. indicators that are identified principally through the comprehensive analysis of organisations (providers, regulators, States). They are designed to help identify whether ANSPs and Regulators are taking actions or have processes that are effective in lowering risk.

In 2007, ICAO decided, at regional level, to adopt the methodology for ICAO EUR Region and Eastern European States adjacent to the ECAC Area were studied in 2007 with an expansion into North African States in 2008.

CANSO has also been instrumental in defining metrics for measuring ATM Safety Maturity, together with EUROCONTROL, FAA, NAVCANADA and Airservices Australia, and have developed a standard to assist ANSPs in the development and implementation of their Safety Management Systems (SMS).

Much has changed in European ATM since the original maturity study methodology was established in 2002 and the last survey using the original methodology took place in 2009. It has therefore been necessary for the whole methodology to be reviewed and brought up to date in line with ICAO and European safety requirements. The revised maturity study methodology is applicable from 2010 onwards. A set of targets for the Study Areas will also be established after the first survey has been completed in 2010 and a thorough analysis has taken place.

Use of the new Safety Framework Maturity Study will establish the extent of progress made by ANSPs with respect to the introduction of ATM safety management systems and how the SMS framework relates with safety in operations and engineering.

The revised Safety Framework Maturity Study was run alongside the 2009 study within a few ANSPs to pilot and validate the revised study methodology and documentation. The revised measurements are applicable to all ICAO EUR Region States from 2010 onwards.

This revised ATM Safety Framework Maturity Survey is aligned with both ICAO and CANSO requirements and approaches.

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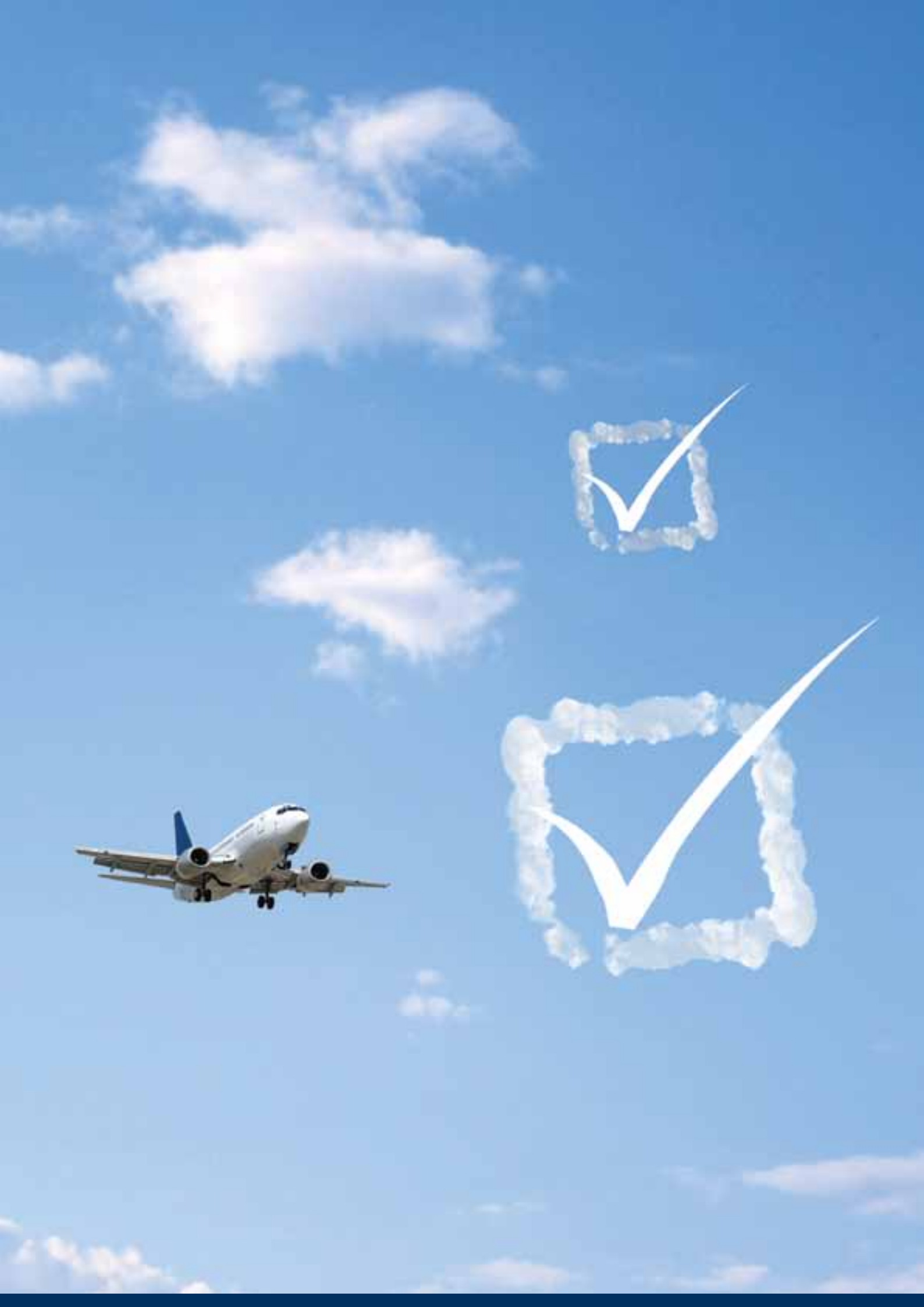


1. INTRODUCTION

1.1 Background

Throughout the 1990s and early years of the 21st century European Air Traffic Management had developed in a safe and efficient manner through programmes established by EUROCONTROL on behalf of the European Civil Aviation Conference (ECAC). Indeed, Europe had an excellent record in ATM safety. However, serious accidents at Linate and Überlingen in 2001 and 2002 respectively showed that there was no room for complacency. It was therefore decided that, as part of a general review of the accident causal factors, a comprehensive review of ATM safety systems in ECAC States should be undertaken.

In 2002 EUROCONTROL commissioned an independent survey of ECAC States' ATM Safety Regulators and Air Navigation Service Providers (ANSPs), to identify how well ATM safety requirements were being met. The objective was to provide a reference point for future development and measurement. In particular the survey sought to identify areas that would provide the most benefit if States and Service Providers were given support to enable them to meet the necessary requirements. The surveys were not intended to be audits, but to provide an overview of how regulators and service providers saw their own system development.

The 2002 survey proved an extremely useful tool in understanding how well State Regulators and ANSPs thought they were implementing ATM Safety Requirements and it clearly identified the areas where support was required. It was therefore decided by the EUROCONTROL Provisional Council to continue this form of "self-assessment" measurement. The surveys not only identified where support is required, but they give Regulators and ANSPs the opportunity to assess themselves ahead of EUROCONTROL and ICAO Audits, thus enabling them to identify areas where there are shortcomings. The safety framework maturity measurements taken over the period 2002 – 2009 focused on reviewing the status of the development and implementation of safety management and safety oversight mechanisms within the ECAC region; and also the wider ICAO EUR Region. This fact-based exercise gave an indication of the status of current and future ATM safety management, regulation and oversight within the ICAO EUR Region. The results were presented in the form of a "maturity score" ranging from zero to 100, for each individual ANSP and regulator, where 100% meant that all ATM safety requirements were being met. After 2002 the surveys were repeated in 2004, 2006, 2007, 2008 and 2009 with the 2002 survey being used as the benchmark against which the later studies were compared. Reports were published for the ECAC area since 2002 and from 2007 an additional report was published for the whole ICAO EUR Region.

Safety Programmes

Since 2002, EUROCONTROL's Provisional Council (PC) have launched a series of safety enhancement programmes such as the (Strategic Safety Action Plan (SSAP) and the European Safety Programme for ATM (ESP). The original series of ATM Safety Framework Maturity Studies were completed in 2009 to coincide with completion of the ESP programme.

Revised ATM Safety Framework Maturity Survey Methodology

Much has changed in European ATM since the original maturity survey methodology was established in 2002 and the last survey using the original methodology was conducted in 2009. The whole methodology has been reviewed and brought up to date to be in line with ICAO and European safety requirements. The revised methodology is in force from 2010 onwards and coincides with the launch of the ESP successor programme. Following the initial set of measurements gained during the 2010 survey, a set of targets for each of the Study Areas will be established following a thorough analysis of the data.

1.2 Safety Key Performance Indicators

In EUROCONTROL, at the request of the PC, the Safety Data Reporting and Data Flow Task Force (SAFREP TF) developed a 'Roadmap for the Development of the Safety Key Performance Indicators in ATM'. This Roadmap was subsequently approved by the PC in November 2007. The roadmap confirmed the ATM safety framework maturity survey to be a good example of a 'leading' indica-

tor, i.e. indicators that are identified principally through the comprehensive analysis of organisations (providers, regulators, States). They are designed to help identify whether ANSPs and Regulators are taking actions or have processes that are effective in lowering risk.

The Roadmap for the Development of the Safety Key Performance Indicators in ATM identified the following key activities for the development of leading indicators such as the ATM Safety Framework Survey:

- Workshop with main stakeholder groups (ANSPs & Regulators) to define the methodology and its application;
- Approval by the Safety Team and Safety Regulation Commission;
- Testing of the revised framework maturity survey involving stakeholders;
- Validated mechanism and agreed target for the Safety Framework Maturity Survey by stakeholders;
- PC adoption of one set of leading KPIs based on the Safety Framework Maturity mechanism.

In November 2007, the Provisional Council approved the continuation of the safety measurements and anticipated that it would adopt the new methodology during its meeting in November 2009.

In 2007 ICAO decided, at regional level, to adopt the methodology for ICAO EUR Region and Eastern European States adjacent to the ECAC Area were studied in 2007 with an expansion into North African States in 2008.

In order to comply with the Provisional Council's requirement requirement the revised Safety Framework Maturity Survey was conducted alongside the 2009 survey within a few ANSPs and Regulators to pilot and validate the revised survey methodology and documentation. The revised measurements are fully applicable in all ICAO EUR Region States from 2010 onwards.

CANSO has also been instrumental in defining metrics for measuring ATM Safety Maturity, together with EUROCONTROL, FAA, NAVCANADA and Airservices Australia, and have developed a standard to assist ANSPs in the development and implementation of their Safety Management Systems (SMS). It provides a framework for continually improving the management and oversight of safety within ANSPs. It supports the clear message from the Global Aviation Safety Roadmap, and promoted by the ICAO Safety Management Manual, that achievement of the highest level of SMS maturity is a long-term process that must proceed in a systematic manner.

The revised ATM Safety Framework Maturity Survey is aligned with both ICAO and CANSO requirements and approaches.

1.3 Objectives and approach

The Safety Framework Maturity Survey establishes the extent of progress made by ANSPs with respect to the introduction of ATM safety management systems and how the SMS framework relates with safety in operations and engineering.

Specifically, the survey:

- Determines the level of SMS improvement within the industry;
- Determines the extent to which learning is transferred across the industry;
- Establishes a path along which ANSPs can focus their activities for continuous improvement.

Two factors determine the approach:

- The methodology used in previous safety framework maturity surveys for the Strategic Safety Action Plan (SSAP) and the subsequent European Safety Programme for ATM (ESP) maturity surveys were considered to be a practical approach that quickly delivered a comprehensive overview of the status of ATM safety mechanisms within each ECAC State;
- Data obtained via the surveys provide comparisons with previous studies so that required improvements and other issues can be identified.

The methodology is keeping pace with the modernisa-

tion of the SMS. It measures the extent to which the ICAO Global Aviation Safety Roadmap is being implemented regionally, and enables policy-makers and decision-makers to prioritise their safety efforts. It also enables the initial focus to be on implementation of the more fundamental basic elements that are considered to deliver immediate safety benefits while planning the implementation of the more sophisticated SMS elements for implementation in the later phases of SMS development.

The methodology uses a maturity scale that has been adapted from CMMI (Capability Maturity Model® Integration) Model, which is a recognised industry standard. CMMI is briefly described in Section 2.2.5 Maturity Categories.

The measurements are not a replica of an audit and are not based on detailed evidences. The maturity survey is a unique but blunt instrument based on self assessment which is verified during a telephone or face-to-face interview. The new methodology, applied from 2010 onwards, has strengthened the verification mechanism of the replies through a series of additional validation activities agreed by stakeholders. These are further presented in the section describing what additional measures are taken to further increase the robustness of the safety maturity tool.

2. STUDY METHODOLOGY

2.1 Study areas

The overall status of ATM safety management is assessed through the review of a number of key elements of safety management (or "Study Areas"). Each Study Area has a clear definition and is linked directly to both quantitative and/or qualitative results.

The Study Areas are in line with the SMS Standard that has been developed cooperatively between EUROCONTROL and CANSO.

This SMS Standard consists of a 'system enabler' (Safety Culture), and a framework of four components – Safety Policy, Safety Achievement, Safety Assurance, and Safety Promotion. Within all of these areas, there are one or more elements. Figure 1 depicts the interaction between these areas. Together, they are considered to constitute a mature situation for a systematic safety framework.

No single element will meet today's expectations for risk management. Rather, an integrated application of all elements will increase the ANSP system's resistance to unsafe acts and conditions.

Some ANSPs may wish to expand their SMS beyond the elements presented in this standard. For example, an ANSP may choose to include fitness-for-duty requirements, such as fatigue or psychoactive substance abuse, within the scope of its SMS.

2.1.1 Safety Culture

Effective safety management requires a genuine commitment to safety on the part of everyone in the organisation. Contemporary thinking is that organisations are not immune from cultural considerations. The priority of safety must be demonstrated in the attitudes, decisions and methods of operation at all levels.

The success of an SMS is completely dependent on the development of a positive and proactive Safety Culture in the ANSP organisation.

Safety Culture is presented as a system enabler in that it has the most significant influence on the overall integration and evolution of SMS elements within the ANSP organisation.

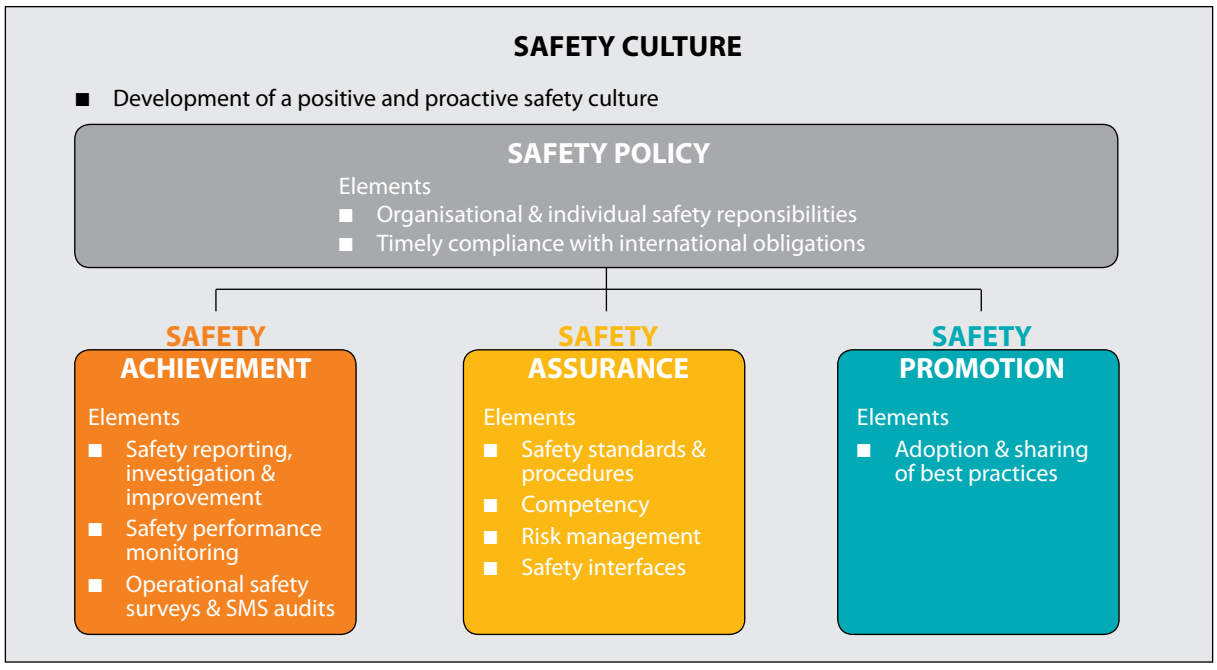


Figure 1: SMS Standard

2.1.2 Safety Policy

The Safety Policy component consists of elements which address:

- Organisational and Individual Safety Responsibilities; and
- Timely Compliance with International Obligations.

Management's commitment to safety must be formally expressed in a statement of the organisation's safety policy. The policy and associated statements regarding safety objectives define the basic approach to managing safety. In so doing, the policy drives the form of the SMS and the priority of work.

A Safety Policy may take different forms, but will typically include statements concerning the priority of safety in the organisation and the specific safety objective of the organisation. A statement regarding the priority of safety within the ANSP is a common feature within a Safety Policy, for example: *"As an integral part of the management of its services, the organisation has in place a Safety Management System (SMS) which ensures that the achievement of safety in air traffic services shall be afforded the highest priority."*

Generally, the Safety Objective statement explicitly defines the desired outcome of the SMS. For example: *"The overall objective is to assure that risks to operational service delivery are reduced as far as reasonably practicable."*

The SMS safety policy statements can also be used in a retrospective way, with the organisation continually measuring itself against the requirements within the policy.

2.1.3 Safety Achievement

Each ANSP must undertake activities that aim to achieve and improve safety. The elements covered by the Safety Achievement component include:

- Safety Standards and Procedures;
- Competency;
- Risk Management; and
- Safety Interfaces.

2.1.4 Safety Assurance

Reviews of reporting mechanisms will contribute to understanding how an ANSP is performing, whether all

Area No.	ANSP Study Areas
Safety Culture	
SA1	Development of a Positive and Proactive Safety Culture
Safety Policy	
SA2	Organisational and Individual Safety Responsibilities
SA	Timely Compliance with International Obligations
Safety Achievement	
SA4	Safety Standards and Procedures
SA5	Competency
SA6	Risk Management
SA7	Safety Interfaces
Safety Assurance	
SA8	Safety Reporting, Investigation and Improvement
SA9	Safety Performance Monitoring
SA10	Operational Safety Surveys and SMS Audits
Safety Promotion	
SA11	Adoption and Sharing of Best Practices

Table 1: Safety Framework Maturity Study Areas

safety requirements are effective, and how any deficiencies may be overcome. Safety assurance requirements include the need to address:

- Safety Reporting, Investigation and Improvement;
- Safety Performance Monitoring; and
- Operational Safety Surveys and SMS Audits.

2.1.5 Safety Promotion

Each ANSP must promote safety within its organisation. As an ANSP matures, the sharing of information extends from an internal focus to one which engages with those who use its services and external sources of international best practice in ATM. A Safety Promotion element that addresses the 'Adoption and Sharing of Best Practice' is therefore included.

Each of the SMS Standard elements depicted in Figure 1 constitutes a unique Study Area.

Appendix 1 provides a detailed description of all areas that form the ANSP Safety Maturity Methodology.

2.2 Details of the approach

2.2.1 Link with the technical scope of work

The methodology is designed to take account of a number of essential issues:

- Each Study Area has a clearly defined goal;
- Each Study Area has distinct sub-objectives, as appropriate, to clarify what is being measured and what maturity level is appropriate for Organisations answering the questionnaire;
- Consolidating replies from the Study Areas and across respondents, allows an opinion to be formed with respect to the ATM safety maturity levels.

2.2.2 Respondent workload and validation

The ANSP questionnaires are pre-completed where possible using the most up-to-date information (e.g. for ECAC States from the Local Single Sky ImPlementation (LSSIP) data (if available)) and any other available information for each State (such as data from previous surveys and regional Air Navigation Plans).

The purpose of this is four-fold:

- To provide a mechanism for internal pilot testing of the questionnaires and to enable review and refinement of the questionnaires prior to issue;
- To ensure that participants receive positive feedback from earlier information they may have provided and as such avoiding duplication;
- To ease the burden on respondents such that they only need to check, edit and return the questionnaire; and
- To provide the basis for a limited form of validation (in conjunction with telephone interviews) of responses provided by the survey interviewees.

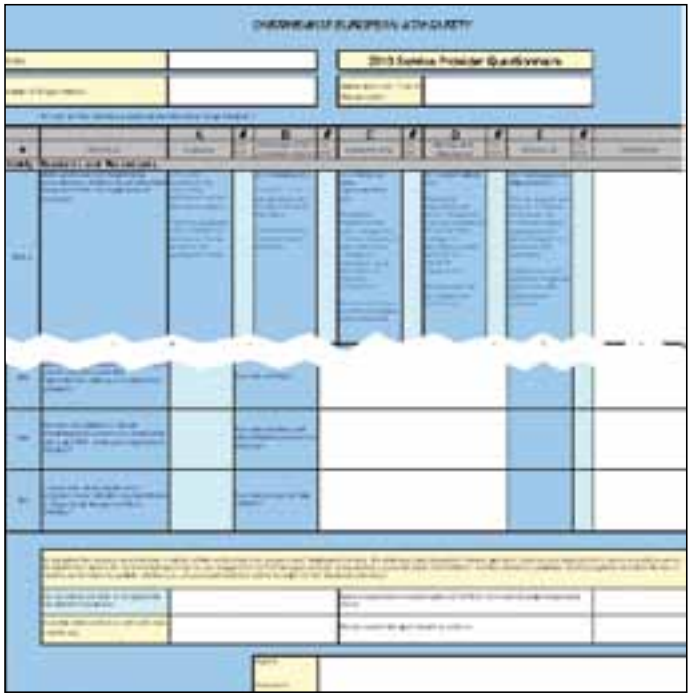


Figure 2: Sample ANSP Questionnaire

The interviews are used to explore and validate respondents' answers given in the questionnaire and are structured in a way to obtain as much feedback as possible on safety related issues. Where agreed between the interviewer and interviewee, responses may be revised and questionnaires re-submitted.

2.2.3 Analysis of the feedback

Analysis of the ANSPs' questionnaire feedback is built up as a statistical process with clearly defined logical links between the questions, mapping of the questions to the objectives and weighting of the questions within each Study Area.

Results are compared to the original survey objective, and to the results of the telephone interviews.

Qualitative and anecdotal comments are used in combination with the quantitative results in formulating the conclusions.

2.2.4 Mechanisms to increase the robustness of the measurements

The SAFREP TF and their ANSP members favour the following activities to increase the robustness of the self-assessment maturity measurements in Europe:

- Encouragement of peer surveys under the umbrella of EUROCONTROL;
- Random visits prior to developing the survey report (in ECAC it is anticipated that 4-8 random short visits would be conducted each year irrespective of the maturity results of ANSPs). During the visits a thorough analysis and completion of the questionnaire and interview will be undertaken with a team of local experts (safety, operational and engineering);
- Should an ANSP disagree with the final measurement based on the questionnaire and the interview results, the overall maturity report will record details of the disagreement and/or withdraw results of the specific ANSP from the survey report;
- ANSPs should, within their SMS framework, undertake periodic (annual) safety surveys using recognised methodologies that match the safety maturity scale. Reference to ICAO, EUROCONTROL, Transport Canada, and other similar methodologies (Ref: EANPG E48 WP06 - Safety Management Systems WP06/06/11/2006, EUROCONTROL Safety Survey methodology 2007). ANSPs undertaking safety surveys will have evidence to support their answers in the questionnaire and during the interviews;
- Each ANSP and Regulator may score both ANSP and Regulatory questionnaires to assess both their own progress with regard to increasing their safety framework maturity level, and also to assess progress of the other organisation. EUROCONTROL will cross-check the responses and, where significant differences are found, will liaise with both organisations to resolve any issues.

2.2.5 Maturity categories

The questionnaires have a graded scale of responses that correspond to five categories of safety maturity (from Initiating being the lowest to Continuous Improvement being the highest). These categories are:

- **Initiating**
- **Planning/Initial Implementation**
- **Implementing**
- **Managing and Measuring**
- **Continuous Improvement**

These categories have been designed so that, using the specimen answers provided, the service provider in each State can give the most appropriate graded answer to each question. A detailed generic definition for every maturity category is given in Table 2 on page 16.

All requirements for the previous stage/level must be fully satisfied before proceeding to the next stage of the model. No maturity stages can be skipped.

The 5 categories are derived from the CMMI (Capability Maturity Model® Integration). The initial Capability Ma-

turity Model (CMM v1.0) was developed by the Software Engineering Institute (following an approach of IBM) and specifically addressed software process maturity. It was first released in 1990, and after its successful adoption and usage in many domains, other CMMs were developed for other disciplines and functions such as Systems Engineering, integrated product development, software acquisition, and others.

Lately, CMMI has become a process improvement approach that provides organisations with the essential elements for effective processes. It can be used to guide process improvement across a project, a division, or an entire organisation. CMMI helps integrate traditionally separate organisational functions, set process improvement goals and priorities, provide guidance for quality processes, and provide a point of reference for appraising current processes.

The CMMI models improve the best practices of previous models in many important ways. CMMI best practices enable organisations to:

- more explicitly link management and engineering activities to their business objectives;
- expand the scope of and visibility into the product lifecycle and engineering activities to ensure that the product or service meets customer expectations;
- incorporate lessons learned from additional areas of best practice (e.g., measurement, risk management, and supplier management);
- implement more robust high-maturity practices;
- address additional organisational functions critical to their products and services;
- more fully comply with relevant ISO standards.

CMMI adoption in industry is not a "one-size-fits-all". Some[1] adopt CMMI with or in addition to other approaches, such as: *Six Sigma, Agile Methods, TSP/PSP, ISO 9000/9001, IEEE Standards, RUP, Balanced Scorecard.*

For the above reasons, and at the initiative of CANSO, the SAFREP TF adapted the CMMI model to derive the revised safety maturity scale for Air Navigation Service Providers. Similarly, as in quality models, the CEOs of ANSPs should strive to go beyond the minimum level of competency and push their organisation to beyond the level of *Implementing* and achieve the level of *Managing and Measuring* - (which is about quantitative management and represents a maturity level characterised by improving organisational performance) and even the level of *Continuous Improvement*, for the safety management system processes and procedures but also for the safe services delivered during operations.

Historical results for elements contained in the *Implementing* level can be exploited to make trade-offs, with predictable results, among competing dimensions of business performance (safety, cost, quality of service, efficiency/delays).

Additional process areas covered by the *Managing and Measuring* level include: *Organisational process performance:* setting norms and targets for process performance & *Quantitative safety management:* executing and managing safety based on statistical quality-control methods.

The *Continuous Improvement* level represents a process maturity characterised by rapidly reconfigurable organisational safety performance as well as quantitative, continuous process improvement. Additional safety process areas include: *Causal analysis and resolution:* proactive safety management and safety best practice reinforcement & *Organisational innovation and deployment:* establishing a learning organisation that organically adapts and improves.

1- Organisations using CMMI : Accenture, Boeing, Bosch, Dyncorp, EDS, Ericsson, Fujitsu, Hitachi, Honeywell, IBM, Infosys, Intel, J. P. Morgan, KPMG, L3 Communications, Lockheed Martin, Motorola, NASA, NEC, Nokia, Northrop Grumman, NRO, Polaris, Raytheon, Reuters, SAIC, Samsung, Social Security Administration, Tata C. S., U.S. Air Force, U.S. Navy, U.S. Treasury Department, Wipro, Zurich Financial Services etc.

Initiating	Planning/ Initial Implementation	Implementating	Managing & Measuring	Continuous Improvement
■ Awareness exists of the need for SMS. No specific formal implementation actions are in place or planned. ■ The processes for managing safety are ad-hoc and/ or inconsistent with the Organisation's safety obligations.	■ A gap analysis has been performed. ■ The Organisation has an SMS Implementation Plan that is consistent with the organisation's safety goals and obligations. ■ Implementation is underway but not yet completed in some major aspects.	■ The Organisation has achieved the required regulatory standard. ■ The SMS standard processes are in use across the organisation and are producing consistent results. The results are being measured using qualitative techniques.	■ SMS Implementation has been completed and both safety performance and system performance are measured and controlled using statistical and other quantitative techniques. ■ Quantitative safety objectives are based on customer, end user and organisational needs. ■ Sub-processes are developed that significantly contribute to overall organisation safety performance.	■ Safety processes/systems are firmly embedded within the organisation. ■ The focus is on continuous improvement in operational safety and maximising the effectiveness of SMS processes through innovative improvements. ■ There are defined processes to set standards and improvement targets. ■ The effectiveness of the SMS and safety improvement actions are measured and evaluated against defined improvements criteria.
The SMS framework is very immature or non-existent in the organisation. *The SMS components and elements are not documented and have not been implemented. No SMS Implementation Plan has been formally developed.*	*The SMS framework is not yet effective and does not yet meet the required regulatory standard.* *An Implementation Plan exists covering all SMS. The plan is not yet fully deployed.*	*The SMS framework meets the required regulatory standard.* *The SMS Implementation Plan is mostly implemented.*	*The SMS framework is functioning and is effective in achieving the overall safety policy and objectives of the organisation.* *The Organisation is identifying and adopting Industry best practices.*	*The SMS framework is regularly reviewed and enhanced to achieve excellence in ATM safety management. Ongoing planning ensures that safety management activities are integrated and drive priorities for operational safety improvement.* *The Organisation is setting the Industry SMS best practices.*
The organisation is not measuring and monitoring safety performance.	***The organisation has a plan to capture information about safety performance.***	***The organisation is collecting safety reports under a controlled process, and is responding to safety issues identified as a result of individual incident investigations.***	***The organisation is measuring safety performance. It has identified its key safety risks and has developed plans for improvement.***	***The organisation is managing its key safety risks in conjunction with external stakeholders and can demonstrate improved safety performance.***

Table 2 - Safety Maturity Categories

2.3 Methodology flowchart

The implementation process for the methodology applied in ECAC is exemplified as follows:

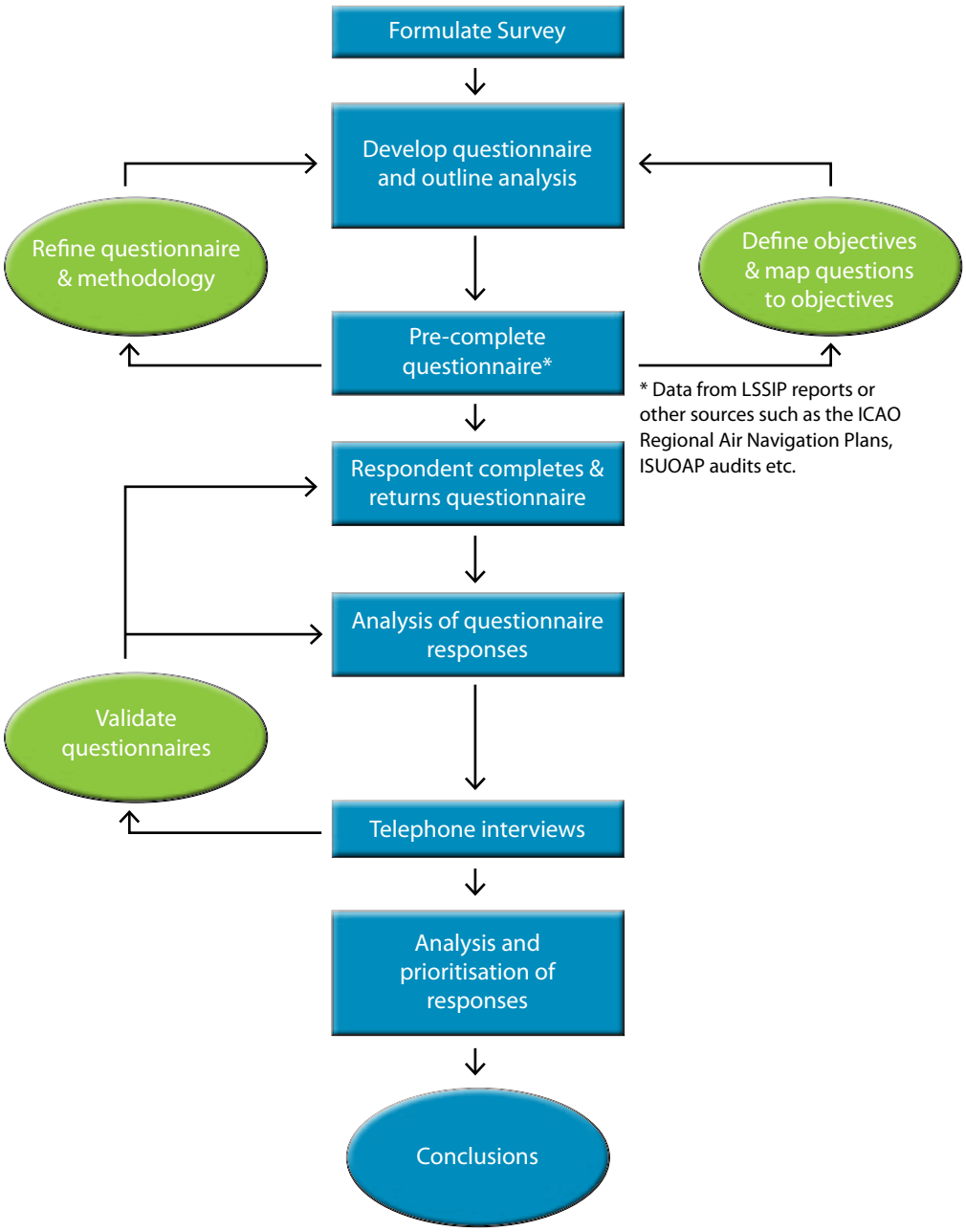


Figure 3: Methodology Flowchart

Outside of the ECAC area, the phase of pre-completion of the questionnaire, information such as LSSIP (formerly called LCIP) data will not be available. Instead, similar information will be gained from other sources e.g. in ICAO Regional Air Navigation Plans, IUSOAP audits, etc.

2.4 STUDY INPUTS AND OUTPUTS

2.4.1 Structure of the questionnaire and way of completing the questionnaire

The ANSP Maturity Survey Questionnaire covers 11 Study Areas as depicted in Section 2.1.5, Table 1. Each Study Area and, where appropriate, its sub-areas has a description of the five maturity levels as applicable to the SMS element being measured. The respondents should review each of the maturity levels (progressing from left to right – i.e. from '*Initiating*' to '*Continuous Improvement*') to determine the appropriate maturity level.

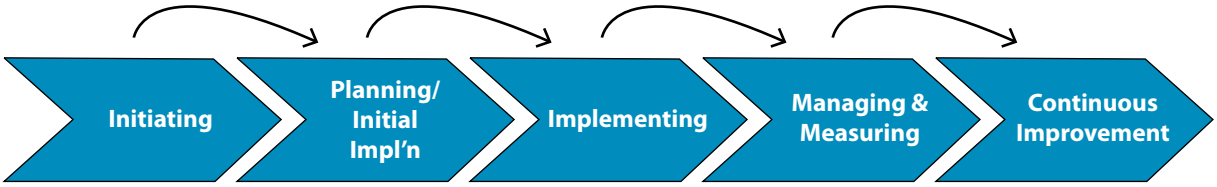


Figure 4: Maturity Level Flow

Only if all the elements of one maturity level are fully observed by an Organisation can that maturity category be selected. If an Organisation has elements in various adjacent maturity categories then they shall take a conservative approach and select the lower maturity level.

In future surveys, when reviewing the maturing levels from left to right, the respondent shall consider whether all elements in the previous maturity level still apply. There may be occasions when it is more appropriate to revert back to a previous maturity level. Any disparity and uncertainty will be discussed during interviews and clarification may be sought to confirm that a maturity level has indeed been achieved.

2.4.2 Structure of the telephone or face-to-face interviews

Whereas the questionnaires have been designed to generate a 'snap-shot' picture of the current situation with regard to ATM safety mechanisms, the telephone interviews have been designed to review as many issues as possible that influence the further development of organisational safety arrangements within an ANSP.

A brief explanation of the purpose of the interview, expected duration and overall structure of the interview, is provided to the interviewee.

The interview will generally follow the structure of the questionnaire the respondent had already completed.

Open questions are asked to stimulate the interviewee to elaborate on why a certain position in terms of maturity had been chosen (e.g. *"What made you decide that your organisation is in a …… stage of maturity?"*); what sorts of issues were holding back further development (e.g. *"What sorts of things are holding up the further development of your organisation in this area?"*) And, in some cases, what issues or circumstances had helped the organisation to progress towards maturity (e.g. *"You reported to be in category "Initiating" two years ago and now you are reporting to be in "Managing & Measuring". How did you manage to make so much progress in this area?"*).

The essentials of the conversation will be reported back by the interviewer at each stage to check that the message had been well understood (e.g. *"So, what you are telling us here is that...."*) and these essentials will be captured in a document. To allow interviewees to speak freely, conversations will not be recorded by electronic means.

2.4.3 Structure of the results

The data from the survey can be grouped under two principal headings:

- Quantitative data developed from an analysis of replies provided by respondents;
- Qualitative data from the telephone interviews and from data collected through any random visits made to ANSPs.

Out of this wealth of information the following tools and visual information will be constructed:

- A Repository tool containing the summary of the interview(s);
- A report detailing the results for each study area including the enablers for reaching a certain level of maturity as well as the disablers that prevent further development and increase of maturity (the report will include inter-alia dis-identified annual comparison);
- A 'What-if' Tool for allocating the priorities for future investments (per organisation, per group of organisations or per region/s);
- A 'Dashboard' Tool, (per Organisation, per group of Organisations or per Region/s), e.g. a radar type tool, to measure the overall and the detailed progression or regression of Organisations.

'WHAT-IF' TOOL

The 'What-if' tool is an Excel type tool (a Workbook) that allows users to explore the potential effects that improvement initiatives may have on the overall safety maturity. For each of the Study Areas, the user can explore the effect of proposed initiatives targeted on individual ANSPs, groups of ANSPs with similar characteristics or global initiatives across all States.

The 'What-if' worksheet displays an average result across each of the Study Areas for ANSPs. These data are then plotted onto graphs.

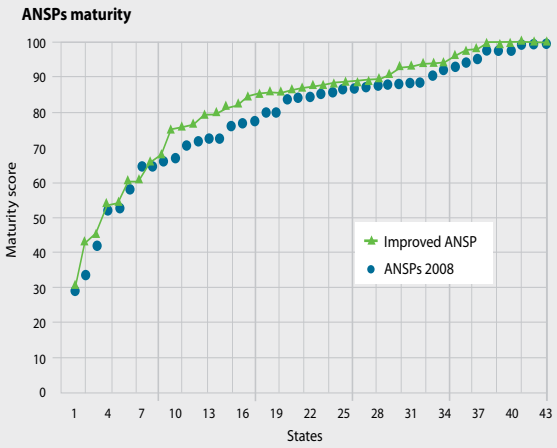


Figure 5: Sample of 'What-If' Tool

What if?

	Study Areas										
	SA1	SA2	SA3	SA4	SA5	SA6	SA7	SA8	SA9	SA10	SA11
Current average	80,6	80,3	79,7	81,9	83,3	81,9	81,6	NA	79,3	67,5	82,3
Global improvement initiatives											
Percentage improvement in study area?	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Improvement initiatives targeted by size	all	all	all	all	all	all	all	all	all	all	all
Percentage improvement in study area?	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Improvement initiatives for specific ANSPs											
Percentage improvement in study area?	15%	10%	0%	20%	0%	0%	30%	0%	10%	0%	0%
Improved Average	92,0	88,0	79,7	92,0	83,3	81,9	97,0	84,3	82,0	67,5	82,3

DASHBOARD TOOL

The 'Dashboard' tool is an Excel type took (a Workbook) that allows users to explore areas where focus needs to be applied to improve the level of maturity. This information can be seen per organisation, per group of organisations or per region.

Figure 6 provides an example of what the Dashboard tool could contain, e.g.:

1. Graph 1 shows the overall Average Maturity Score of all participating ANSPs. The "RED" indicators depict those ANSPs that are shown in Graph 3.

2. Graph 2 (Maturity by Area) shows the minimum and maximum level of maturity for each Study Area (across all participating ANSPs), plus the interquartile range (IQR) or midspread. The IQR is a measure of variability, spread or dispersion being equal to the difference between the third and first quartiles.

3. Graph 3 provides a list of all participating ANSPs and their maturity level scores for each Study Area. Maturity levels that are less than the 20th percentile are shown in "RED", whilst maturity levels that are more than the 80th percentile are shown in 'GREEN." This graph will enable users to identify those Study Areas where more targeted activity is required to improve maturity levels.

4. Users can select specific ANSPs to analyse.

5. Graph 5 indicates the maturity level for each Study Area for a particular ANSP selected.

6. Graph 6 is another representation of an ANSPs maturity level against a set target/s. It is based on multiple year results of one ANSP.

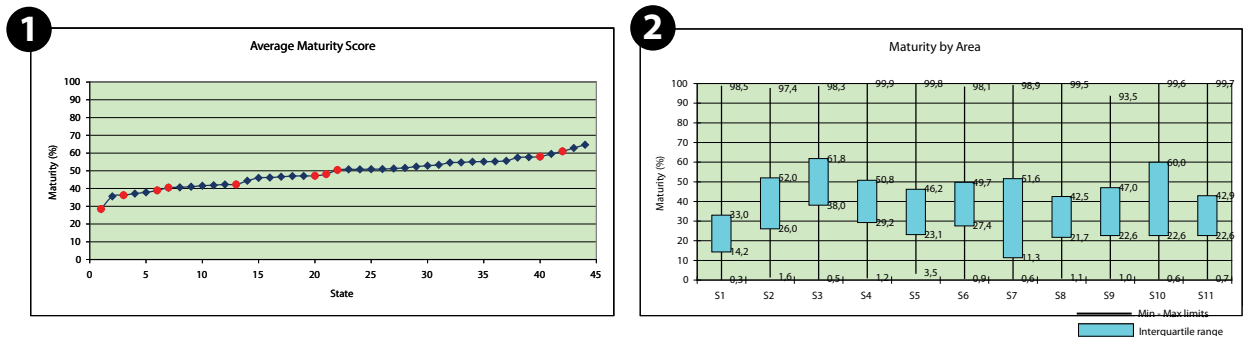
7. A reference table of Study Areas.

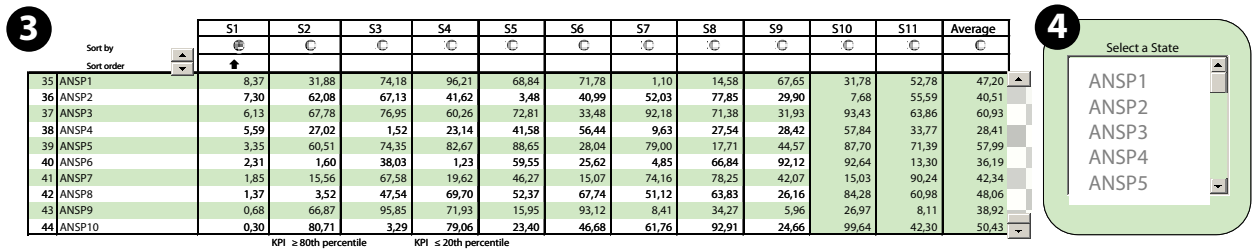
8. This table indicates the number of organisations that fall within a particular percentile range.

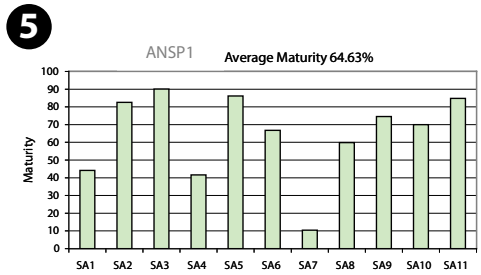
The Dashboard tool will be enhanced over time in accordance with user requirements to enable the drilldown of specific sub objectives within Study Areas.

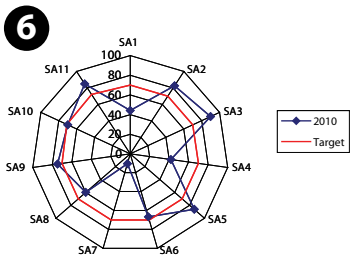
Another tool is available for each ANSP containing their specific data. This will enable ANSPs to identify areas for improvement.

Safety Framework Maturity of Air Navigation Service Providers









7

S1	Development of a positive and proactive safety culture
S2	Organisational and Individual Safety Responsibilities
S3	Timely Compliance with International Obligations
S4	Safety standards and procedures
S5	Competency
S6	Risk Management
S7	Safety interfaces
S8	Safety Reporting, Investigation and Improvement
S9	Safety Performance Monitoring
S10	Operational Safety Surveys and SMS Audits
S11	Adoption and Sharing of Best Practices

8

Average Maturity	No. of States
Greater than 80%	0
Greater than 70%	0
Greater than 40%	38
Less than 40%	6

Figure 6: Sample of Dashboard Tool

3. QUANTITATIVE ASSESSMENT METHODOLOGY

3.1 Methodology introduction

Under this method, the performance of each ANSP with regard to safety and safety management is quantitatively assessed within each of the Study Areas through a normalised scoring system.

3.2 Question mapping and weighting system

A number of different approaches are used to quantitatively assess the questionnaire responses. These approaches have been developed in order to elicit different types of information regarding the current status of safety management within ANSPs. These methods are based on the mapping of the questionnaire objectives with the 11 Study Areas. Under this mapping, subsets are associated with each Study Area.

Additionally, within each Study Area, the various associated sub-objectives will typically have differing levels of significance to that Study Area. For example, a response in the *"Planning/Initial Implementation"* category is of greater concern if the question is critical to the Study Area than it would be if the question were of moderate importance to that Study Area. This variation of importance is handled numerically through the use of weighting factors. These weightings will be further validated and improved following the 2010 baseline survey.

Broadly, three types of analysis are undertaken to drive:

- Maturity scoring;
- Un-weighted classification;
- Weighted classification.

These are described in the following sections.

3.3 Maturity scoring system

Under this method, the performance of each ANSP with regard to safety management and safety in operations, is quantitatively assessed within each of the Study Areas through a normalised scoring system such that a percentage score (i.e. a score from 0 to 100) is calculated for each ANSP within each Study Area. The scoring system takes account of the fact that the various questions associated with each Study Area have different levels of significance. This is achieved through the application of weighting factors.

In addition, by taking the average score across all the Study Areas, the overall performance of the ANSPs can be estimated.

Once the overall scores have been calculated, the ANSPs can then be classified according to their score. The surveys conducted between 2002 and 2009 used the following classification - "Initiator" (0-20%), "Planner" (20-40%), "Implementer (40-60%)", "Manager (60-80%)" and "Continuous Improver (80-100%)." For the 2010 survey onwards, there may be a need for a different classification scheme, but this will be determined once measurements have started and a fairly significant amount of progress has been achieved by ANSPs.

The classification scheme may be totally different from one ICAO region to another. It could be based and dependent on various technical and/or political targets.

3.4 Implementation details

Mathematically, the maturity score is calculated from the questionnaire responses and the assumed weighted factors as follows:

$$S_{i,j} = \frac{100 \sum_{k=1}^{n_{i,j}} r_{k,j,i} \cdot w_{k,j}}{4 \sum_{k=1}^{n_{i,j}} w_{k,j}}$$

Where:

- $S_{i,j}$ is the maturity score for ANSP i in Study Area j.
- $r_{k,j,i}$ is the numeric value of the response of State i to question k in Study Area j
- $w_{k,j}$ is the weight factor of question k to Study Area j
- $n_{i,j}$ is the number of questions in Study Area j for which responses were provided by the ANSP i.

An overall score for each ANSP is then estimated by taking the average of the scores over all Study Areas. The mapping of the objectives to the Study Areas and the associated weighting factors are available on request.

4. LINKAGE OF OBJECTIVES, RESULTS AND CONCLUSIONS

Throughout the study, attention is paid to maintaining logical links between the objectives, the quantitative and qualitative assessment of responses and the conclusions. These links underline the credibility of the conclusions and provide traceability.

The telephone and face-to-face interviews are linked to the questionnaires and are used in part to validate the responses in the questionnaires.

The interviews focus on obtaining information on issues that would affect an ANSP's ability to develop its ATM safety mechanisms (both positive and negative). These issues will be recorded in a searchable Interview Repository and provided input for the conclusions for each Study Area.

5. PRESENTATION OF RESULTS

The results will be presented in a report containing a series of graphs and bar charts showing the percentage of responses and/or ANSPs within each level of maturity for each of the Study Areas. In 2010 there will be no comparative results from previous surveys as it will be the first year that this revised Maturity Survey methodology will have been used and there will therefore be no historic data associated with the methodology being used.

Each graph will be supported by:

- A brief comment on the results that highlight the main points of comparisons;
- Comments from the interviews that highlight issues raised by participants.

In addition to the charts, comments are provided based on broader, more open, questions seeking "safety intelligence" on the enablers and disablers and on additional local/national/regional safety programmes.

A high-level report will also be produced in which the findings will be de-identified.

Each ANSP will also be provided with a synopsis of their own survey assessment.

APPENDIX 1 DETAILED MATURITY STUDY AREAS OBJECTIVES AND ASSOCIATED MATURITY LEVELS

The following tables in this Appendix provide the detailed objectives for each Study Area together with a description for each maturity level for that objective. The survey Questionnaire is composed of these Study Areas.

The questionnaires ask participants to chose the category that best describes their organisation and once the questionnaire is completed, it becomes a Confidential document and the contents are only released to the ANSP that has completed it.

DETAILED MATURITY STUDY AREAS OBJECTIVES AND ASSOCIATED MATURITY LEVELS

Safety Culture

SA1 Development of a positive and proactive safety culture

Objective	Initiating	Planning/ Initial Implementation	Implementating	Managing & Measuring	Continuous Improvement
		*All of **Initiating** plus:*	*All of **Planning/Initial Implementation** plus:*	*All of **Implementation** plus:*	*All of **Managing & Measuring** plus:*
1.1 A positive and proactive just, flexible, and informed safety culture (the shared beliefs, assumptions, and values regarding safety) that supports reporting and learning led by management. (Safety Culture and Just Culture are defined in Appendix 2 – Glossary)	Within the organisation, there are significant differences between what is said, what is done, and what is believed. The regulator may be regarded as being responsible for safety. The organisation determines what safety means and generates some awareness of this throughout the organisation. Individuals may have a different understanding of how their activities contribute to safety.	Individuals within the organisation have a good level of systematic safety management awareness. The organisation is starting to put processes in place for systematic safety management.	A positive safety culture is developing, although it is still immature. Individuals are starting to be involved in systematic safety management.	Staff are proactively involved in planning for and implementing systematic safety management. The organisation operates informed learning and reporting cultures, as well as a just culture with respect to errors in operations.	Individuals across the organisation are proactively and constantly striving to improve their approach to systematic safety management. They are supported by measurement and review processes and organisational management. Experiences are openly exchanged internally and externally. Within the organisation, there is a complete alignment between what is said, what is done, and what is believed.

Objective	Initiating	Planning/ Initial Implementation	Implementating	Managing & Measuring	Continuous Improvement
		*All of **Initiating** plus:*	*All of **Planning/Initial Implementation** plus:*	*All of **Implementation** plus:*	*All of **Managing & Measuring** plus:*
1.2 Regular measurement of safety culture and an improvement programme.	The organisation does not see the need to have a safety culture measuring mechanism in place.	The organisation is aware of the need to have periodic measurements of safety culture in place, as well as an improvement plan. However, what will be measured, and when, is still being defined.	Safety culture is measured and results are available. An improvement plan addresses the need for individuals to be aware of, and support, the organisation's shared beliefs, assumptions and values regarding safety.	The organisation assesses its safety culture on a regular basis and implements improvements to any identified weaknesses. Safety Culture enablers and barriers are identified, and solutions to reduce barriers are being implemented.	All personnel are proactive and committed to improving safety. Safety Culture Surveys confirm that, within the organisation, there is a high level of alignment between what is said, what is done, and what is believed. Organisational management approves a continuous improvement plan.
1.3 An open climate for reporting and investigation of occurrences. NB: Thorough reporting and investigation must include the complete process from notification, data gathering, reconstruction, analysis, safety recommendation and implementation of remedial actions, up to final reporting, exchange of lessons learned and effective monitoring.	Management believes there are no issues regarding the existing reporting and investigation culture and therefore does not see the need for any activity or dialogue with the staff in this area.	Discussions between staff and management to define an open reporting and investigation climate are underway. However, there is no agreed policy in place yet.	Safety data-sharing and publication policies are supported by the staff. Safety data are sufficiently protected from external interference within legal limits.	Within the organisation, the line between acceptable and unacceptable mistakes is established and known by the staff. Just reporting and investigation culture principles are in place and systematically applied within the organisation.	Under certain legal regimes, there is a clear and published policy on how dialogue with judicial authorities and media is established and followed.

Safety Policy

SA2 Organisational and individual safety responsibilities

Objective	Initiating	Planning/ Initial Implementation	Implementating	Managing & Measuring	Continuous Improvement
		*All of **Initiating** plus:*	*All of **Planning/Initial Implementation** plus:*	*All of **Implementation** plus:*	*All of **Managing & Measuring** plus:*
2.1 An approved, clearly documented, and recognised system for the management of safety. Management structure, responsibilities, accountabilities and authorities are clearly defined and documented.	No formal designation of authorities, responsibilities or accountabilities for the management of safety exists.	Safety authorities, responsibilities, and accountabilities have been identified but not yet formalised. Line managers assume responsibility for safety.	Authorities, responsibilities, and accountabilities for the management of safety have been defined and documented. Delineation of responsibility for the development, oversight and implementation of the SMS is clearly understood.[2]	Procedures are in place to address the need to review safety authorities, responsibilities, and accountabilities after any significant organisational change.	Safety authorities, responsibilities, and accountabilities are periodically reviewed to determine whether they are suitable and effective (i.e., continuous improvement of safety management).
2.2 A clearly defined safety management function that is independent of line management.	A safety management function has not yet been appointed to develop the SMS.	A safety management function has been appointed to develop and maintain the SMS.	The safety management function is independent of line management and develops and maintains an effective SMS. The safety manager has access to the resources required for the proper execution and maintenance of the SMS.	The highest organisational level recognises its role in the SMS and actively supports the development, implementation, maintenance, and promotion of the SMS throughout the organisation (including support departments).	There is clear evidence that the highest organisational level plays a proactive role in the continuous improvement of the SMS.

2- Line management is usually responsible for the implementation of procedures or practices which are required by the SMS, whilst specific responsibilities for the development and oversight of the SMS and the organisation's safety outcomes lie within safety departments, executive management and board committees depending on the structure and governance of the organisation.

Objective	Initiating	Planning/ Initial Implementation	Implementating	Managing & Measuring	Continuous Improvement
		*All of **Initiating** plus:*	*All of **Planning/Initial Implementation** plus:*	*All of **Implementation** plus:*	*All of **Managing & Measuring** plus:*
2.3 An integrated safety planning process is adopted by the organisation with published and measurable safety goals and objectives which are accountable to the executive.	An ad hoc or non existent safety planning process is utilised by the organisation. Safety goals and objectives have not been identified or documented for the implementation of a safety management system.	Identification of an appropriate SMS has been identified. A compliance gap analysis has been performed and a SMS Implementation Plan developed to meet the applicable safety regulatory requirements.	The requirements expressed in the SMS Implementation Plan have been completed. The SMS meets the regulatory standard, but may not incorporate best practices.	A Corporate Safety Plan is published on a periodic basis with specific accountable and measurable safety management goals and targets.	The Corporate Safety Plan goals and objectives are developed and prioritised based on corporate safety risks which have been identified through trend analysis, risk assessment processes and identified system safety deficiencies. Where appropriate (considering ANSP size and complexity), the organisation is committed to share and implement ATM safety management international best practices.
2.4 Clear understanding and acceptance of safety management responsibilities by all staff and contractors. Commitment to continuous improvement to safety.	Knowledge of the principles underpinning SMS amongst all staff and contractors is negligible.	All staff and contractors apply rules and procedures to their tasks in the knowledge that some of the rules and procedures need improvement. All staff and contractors are only partially aware of their roles in the SMS.	All staff and contractors are aware of how their actions impact the safety of the wider operation and how the actions of others impact safety.	All staff and contractors across the organisation are actively promoting and improving safety. All staff and contractors take proactive day-to-day action to have rules and procedures changed where they identify a safety benefit by the change.	The organisation regularly reviews and assesses documented safety management responsibilities.

SA3 Timely compliance with international obligations.

Objective	Initiating	Planning/ Initial Implementation	Implementating	Managing & Measuring	Continuous Improvement
		*All of **Initiating** plus:*	*All of **Planning/Initial Implementation** plus:*	*All of **Implementation** plus:*	*All of **Managing & Measuring** plus:*
3.1 A formal SMS that meets all applicable safety regulatory requirements.	There is no SMS in place. There may be deviations from safety regulatory requirements.	The SMS is partially implemented, but it is not yet effective; it does not yet meet the standards established through safety regulatory requirements.	The essential parts of the SMS are implemented, and the organisation meets the standards established through safety regulatory requirements.	The SMS is fully implemented and effective. Operations are monitored regularly to identify deviations.	Where applicable, the organisation is committed to going beyond compliance and operating at the highest international safety standard.
3.2 An organisation that strives to go beyond compliance, takes into account the need to ensure, in a timely manner, that there are no inconsistencies with regional/international safety standards.	There is little awareness of the regional or international safety standards.	There is an awareness of the regional and international safety standards. Work has started in some areas.	Regional and international safety standards are known and met as required.	There is a process in place to address the need for timely and consistent compliance with regional or international safety standards.	The organisation has a structured mechanism to address the need for ongoing and consistent compliance with regional or international safety standards. It contributes to a regional or international dialogue to improve these standards.

Safety Achievement

SA4 Safety standards and procedures

Objective	Initiating	Planning/ Initial Implementation	Implementating	Managing & Measuring	Continuous Improvement
		*All of **Initiating** plus:*	*All of **Planning/Initial Implementation** plus:*	*All of **Implementation** plus:*	*All of **Managing & Measuring** plus:*
4.1 Clearly defined and documented safety standards and procedures.	Some safety and safety management procedures exist, but they are not complete. Operations manuals do not contain any specific safety management procedures.	The documentation of SMS processes and procedures has started and is progressing as planned.	The documentation of the essential parts of the SMS processes and procedures is complete. The processes and procedures ensure that the organisation is compliant with all applicable safety and regulatory requirements.	There is clear evidence that the safety and safety management documentation is readily available to all personnel in the organisation. This documentation details safety and safety management processes and procedures that meet or exceed the applicable safety and regulatory requirements.	Processes are in place and are being applied to give effect to the organisation's commitment to continuously improve safety and safety management processes and procedures.
4.2 Staff know about the safety and safety management standards, which are regularly reviewed, assessed, and maintained.	Staff have limited knowledge of SMS processes and procedures. There is no formal process that maintains the SMS, nor is there an identified authority (or authorities) responsible for the updates.	A process to maintain all safety and safety management procedures exists, but its initial implementation is ad-hoc and not fully effective. The authority (or authorities) responsible for the updates are partially identified.	The process to maintain all safety and safety management procedures is documented and practised. Procedures are kept up-to-date on an ad-hoc basis.	There is a formal process in place to periodically review safety and safety management procedures and ensure that they remain relevant, up-to-date, and effective. The authority (or authorities) responsible for the updates are completely identified. All safety-related procedures are documented in an appropriate manner and are known by the staff.	Changes within the organisation that could affect safety and/or the safety management framework are subjected to formal review.

Objective	Initiating	Planning/ Initial Implementation	Implementating	Managing & Measuring	Continuous Improvement
		*All of **Initiating** plus:*	*All of **Planning/Initial Implementation** plus:*	*All of **Implementation** plus:*	*All of **Managing & Measuring** plus:*
4.3 Emergency response procedures and an emergency response plan that documents the orderly and efficient transition from normal to emergency operations and return to normal operations.	The organisation has sound primary Air Traffic Management systems but does not have redundant capabilities or back-up systems.	There are procedures and some redundant capabilities and resources to cope with abnormal and unexpected situations.	All primary systems have redundant capabilities, and emergency response procedures have been developed, documented, and distributed to appropriate staff. The emergency response plan is properly coordinated with the emergency response plans of those organisations it must interface with during the provision of its services. (Annex 11 – 1.4)	Primary Air Traffic Management systems are reliable and have redundant capabilities and back-up systems. The emergency response plan and procedures have been rehearsed through desktop or operational exercises.	The Emergency Response planning processes and Emergency Procedures and Plans are regularly exercised and revised to keep them up-to-date.

SA5 Competency

Objective	Initiating	Planning/ Initial Implementation	Implementating	Managing & Measuring	Continuous Improvement
		*All of **Initiating** plus:*	*All of **Planning/Initial Implementation** plus:*	*All of **Implementation** plus:*	*All of **Managing & Measuring** plus:*
5.1 Staff, and contractors (where appropriate) are trained, competent in safety and safety management, and where required, licensed.	Competent staff and contractors (where appropriate) are provided on an ad-hoc basis for safety and safety management activities. There are no formal competency methods (including proficiency, licensing, and training).	Competent staff, and contractors (where appropriate) are provided and allocated based on limited planning and only for a limited number of positions related to operations and safety management activities. Competency methods are being developed.	Competency methods have been designed and are applied. An annual planning process for training is in place.	There is a process for the training providers(s) to receive feedback on the effectiveness of training programmes; based on feedback, the training programmes are revised to improve effectiveness.	Competency methods (including proficiency, licensing, and training) are periodically reviewed and improved with industry best practices adopted. Training plans cover safety and SMS activities and allow for the improvement of staff skills and competency.

SA6 Risk management

Objective	Initiating	Planning/ Initial Implementation	Implementating	Managing & Measuring	Continuous Improvement
		*All of **Initiating** plus:*	*All of **Planning/Initial Implementation** plus:*	*All of **Implementation** plus:*	*All of **Managing & Measuring** plus:*
6.1 A continuing risk management process that identifies, assesses, classifies, and controls all identified safety risks within the organisation, including potential future risks.	There is no formal risk management process in place.	The principles of risk management are documented and understood. There is an approved plan in place to implement the risk management process.	There is an approved and structured process in place for the assessment of current and potential safety risks, but it is not yet mature. Training in risk assessment is ongoing.	There is clear evidence that safety risk management is embedded within the organisation and identified safety risks are managed and controlled.	Methods are in place to predict future safety risks and to mitigate these risks. The risk management processes are reviewed and improved on a periodic basis. The organisation develops best practice guidelines that it shares with other ANSPs.

SA7 Safety interfaces

Objective	Initiating	Planning/ Initial Implementation	Implementating	Managing & Measuring	Continuous Improvement
		*All of **Initiating** plus:*	*All of **Planning/Initial Implementation** plus:*	*All of **Implementation** plus:*	*All of **Managing & Measuring** plus:*
7.1 Effectively managed safety-related internal interfaces (e.g. quality management system, security, and environment).	The relationships between various different internal interfaces are defined; however, the interfaces operate in isolation.	Internal safety-related interfaces are managed on an informal or ad-hoc basis.	Internal safety-related interfaces are managed with a solid understanding of the boundaries and relationships between the interfaces.	Safety-related internal interfaces are coordinated, and relationships are managed through interface agreements (e.g., Letters of Agreement (LoAs), Memoranda of Understanding (MoUs), Service-Level Agreements (SLAs)).	A process is in place to regularly identify weaknesses in agreed interface arrangements (LoAs/MoUs/SLAs etc)
7.2 The effective management of external interfaces with a safety impact (e.g., MIL, airspace users, airports). Formalised processes and procedures dealing with external agreements, services, and supplies (e.g., cross-border Letters of Agreement). (NB: for certain organisations MET, CNS and/or AIS are internal interfaces of the Organisation).	There are a limited number of agreements in place.	Safety-related external interfaces are managed on an informal or ad-hoc basis. Draft contractual arrangements are being prepared and negotiated for all safety-related external interfaces. Some elements are already formalised and implemented.	Safety requirements are specified and documented in appropriate agreements.	Activities with safety-related external interfaces are coordinated and relationships are managed through documented agreements. Safety requirements within contractual agreements are systematically reviewed and revised as necessary.	External services and suppliers are surveyed/audited and systematically monitored to identify deviations from the documented arrangements.

Safety Assurance

SA8 Safety reporting, investigation and improvement

Objective	Initiating	Planning/ Initial Implementation	Implementating	Managing & Measuring	Continuous Improvement
		*All of **Initiating** plus:*	*All of **Planning/Initial Implementation** plus:*	*All of **Implementation** plus:*	*All of **Managing & Measuring** plus:*
8.1 A continuing organisation-wide process to report and investigate safety occurrences and risks.	There is an informal system in place for reporting safety occurrences and risks, but reports are not reviewed systematically. The reporting system is not organisation-wide. Investigation is done on an ad-hoc basis and with little or no feedback.	There is a plan to formalise the existing reporting and investigation system. There is commitment from management to allocate resources to implement this system. The reporting system is wide-spread but does not yet cover the whole organisation. Feedback is given on an ad-hoc basis.	The system in place is commensurate with the size of the organisation. The organisation has a complete and formal system that records all reported information relevant to the SMS, including incidents and accidents. Corrective and preventive actions are taken in response to event analysis.	Identified safety-related risks and deficiencies are actively and continuously monitored and reviewed for improvement.	Personnel who report safety occurrences, risks and problems are empowered to suggest corrective actions, and there is a feedback process in place.
8.2 An organisation-wide means to record and disseminate lessons learned.	Safety lessons learned are known only to those who experience them.	There is an intention to develop a means to record and share lessons learned. This may already happen, but only on an ad-hoc basis.	The process for sharing safety lessons learned is systematic and operational and the majority of data is shared with appropriate personnel.	All safety lessons learned are systematically shared across the organisation at all appropriate levels. Corrective actions are taken to address lessons learned.	There is clear evidence that the internal lessons learned dissemination process is embedded across the organisation at all levels and is periodically reviewed.
8.3 Appropriate safety information and knowledge is shared with Industry stakeholders. Information disclosure is compliant with agreed publication and confidentiality policies/agreements.	Safety data and information are treated as confidential. There are no plans to release it in any way to any industry stakeholders.	Safety data and information are shared internally, but the organisation is reluctant or unwilling to share data with industry stakeholders.	Safety data and information is shared internally, nationally, and with international bodies when it is required by regulation.	There is a clear and published policy that encourages the proactive sharing of safety-related information with other parties.	Safety data and information are actively shared internally, nationally, with recognised international bodies, and with other industry stakeholders. The organisation has a process in place to receive and act on safety data and information from external stakeholders.

SA9 Safety performance monitoring

Objective	Initiating	Planning/ Initial Implementation	Implementating	Managing & Measuring	Continuous Improvement
		*All of **Initiating** plus:*	*All of **Planning/Initial Implementation** plus:*	*All of **Implementation** plus:*	*All of **Managing & Measuring** plus:*
9.1 An established and active monitoring system that uses and tracks suitable safety indicators and associated targets (e.g., lagging and leading indicators).	There are no indicators, thresholds, or formal monitoring system in place to measure safety achievements and trends.	There is a plan to implement a monitoring system. A limited set of indicators has been implemented.	The safety monitoring system has been implemented and documented. Indicators and targets have been set: limited to meeting the safety regulatory requirements.	Additional indicators are also defined and monitored to meet both organisational and local safety objectives. All indicators are tracked against thresholds/targets on a regular basis. Trends are analysed for safety improvement purposes.	Safety indicators covering all aspects of the system/operations are mature and used to measure safety improvement. There are comprehensive metrics in place to measure and monitor indicators and thresholds throughout the system.
9.2 Methods to measure safety performance, which is compared within and between ANSPs.	Ad-hoc safety performance data related to individual incidents is available, but there is no systematic approach for measuring safety performance.	The implementation of some qualitative and quantitative techniques in certain parts of the organisation has started. However, there is insufficient data to analyse.	Qualitative techniques are in place, and the implementation of quantitative techniques has started.	Safety performance is measured using statistical and other quantitative techniques. Internal comparative analysis is done, and external comparative analysis has begun.	The reporting, operational safety survey and SMS auditing programmes are integral parts of the management and operational processes. Results are used to drive further safety improvements across the organisation. Internal and external comparative analysis is well-established.
9.3 A general public knowledgeable of the ANSP's performance through routine publication of achieved safety levels and trends. (Information disclosure is compliant with the requirements of ICAO Annex 13, Attachment E).	Safety-related performance information is not made available to the public under any circumstances.	A limited amount of safety-related performance information is made available, but only to selected authorities.	High-level safety-related performance information is made available according to regulatory requirements.	Safety performance information not governed by regulatory requirements is also made available to the public.	The organisation voluntarily makes available appropriate safety-related performance information to the general public. The achieved safety levels and trends are transparent to the general public.

SA10 Operational safety surveys and SMS audits

Objective	Initiating	Planning/ Initial Implementation	Implementating	Managing & Measuring	Continuous Improvement
		*All of **Initiating** plus:*	*All of **Planning/Initial Implementation** plus:*	*All of **Implementation** plus:*	*All of **Managing & Measuring** plus:*
10.1 Internal and independent (external) operational safety surveys and SMS audits.	There is no plan to conduct systematic operational safety surveys and SMS audits. Operational safety surveys, SMS audits, and gap assessments are conducted on an ad-hoc basis (e.g., when deficiencies in the system or in working arrangements are found).	There is a plan in place to formalise the conduct of systematic operational safety surveys and SMS audits. A limited number of operational safety surveys and SMS audits have been carried out.	Internal operational safety surveys and SMS audits are conducted on a periodic basis. Based on the output of operational safety surveys and SMS audits, a process is in place that requires the development and implementation of appropriate improvement plans.	Internal or external operational safety surveys and SMS audits are carried out in a systematic way. There is a process in place to monitor, analyse trends, and identify areas that require follow-up operational safety surveys or SMS audits. Follow-up operational safety surveys, SMS audits, and gap assessments are conducted in all areas affecting operational safety and the SMS. Operational safety surveys and SMS audits are actively reviewed to assess opportunities for system improvement.	Independent (external) operational safety surveys and SMS audits are periodically conducted. The outputs from operational safety surveys and SMS audits are incorporated as appropriate into operations or the SMS. There is a process in place that requires external data (e.g. pilot performance trend information) to be considered when selecting areas to be subject to operational safety surveys and SMS audits.

Safety Promotion

SA11 Adoption and sharing of best practises

Objective	Initiating	Planning/ Initial Implementation	Implementating	Managing & Measuring	Continuous Improvement
		*All of **Initiating** plus:*	*All of **Planning/Initial Implementation** plus:*	*All of **Implementation** plus:*	*All of **Managing & Measuring** plus:*
11.1 A structured approach exists to promote safety, its standing within the organisation and lessons learned through application of the SMS.	There is no structured approach to promote safety and its management within the organisation. The organisation has the capability to identify lessons learnt and promote them but on an ad-hoc basis.	Ad-hoc processes are in place to gather and then promote information on safety, lessons learnt and the SMS. Some initial implementation has begun. Some internal best practises are spread across units within the organisation, but there is no systematic structure for internal safety promotion.	An organisational approach has been established to promote safety, lessons learned and the SMS.	Formal methods are in place to capture safety knowledge and promote it internally. The standing of safety and its management is a consistent and expected feature in internal communication.	Staff are encouraged to share lessons learned in order that the lessons can be promoted across the organisation. Strategies to promote safety and its management are developed by senior levels in the organisation and are being implemented. Other industries' initiatives in relation to internal safety promotion are periodically reviewed with the approach being modified on the basis of the information gathered.
11.2 A structured approach to gather information on operational safety and SMS best practises from the industry.	There is no structured approach to gather best practises from the industry. The organisation has the capability to identify and adopt industry best practises on an ad-hoc basis.	There is an ad-hoc structure in place to gather information on operational safety and SMS best practises. Some initial implementation has begun. Some internal best practises are spread across units within the organisation, but there is no systematic structure for the adoption of best practises.	A structure has been established to identify applicable operational safety and SMS best practises from the industry.	Industry best practises are periodically reviewed to provide the most current information, which is then assessed for applicability, and adopted as appropriate.	All relevant best practises are readily accessible to appropriate personnel. The organisation actively participates in developing industry best practises.
11.3 Sharing of safety and SMS-related best practises with industry stakeholders.	There are no plans to release and share best practises with industry stakeholders.	Sharing of best practises takes place in response to requests for assistance from industry stakeholders.	Best practises are shared with industry stakeholders as required by regulation.	Best practises are actively shared with industry stakeholders. Sharing of safety-related best practises with industry has demonstrated improved safety performance.	SMS-related best practises are pro-actively shared with industry stakeholders with the aim of improving SMS standards.

The following additional study areas are not used to quantify the safety maturity but are rather seeking "safety intelligence" on the enablers and disablers and on additional local/national/regional safety programmes.

SA12	Are there any enablers that are leading to operational safety and SMS improvements within your organisation (Yes/No)?		If so what are they?		
SA13	Are there any inhibitors that are preventing improvements to operational safety and SMS within your organisation (Yes/No)?		If so what are they, and what mitigation actions are foreseen?		
SA14	If applicable, do you have safety programmes not detailed in your national or Regional Air Navigation Plans (Yes/No)?		If so what issues do they address?		

APPENDIX 2 - GLOSSARY

Acronym or Term	Meaning
ANSP	Air Navigation Services Provider. This is the operational organisation delivering service to airspace users.
ATM	Air Traffic Management
Best Practice	A method, initiative, process, approach, technique or activity that is believed to be more effective at delivering a particular outcome than any other means. It implies accumulating and applying knowledge about what is working and not working, including lessons learned and the continuing process of learning, feedback, reflection and analysis (what works, how and why) It is recognised within the ATM industry as some thing that, when applied, improves safety levels or operations.
CANSO	Civil Air Navigation Services Organisation
CMMI	Capability Maturity Model Integration
EANPG	European Air Navigation Planning Group
ECAC	European Civil Aviation Conference
ESARR	EUROCONTROL Safety Regulatory Requirement
ESIMS	ESARR Implementation Monitoring and Support (ESIMS) Programme.
ESP	European Safety Programme for ATM
ICAO	International Civil Aviation Organisation, a special United Nations division tasked with fostering safe and efficient international civil air transport.
ISO	International Organisation for Standardisation
IUSOAP	ICAO Universal Safety Oversight Audit Programme
Just Culture	A culture in which front line operators or others are not punished for actions, omissions, or decisions taken by them that are commensurate with their experience and training, but where gross negligence, wilful violations and destructive acts are not tolerated. (SAFREP Task Force description). An atmosphere of trust in which people are encourages for providing essential safety-related information, but in which they are also clear about where the line must be drawn between acceptable and unacceptable behaviour. (CANSO definition).
KPI	Key Performance Indicator
LCIP	Local Convergence Implementation Plan
LSSIP	Local Single Sky ImPlementation
Operational Safety Surveys	Programmes which provide organisations with an understanding of the threats or opportunities which exist to improve safety performance or compliance with domestic or international safety regulations.
PC	Provisional Council
Regulator	Regulator, often the National Civil Aviation Authority.
Risk Management	A systematic, explicit, and comprehensive analytical approach for managing safety risk at all levels and throughout the entire scope of an operation or the lifecycle of a system in ATM.
Safety	Freedom from unacceptable risk of harm.

Safety Audit	Testing of process, product, people, organisation or system to assure that safety requirements embedded in domestic and international regulations are complied with.
Safety Culture	Safety culture refers to the enduring value, priority and commitment placed on safety by every individual and every group at every level of the organisation. Safety culture reflects the individual, group and organisational attitudes, norms and behaviours related to the safe provision of air navigation services.
Safety Management Function	A business unit within an organisation which is dedicated to the oversight of safety and its management. (CANSO definition) A managerial function with organisational responsibility for development and maintenance of an effective safety management system. (EUROCONTROL ESARR3 definition).
Safety Management System (SMS)	An organised approach to managing safety, including the necessary organisational structures, accountabilities, policies and procedures. (CANSO definition). 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. (EUROCONTROL ESARR3 definition)
SMS Audit	Testing of process, product and people to assure that standards and requirements as documented in the organisation's SMS are complied with.
SAFREP TF	Safety Data Reporting and Data Flow Task Force

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