FABEC Implementation Phase

FABEC Safety Case

EC Information

Annex L

Co-financed by the European Union
Trans-European Transport Network (TEN-T)

DOCUMENT SUMMARY

Objective : Provide required evidence when establishing FABEC	
Origin : Chairman Standing Committee Safety (SC SAF)	**Audience :** FABEC Provisional Council, ANSCB, ASB, AFG, European Commission

Title :	EC Information Annex L
Reference :	FABEC_AFG_EC Information_Annex L_v1-0

Version : 1.0	**Date :** 19.03.2012	**Status :** ☐Draft ☑ Released	**Classification :** ☐ Public ☑ FABEC limited ☐ Addressees limited

DOCUMENT CHANGE RECORD

Version	Status	Date	Reason for changes	Author of changes
0.1	Draft	07.12.2011	Template	AFG
1.0	Final	15.03.2012	Document completed	CM SC SAF

APPROVALS

Name: Job Brüggen **Signature:**

Function: CM SC SAF

Date: 4 apr 2012

QUALITY CONTROL

Name: Manuel De Klerck **Signature:**

Function: AFG Quality Manager

Date: 12/4/12

ATTACHMENTS CONTAINED IN THIS ANNEX

ID	Origin	Status	Version	Date	Title
L.1	ASB	Final	1.2	1.03.2012	FABEC Safety Policy
L.2	SC SAF	Final	1.1	23.02.2012	FABEC Safety Occurrence Management
L.3	SC SAF	Final	1.0	20.02.2012	FABEC Safety Performance Management Handbook
L.4	SC SAF	Final	1.0	10.02.2012	FABEC Safety Case Report
L.5	SC SAF	Final	2.8	22.02.2012	FABEC Safety risk assessment and mitigation for FABEC changes
L.6	SC SAF	Final	1.1	22.02.2012	FABEC Initial Safety Impact Assessment (ISIA)
L.7	AFG/SO	Final	1.0		Status of Safety Assessments FABEC changes

1 BACKGROUND

EU Regulation 176 specifies the minimum deliverables for the establishment of a FAB where the safety case is concerned. These requirements are:

Requirements of Article 9a(2) of Regulation (EC) No 550/2004

The Member States concerned shall provide information, including supporting documentation, pertaining to the requirements of Article 9a(2) of Regulation (EC) No 550/2004.

1. *Functional airspace block safety case*

With regard to the functional airspace block safety case, the following information shall be provided:

(a) the common safety policy or plans to establish a common safety policy;

(b) a description of the arrangements dealing with accident and incident investigation and plans on how to address safety data collection, analysis and exchange;

(c) a description of the way in which safety is being managed to avoid degradation in safety performance within the functional airspace block;

(d) a description of the arrangements clearly identifying and allocating the responsibilities and interfaces with relation to the setting of safety targets, safety oversight and the accompanying enforcement measures in regard to the provision of air navigation services within the functional airspace block;

(e) documentation and/or statements that the safety assessment including hazard identification, risk assessment and mitigation has been conducted before introducing operational changes resulting from the establishment or modification of the functional airspace block.

For all these requirements descriptions exist within FABEC to satisfy these requirements .Whilst these are certainly very relevant items, FABEC has chosen to provide in addition a slightly more comprehensive overview of the deliverables that are made in order to demonstrate that the transition from seven individual ANSPs to a FABEC alliance can be done reliably safe.

2 PURPOSE AND CONTENT OF THE OVERALL DELIVERABLE

The main deliverable is termed OSCAR, the Overall Safety Case Assembly and Reporting that has been written by the FABEC ANSPs and the FABEC NSA Committee collectively. This document, referenced in attachment 6 to this annex describes the claim, the argument pillars and the associated evidence items that together constitute the overall safety case for FABEC.

This document will form the basis of the items that are submitted in evidence to the above requirements.

3 SAFETY DELIVERABLES

3.1 Safety Policy

The safety policy for FABEC has been approved by the ASB at their meeting March 1st, 2012. A signed copy is available in attachment 1 to this annex.

Updates to this safety policy shall be made at a later stage when the FABEC alliance matures or changes in form or operational scope.

3.2 FABEC Occurrence Management

3.2.1 At state level

States are responsible to handle the investigations of all accidents (there is a binding EU regulation EC2003/42 and the ICAO annex 13).

For this purpose dedicated structures exist (Air Accident Investigation Board / Bureau Enquêtes Analyse, Defence Investigation Board).

The final reports are public access free (usually they are online).

Currently there are existing arrangements for collection of accident and serious incident investigation data between individual States and their respective ANSPs. However, in the FABEC situation, there are advantages to be gained to the safety lifecycle by wider sharing of information across the States and ANSPs.

The FABEC Treaty Art 31 defines the arrangements at FABEC level regarding the investigation of accidents and serious incidents applicable for all FABEC Member States.

The NSAC Safety Performance Task Force is, commencing January 2012, ensuring liaison with the Aviation Accident Investigation Boards in order to collect relevant safety recommendations that make sense for the performance improvements of both States and ANSPs safety management.

The AIBs for each State within the FABEC are as follows:

- Luxemburg: Administration des Enquêtes Techniques
- Germany: Bundesstelle für Flugunfalluntersuchung (BFU)
- Belgium: Service public fédéral mobilité et transports
- Netherlands: De Onderzoeksraad voor veilgheid
- Switzerland: Aircraft Accident Investigation Bureau
- France: Bureau d'Enquètes et d'analyses pour la sécurité de l'aviation civile (BEA)

This NSA procedure for oversight of occurrence management is covered by the audit procedures of each NSA. The plan exists for the development of a harmonised NSA auditing procedure. However, for the establishment of FABEC in 2012, FABEC will consist of separate ANSPs, hence a harmonised auditing procedure is not required at FABEC implementation.

For now, audits will be conducted by NSAs separately. In case of oversight of ANSPs providing cross border services, a procedure is drafted by the NSAC manual working group, and approved by the NSAC. This manual is available in attachment C.2.

3.2.2 At ANSP level

The Terms of Reference of FABEC Standing Committee for Safety state that this is a body of the governance structure for the ATSPs to cooperation on safety within the FABEC program. It shows that the membership includes the different representative ATSPs safety directors/managers of the FABEC ATSPs. The SC SAF is assuring a joint implementation and operation of a safety management system (FABEC SMS).

As an important part of the FABEC SMS, the Safety Occurrence Management System Reference document defines how the FABEC Air Navigation Services Providers will manage the reporting, investigation and analysis of safety occurrences within FABEC.

A crucial element in any safety management system is the handling of occurrences that result from the primary ATC service provision. In general, all reportable safety occurrences - as required by legislation - will be investigated, and further or deeper investigation will be conducted individually by ANSPs depending on ATM ground contribution's safety impact or on events of safety interest, like re-occurring similar events or potential lessons that can be learnt from.

For this, the FABEC ANSPs documented their respective processes that deal with safety occurrences. Above that, the FABEC ANSPs documented in a ´reference document´ a set of definitions and common interpretations of safety occurrences and the main process steps to at least ensure compliance with EC 691/2010 requirements at FABEC level.

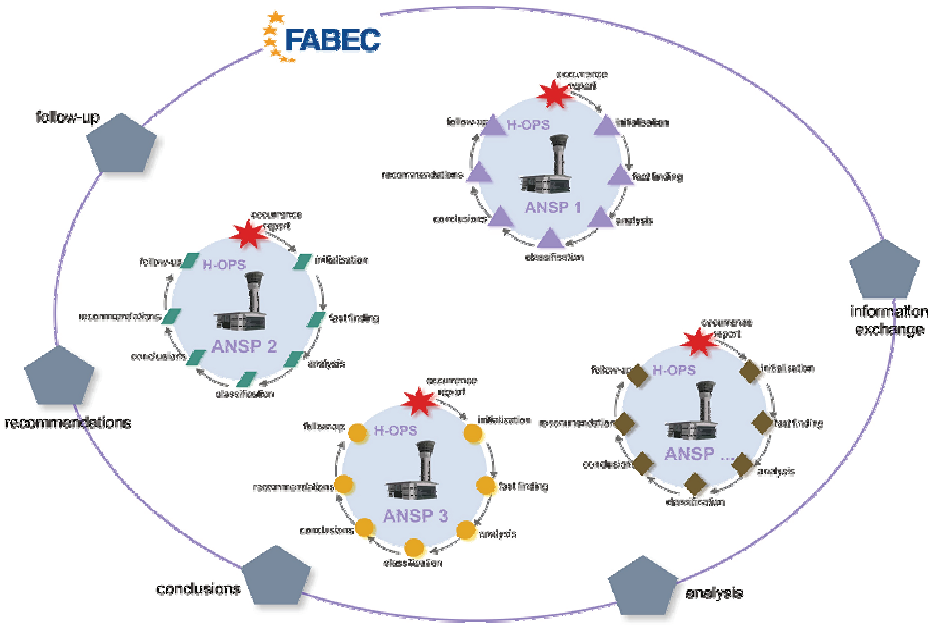
The intention of this ´reference document´ is to prepare the ground for a harmonized / joint implementation and operation of the Safety Occurrence Management System (SOMS) within the Safety Management System (FABEC SMS) inside the ANSPs.

The aim of SOMS is to support safety improvement by

- ensuring the production of highly reliable, comparable statistical data for safety monitoring,
- paving the way for harmonised understanding and knowledge of occurrence investigation and risk analysis,
- fostering the exchange of results from individual ANSP's risk analysis (key risk areas) at FABEC level,
- triggering further analysis of statistical trends and key risk areas at FABEC level on the whole,
- building a common ground for the exchange of best practice on safety improvement.

A generic process describing the handling of safety occurrences fitting any FABEC ANSP can be described by the below diagram:

From this, a generic process that depicts the handling of safety events by the FABEC ANSPs collectively can now be constructed as:



Full information on the Safety occurrence Management System for FABEC in the year 2012 can be found in [SOMS Reference Document] .

3.2.3 *Safety Performance Monitoring*

Safety performance is monitored by the NSA Committee in liaison with the Financial & Performance Committee. The National Supervisory Authority Committee has therefore established the safety performance task force to develop and maintain safety performance monitoring at FABEC level. This task force has membership of the Financial & Performance Committee (F&PC) and deals with the safety elements of the FABEC Performance Plan on behalf of the NSAC. It will provide the Finance & Performance Committee with the safety elements of the FABEC performance plan as of 2012. Coordination between NSAC and F&PC is described into the States Performance Process description document. (Attachment T.1).

With these evidence items, it is claimed that arrangements for dealing with accidents and incidents are in place, subject to supervisory audits by the States. Arrangements exist to enhance the data sharing between the respective AAIBs of the FABEC countries. Equally, the FABEC states are harmonizing their audit procedures. Lastly, there are arrangements in place between the FABEC ANSPs to interface between them in order to harmonize their processes for accident and incident investigation and cross-feed the lessons learned between the ANSPs.

3.3 *FABEC management of safety*

3.3.1 *Introduction*

Undoubtedly the most important element of the safety case is how the safety is actually managed.

To avoid degradation in safety performance, the FABEC ANSPs and NSAs have arrangements in place to monitor the safety performance and take appropriate action should the safety performance deteriorate. In a more proactive manner, the FABEC ANSPs each perform audits and surveys to ensure that the processes for service delivery remain appropriate for their task. Additionally, the Safety Maturity is monitored for signs of leading indicators deteriorating such that action is needed to correct processes or procedures.

The FABEC states are subject to the EU Performance Regulation (EU REG 691/2010) which precisely describes the safety performance indicators that need to be submitted by the ANSPs to the oversight authorities on an annual basis. On top of this, the member states may add additional objectives for their ANSPs.

The FABEC ANSPs have described an approach for Safety Performance Management suitable for the FABEC organization paving the way:

- For exchanges between FABEC ANSPs in the domain of Safety performance management in order to enhance mutual understanding, knowledge and results.
- For the establishment for a data reporting chain including; collection of trustworthy and meaningful data, Data processing, Data storage and Data reporting.
- For the coordination with the FABEC Performance Management Group, when needed, in order to provide timely the expert views of the SC-SAF, and prepare the Safety elements of the FABEC Performance Plan.

How the FABEC Air Navigation Services Providers will manage the data gathering, reporting process and organization of the Safety Performance Indicators within FABEC and to be compliant with regulation EC691 and FABEC performance plan is described in the document [FABEC Safety Performance Management Handbook, version 1.0] (attachment K.3).

It is stressed that safety performance indicators will be used to monitor trends and to demonstrate that safety is managed effectively. It is not the purpose of safety performance measurements to benchmark individual ANSPs safety performance.

The data that will be gathered is based on both leading indicators (indicators about the management and control of key processes within an ANSP) and lagging indicators (indicators about the result of the ATC process, such as incidents).

The data collected are in the area of “Leading indicators”, parameters that are considered “ as influencing the actual ATC service provision before the service provision takes place and “lagging indicators”, parameters that are describing events during/after the service provision.

3.3.2 Leading Performance indicators

Effectiveness of Safety Management System

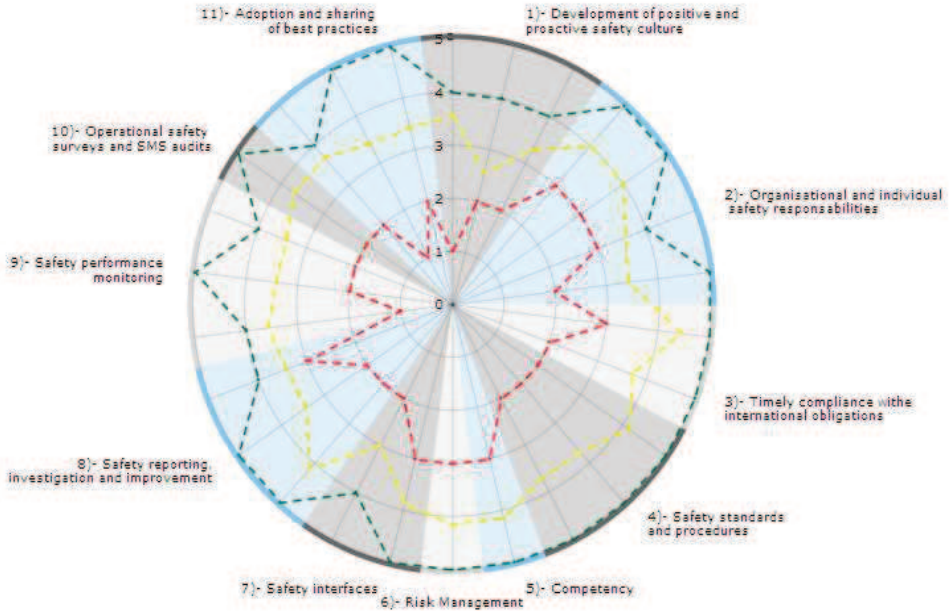
This indicator is measured by a methodology based on ATM safety maturity survey framework and consists of the measurement of the following studies areas and their distinct objectives:

- Safety culture
- Safety policy
- Safety achievement
- Safety assurance
- Safety promotion

For each objective of these domains, five levels of achievement exist:

- Initiating;
- Planning/initial implementation;
- Implementing;
- Managing & measuring;
- Continuous improvement.

Safety Maturity radar plots showing the maturity (lowest, average, highest) of the FABEC members:



3.3.3 *Usage of the RAT*

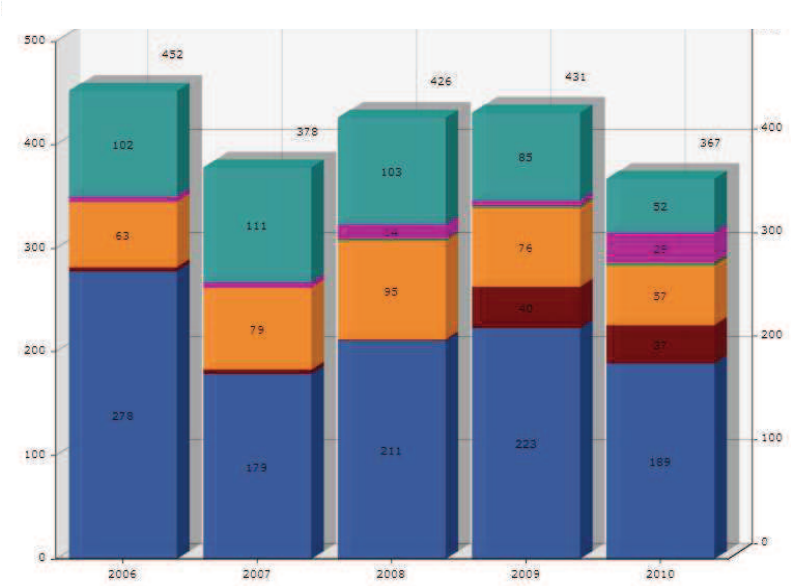
According to the regulation 691/2010, only the application of the severity classification of the Risk Analysis Tool shall be taken under consideration.

3.3.4 *Just culture*

Measuring “Just Culture” is a completely new process and consists of a number of questions to be answered by each ANSP. The measurement has been designed by Eurocontrol, the European Commission and EASA collectively and has first been applied for ANSPs late in 2011. For the moment this measurement only applies to ANSPs and not to countries yet; e.g. does not take into account the legislative regime in the different FABEC states.

3.3.5 *Lagging Indicators.*

Lagging indicators providing insight into the results of the ATC processes over the past 5 years. As just one example, the below graph represents the total absolute number of FABEC reported runway incursions (2006 => 2010, regardless of cause or airport size), with the colored blocks being the individual contributions.



For a complete description of the Safety Performance Management, please refer to the [SPM handbook].

3.3.6 *Organization*

At every ANSP, the safety manager or safety director reports directly to their respective CEO, thus ensuring direct information for the CEO on safety performance and status of safety management system. At every ANSP, the CEO is the ultimate accountable executive for safety empowered to take measures in favour of safety should this be necessary. Mirroring that, at FABEC alliance level, the SC SAF, composed of the safety directors of the ANSPs, reports directly to the ASB, composed of the CEOs of the ANSPs.

Also see the complete safety argument description in the FABEC Overall Safety Case Assembly and Report (attachment K.6).

3.4 FABEC Responsibilities and interfaces

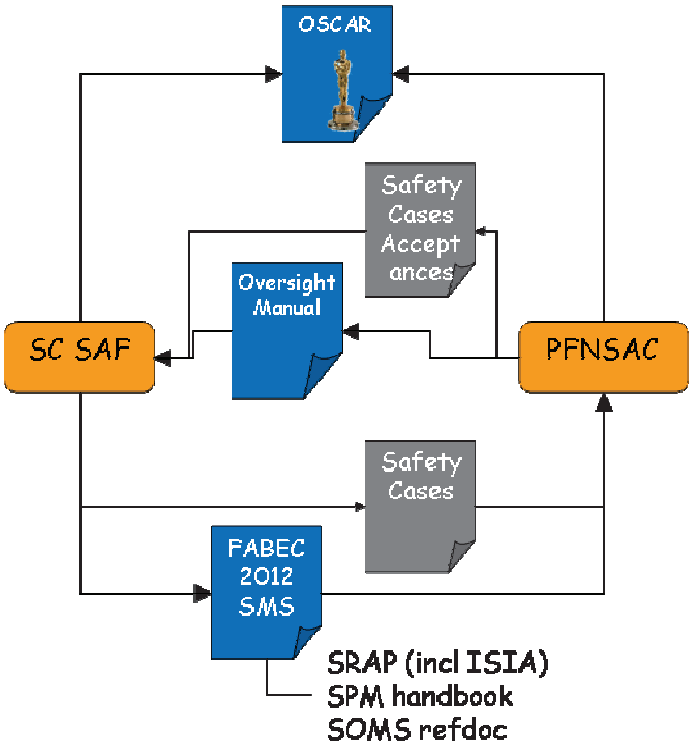
The responsibilities for safety rulemaking, oversight & enforcement are covered by the regulatory and supervisory pillars of the safety case. See the complete OSCAR document pages 17 through 21.

The responsibilities for safety target setting and safety performance are covered for both NSAs and ANSPs. See the complete OSCAR document pages 25, 30 and 32.

For the coordination of safety managment between the FABEC ANSPs, a Standing Committee for Safety (SC SAF) has been created. This is a coordination / direction body between the ANSPs.

This SC SAF interfaces with the National Supervisory Authorities Committee (NSAC) to ensure that the notification of FABEC changes to the PFNSAC and the acceptance by the NSAC of the FABEC changes is coordinated.

The SC SAF will keep abreast with developments within the FABEC which impact on safety and also update the FABEC Overall Safety Case Assembly and Reporting (OSCAR) accordingly.



3.5 Safety Assessments FABEC Changes

The FABEC airspace and organization implies that changes may occur that need to be managed safely by more than one ANSP. These changes will be called FABEC changes. As is required by

European legislation, all changes must be accompanied by a safety case that argues and demonstrates that safety risks have been identified, classified and if necessary mitigated.

Already during the feasibility study phase of FABEC, the safety risk assessment and mitigation processes and methodologies of the individual ANSP's have been compared extensively, see Ref. ["Analysis of safety assessment methodologies and criteria" – Oct 2008]. The scope of this study was safety assessment and safety criteria. The main findings of this study can be summarized as:

- All individual FABEC ANSPs have NSA certified processes and methodologies;
- All individual FABEC ANSPs have similar processes and methodologies for safety assessment;
- There exist many differences in tools and techniques for safety assessment that are being used by the individual FABEC ANSPs; and
- For safety criteria, there exist more fundamental differences between the individual FABEC ANSP's.

At the time of the implementation phase of FABEC, all ANSPs agreed that, at the initial stage of FABEC implementation, one uniform and overall FABEC methodology for safety risk assessment and mitigation cannot yet be defined. Therefore, it was agreed to define a pragmatic version of a "handbook" for safety risk assessment and mitigation for FABEC changes. The rationale of this approach was to define a solution for the short term (i.e. directly applicable), and to plan a strategy to come to one FABEC methodology for the longer term.

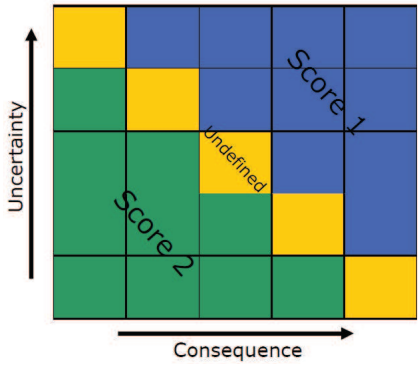
The solution for the short term is described in the document 'Safety risk assessment and mitigation for FABEC changes [SRAP version 2.8] (attachment K.4). Note that this includes the description of the interaction with the National Supervisory Authorities of the FABEC member states.

Most importantly the document specifies the different process steps that need to be undertaken when arguing a safety case for a specific change in the ATM system. These steps follow internationally agreed standards. Added to that is the "Safety View and Planning View" step that describes items such as:

- Introduction of the change
- The rationale of the selected safety case option
- Verification of adequate safety management plan
- Overview of safety management activities (e.g., hazard logs, audits, roles and responsibilities, participants in the project, et cetera)
- Overview of safety assessment activities
- Safety evidence approach
- Safety organization roles and responsibilities inside the change project
- When there is an external supplier, safety management arrangements have to be defined
- Make clear how the interactions will be set up and managed between the different units or ANSPs
- Establish how the AFG/Task Force Leader will interact with the SCS, e.g. through the local SCS representative
- Schedule and resource allocation, define the milestones and deliverables
- Use a glossary and definitions, references documents
- Communication plan

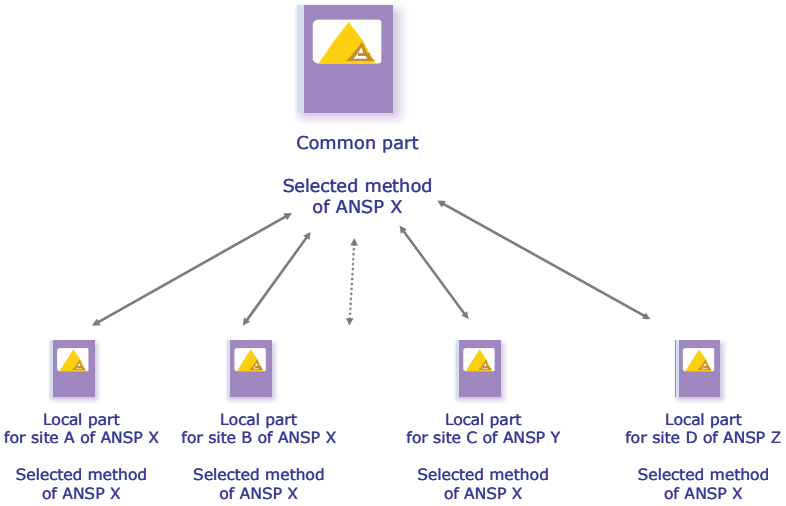
Before the change is notified to the authorities it needs to be determined whether the change implies a serious safety risk (a Type I change) or not (Type II change).

For that, a process has been set up and agreed between the partners (ISIA: Initial Safety Impact Analysis) that ultimately results in the decision for a type I or type II change, applying the criteria in the following diagram:

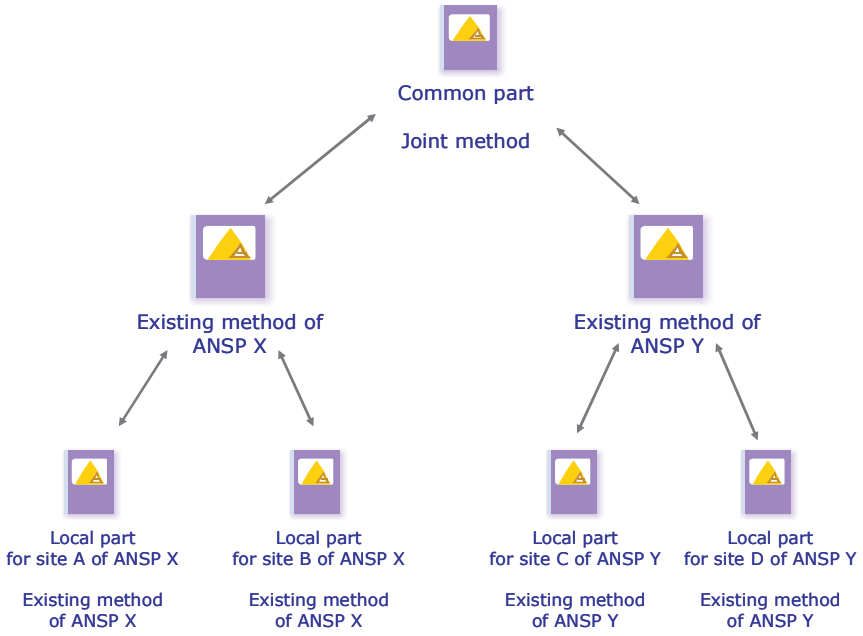


For the methodology to be followed during the risk assessment and mitigation process, two options have been set up to serve the needs of the ANSPs for a coordinated safety risk assessment process.

Option 1 is where the methodology of one ANSP ("ANSP X" in the below diagram) is declared 'leading' and all part of the safety argument / safety case will be built on this methodology.



Option 2 is where no particular methodology is leading but rather an overall coordinated safety case document is produced (a common part), building on the arguments of two or more sub safety cases, each sub safety case following the methodology of the local ANSP. This process approach is an essential tool for the ANSPs to create joint safety cases whilst avoiding the need to significantly invest in new methodologies at any ANSP, which would endanger the development of new airspace and procedures in FABEC and thus prevent significant performance improvements.



For each change that has been introduced and implemented as a FABEC change, there is a separate endorsement of the safety case by the NSAC. According to current legislation, no change can be implemented without a safety assessment by the ANSPs (or the involved stakeholders) which, on the basis of the safety severity of the change, will have to be endorsed by the NSAC. Thus it is ensured that no operational changes are being introduced without a proper safety assessment.

The central repository of all the FABEC changes and the associated safety assessments are kept at the AFG level. A status of the safety work per initiative is available at attachment K.67

4 ATTACHMENTS

Att. 1: FABEC Safety Policy

Att. 2: FABEC Safety Occurrence Management

Att. 3: FABEC Safety Performance Management Handbook

Att. 4: FABEC Safety Case Report

Att.5: FABEC Safety risk assessment and mitigation for FABEC changes

Att. 6: FABEC Initial Safety Impact Assessment (ISIA)

Att. 7: Status of Safety Assessments FABEC Changes

FABEC Implementation Phase

FABEC Safety Policy

EC Information

Attachment L.1

Co-financed by the European Union
Trans-European Transport Network (TEN-T)

DOCUMENT SUMMARY

Objective : *The FABEC Safety Policy*	
Origin : *ASB*	**Audience** : *All FABEC personnel*

Title : *FABEC SAFETY POLICY*
Reference : *FABEC SAFETY POLICY*

Version : 1.2	**Date** : *March 1st 2012*	**Status** : ☐ Draft ☑ Released	**Classification** : ☑ Public ☐ FABEC limited ☐ Addressees limited

DOCUMENT CHANGE RECORD

Version	Date	Reason for changes	Author of changes
1.0	Dec 2011	Update from previously agreed version 0.7	J. Brüggen
1.1	Feb 2012	Joint accountability for safety is not possible for FABEC in 2012	J. Brüggen
1.2	Feb 2012	Ambiguous text about safety ambition vs safety target was removed.	J. Brüggen

SAFETY POLICY.

THE CEO'S OF THE FABEC ANSPS DECLARE:

Our safety commitment is to strive continually to improve our operational safety performance and to minimize our contribution to the risk of an aircraft accident as far as is reasonably practicable.

The CEOs of the FABEC ANSPs will ensure that this commitment is part of every activity undertaken as part of FABEC;

In order to fulfill this commitment, we will have a formalized, explicit and proactive approach to systematic safety management which:

Defines the safety organization with clear lines of safety accountability;

Promotes a climate of safety awareness and understanding throughout the organization;

Monitors achievement against safety objectives and indicators of safety performance.

Ensures that everyone understands the role they play in delivering operational safety performance, has the capability to discharge their role and recognizes that they have an individual responsibility for the safety of their actions;

Encourages all staff to report operational safety concerns within a Just Culture such that appropriate improvement actions can be taken;

Seeks out and adopts good operational and safety management practices;

Engages with external stakeholders to share safety improvement opportunities;

Complies with all applicable safety standards and requirements.

As CEO's committed to safety, we will make sure that all participants in FABEC are aware of and committed to this safety policy and we will use all possible and practicable means to assure the objectives of this safety policy.and to the provision of the necessary resources to support its implementation and maintenance.

Page intentionally left blank

FABEC Implementation Phase

FABEC Safety Occurrence Management

EC Information

Attachment L.2

Co-financed by the European Union
Trans-European Transport Network (TEN-T)

FABEC

V1.1

Objective:
➢ The objective of this document is to describe how the FABEC Air Navigation Services Providers will manage safety related occurrences within FABEC. ➢ It will assist in harmonizing the definition and classification of the occurrences and the process for data collection and sharing, analysis and lessons learned. ➢ The Annex is a "living part" that is being continuously reviewed. ➢ This document will be part of the FABEC 2012 SMS.

Origin:
➢ Safety Occurrence Management System Sub-group

Audience:
➢ FABEC SC-SAF

Title:
➢ FABEC Safety Occurrence Management Reference Document

Reference
➢ EC n°669/2010 of 20 October 2010 on the investiga tion and prevention of accidents and incidents in civil aviation and repealing Directive 94/56/EC ➢ EC n°42/2003 of 13 June 2003 on occurrence reporti ng in civil aviation ➢ EC n°2096/2005 of 20 December 2005 laying down com mon requirements for the provision of air navigation services ➢ EC n°691/2010 of 29 July 2010 laying down a perfor mance scheme for air navigation services and network functions and amending Regulation (EC) No 2096/2005 laying down common requirements for the provision of air navigation services ➢ Eurocontrol Safety Regulatory Requirement 2 Edition 3.0 of 2 December 2009 on "Reporting and Assessment of Safety Occurrences in ATM" ➢ REG (EU) No 176/2011 Annex Part II Art 1 b) "Arrangements dealing with accident and incident investigation and a description on how to address safety data collection, analysis and exchange"

Version 1.1	Date: 23 feb 2012	Status: released

Classification:	Public ☐ FABEC limited ☒ FABEC SC-Safety ☐

Document Change Record			
Version:	Date:	Reason of changes:	Author of changes:
V0.1-0.5	14/09/11	First draft versions by SOMS SG	SOMS Team
V1.0	22/11/11	Approved version	SC SAF
V1.1	14/02/12	Update of Annex (discussable examples removed)	SOMS Chairman

Document Approval:					
Version:	Authority	Name	Function	Signature	Date
V1.1	Endorsement	Heino Küster	Chairman SOMS WG		23.2.12
	Approval	Job Brüggen	Chairman SC SAF		23.2.12

Point of Contact:			
Name	Telephone	Unit	Email
Heino Küster	+4961037074043	DFS	Heino.kuester@dfs.de

Table of contents

1. Executive Summary

This reference document harmonises the set of definitions and common interpretations of safety occurrences and the main process steps to at least ensure compliance with EC 691/2010 requirements at FABEC level.

The intention of this document is to prepare the ground for a harmonised / joint implementation and operation of the Safety Occurrence Management within the Safety Management System (FABEC SMS) inside the ANSPs. To cope with this objective further development is foreseen beyond 2011.

The aim of SOMS is to support safety improvement by

- ensuring the production of highly reliable, comparable statistical data for safety monitoring,
- paving the way for harmonised understanding and knowledge of occurrence investigation and risk analysis,
- fostering the exchange of results from individual ANSP's risk analysis (key risk areas) at FABEC level,
- triggering further analysis of statistical trends and key risk areas at FABEC level on the whole,
- building a common ground for the exchange of best practice on safety improvement.

It is to be stressed that process development in 2010/11 primarily focused on those issues that ensure full compliance with EC n°691/2010 of 29 July 2010 concerning the use of the Risk Analysis Tool (RAT) methodology for Separation Minima Infringements (SMI), Runway Incursions (RI) and ATM Specific Technical Events (ATM STE). Therefore the process as described in this document ensures reporting and initial investigation of all reportable occurrences with regard to this regulation.

At least it is commonly agreed by all ANSPs within FABEC that those **SMI and RI occurrences with any "ATM ground contribution"** as well as **all ATM STE** are being investigated to an extent that ensures harmonised severity classification based on the use of the required standard RAT methodology.

Severity classification at FABEC level referring to SMI and RI is limited to those occurrences with ATM ground contribution only, as this reflects ANSP's responsibility. It is left to individual ANSPs to go beyond ATM ground contribution and to further assess the "ATM overall" severity of the occurrence.

In general, all reportable safety occurrences - as required by legislation - will be investigated, and further or deeper investigation will be conducted individually by ANSPs depending on ATM ground contribution's safety impact or on events of safety interest, like re-occurring similar events or potential lessons that can be learnt from.

Caution!

Reporting is 'human based' and therefore has its human limits. For this reason the process might be limited in terms of data completeness or comparability. Statistical trend monitoring and conclusions should be handled with care.
A Just Culture environment will be supportive to occurrence notification by involved staff and should improve process results.

Future developments

Beyond 2011, a permanent group is needed at FABEC level to regularly analyse the safety performance within FABEC. Reference is made to the TOR of the new "Safety Performance Management Subgroup (SPM)".

The scope of further work of this group should include at least

- investigation principles and definition of causal and contributory factors including contextual conditions,
- data analysis at FABEC level (may need 'ad-hoc experts working group'),
- recommendations at FABEC level (by SC SAF),
- lesson dissemination at FABEC level (may need 'ad-hoc experts working group'),
- data repository (purpose and functional requirements to be defined),
- data exchange and measurement (safety performance indicators)

in a Just Culture environment.

2. Generic Process at ANSP Level

The process of Safety Occurrence Management and its single steps are shown in the graphic below:

It starts with the “report of an occurrence” from a controller, engineer or any other person.

Investigation is “initialised” within the ANSP by checking the report’s content, recorded data and having decided upon the need for investigation (e.g. whether it was a ‘safety related’ or ‘reportable’ occurrence (as listed in the Annex).

If so decided, investigation continues with “fact finding” by data and information gathering, including recorded data (like radar plots, voice transmissions), interviews with and/or specific questionnaires filled by persons involved.

Based on these facts, the “analysis” is done by reconstructing the occurrence in a chronological order, sequencing all identified actions/non actions, factors and events that lead and/or contributed to it. This should - whenever possible - include positive factors that mitigated the overall risk of the situation. Only factual information without any personal technical judgements or assumptions shall be considered at this step of the investigation.

Following the analysis, “classification” of the occurrence is being determined, i.e. the ‘occurrence category’ (e.g. SMI, RI), the ‘ATM ground contribution’ (for SMI and RI) and its ‘severity’.

‘ATM ground contribution’ is being defined as “any causing, contributing or aggravating factor” from the ATM ground system to a situation - in the air or on the ground - where an aircraft/vehicle/person has been in danger to lose required safety margins”.
In contrary, ‘ATM ground contribution is none’ when “investigation shows evidence that there wasn’t any kind of contribution from ATM ground”, and there was at no point of time any chance for the ATM ground system to detect and resolve a sudden/potential conflict in advance of a loss of required safety margins”.

"Severity" of the occurrence is being assessed and classified in compliance with the RAT-methodology as laid down in EC 691/2010 regulation and it's Implementing Rule.

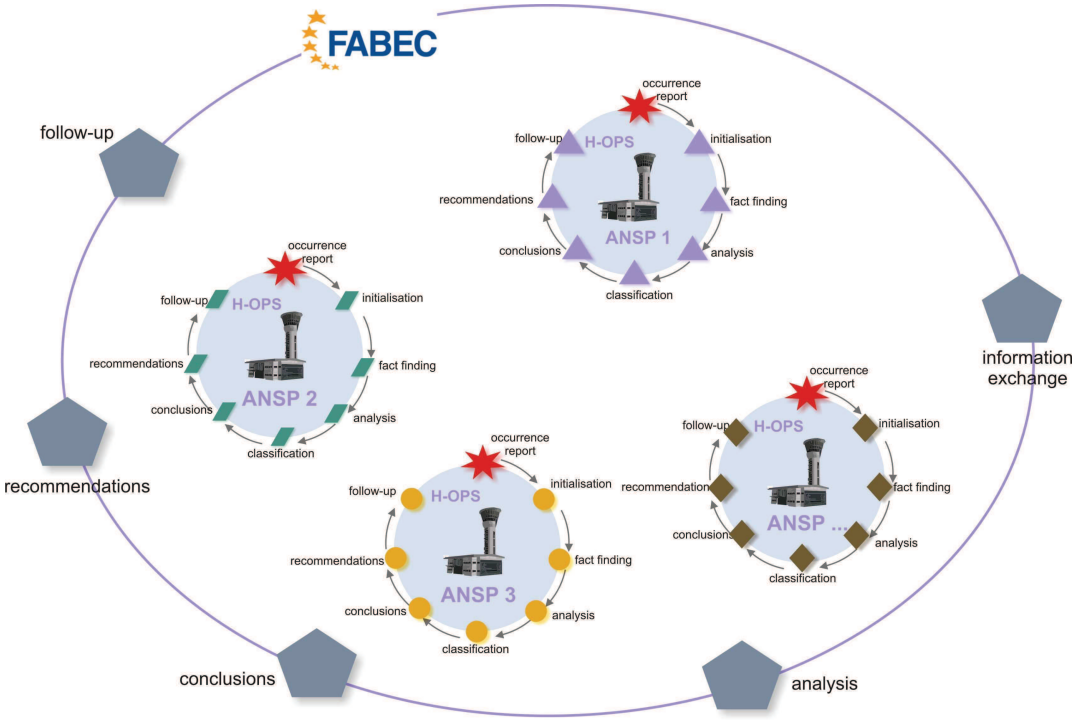
The investigation report is summarising all the findings from the investigation, focussing on the causes and contributing factors that have lead to the occurrence. In some ANSPs this step is called "Conclusions".
From the conclusions, "recommendations" (proposals for corrective actions) to the responsible management may be formulated.

The response and the implementation of the "follow-up" activities (e.g. corrective actions) as decided by responsible management is being monitored.

"Notification & Reporting (external)" to the authorities is done by individual ANSPs according to the requirements set at national level.

In summary, all ANSPs are compliant with applicable regulations and thereby ensure a common input at FABEC level.

3. Process at FABEC Level



"Data collection" and "Information exchange" includes

- Fulfillment of EC 691/2010 requirements
  - Total numbers of all reported SMI and RI
  - Total numbers of ATM STE
  - Total numbers of all reported SMI and RI with ATM ground contribution
  - Severities A, B, C, D and E of SMI and RI with ATM ground contribution
  - Severities AA, A, B, C of ATM STE

- Individual collection and sharing at FABEC level of
  - lessons learnt/recommendations from occurrences (from ANSP as well as AAIB) or from SMS audits on the Occurrence Management process
  - identified safety risks from occurrences seeking for mitigation measures
  - best practices concerning Occurrence Management process and/or safety improvement measures

"Analysis" at FABEC level is done by the "Safety Performance Management Subgroup (SPM)" dealing with safety issues as:

- Trend monitoring on statistical data (lagging indicators) including the assessment and explanation of increasing or decreasing trends. This also comprises reasons and/or contextual information from individual ANSPs on

their increasing or decreasing trends.

- Collected risks individually identified at ANSP level, based on causal and contributory factors that had lead to a safety occurrence. The aim of this is to share this information to learn from each other, and to exchange risk mitigation practices.

“Conclusions” from SPM include overall findings from the “analysis” that might need to be disseminated (at FABEC or ANSP level) or may require further collaborative investigation by an ‘ad-hoc experts working group’ to improve the overall safety level of the FABEC ATM system.

“Recommendations” by SPM that are being derived from the conclusions at FABEC level will be proposed to SC SAF (SPM report).

SC SAF will consult responsible bodies within FABEC (e.g. SC OPS) for acceptance of the recommendations and decision on further actions to be taken.

“Follow-up” monitoring on the implementation of the actions (e.g. by SC OPS) and the achieved effect on the overall level of safety needs to be carried out within FABEC SMS.

The above process steps from “Analysis” till “Follow-up” at FABEC level need further development beyond 2011.

A. Annex [Definitions&Examples]

List of Occurrences/Definitions wrt EC 691/2010

The occurrences listed in A.1- A.3 fall under the scope of the FABEC Safety Occurrence Management System, to comply with EC 691/2010.

There are definitions for Separation Minima Infringements and Runway Incursions. Most ANSP's within FABEC already apply the same definitions. Yet the definitions are concise and may be interpreted differently. From a survey amongst the FABEC ANSP's it appeared that there is quite a variety of interpretations. In order to have a harmonized application of these definitions within the FABEC, it was considered essential to clarify the definitions by means of generic examples of occurrences that meet the definitions. In practice more unambiguous results are expected working from these generic examples. **Over time the examples can be adjusted or extended where experience shows it is considered necessary.**

A.1. Separation Minima Infringement (SMI)

Definition (Eurocontrol ESARR 2):
A situation in which prescribed separation minima were not maintained between aircraft.

EXAMPLES OF SITUATIONS THAT ARE A SEPARATION MINIMA INFRINGEMENT [1]

The following generic examples are considered to meet the definition of a Separation Minima Infringement.

Nr	Example	Explanations/Remarks
1	AC 1 (VFR), training T/G on RWY 25R, on TWR frequency. AC 2 established ILS RWY25L for landing, on APP frequency. AC 1 deviates from extended centreline of RWY 25R, coming in the vicinity of AC 2.	Radar separation procedure in Airspace class D infringed (AC 1 and AC 2 both in same airspace but not on same frequency). AC 1 (Trainer) kept on TWR frequency in Airspace D.
2	Infringement of separation after aircraft having passed each other.	Maybe no STCA alert, depending on set parameters (e.g. if more than 3 NM and aircraft on diverging tracks).
3	Aircraft just after take-off and another aircraft in missed approach.	If not under visual separation procedure
4	Infringement of wake turbulence separation.	ICAO guidance on A380 wake turbulence prescribed separation to be considered; no STCA alert!
5	Non RVSM aircraft in RVSM airspace: SMI whenever less than 2000 ft separation with other acft.	e.g. one acft FL 231, the other in FL 250
6	SMI whenever less than 1000 ft separation with other acft	e.g. one acft in FL 239, the other in FL 230

[1] Examples collected in SOMS SG

Nr	Example	Explanations/Remarks
7	Parallel flights or no rate of closure (closing/decreasing distance) with less than prescribed horizontal separation (same level or less than 1000 ft /2000 ft)	Detection depending on accuracy of radar system or presence of automated reporting systems. These cases (e.g. 4.8 instead of 5 NM) might not be caught, but if reported they are dealt with as an SMI.
8	Separation minima infringement between IFR flights and VFR flights having infringed controlled airspace (A, B, C, D in IMC).	SMI caused by an infringement of controlled airspace by VFR flight and separation provision between IFR/VFR applies
9	Separation minima infringement involving a flight already being transferred to the adjacent ANSP, but still in own ANSP's airspace.	**Avoid double counting! Decision to be taken on individual case basis.**
10	Separation minima infringement outside own ANSP's airspace (transferred from adjacent ANSP) but involving a flight under own control.	**Avoid double counting! Decision to be taken on individual case basis.**

EXAMPLES OF SITUATIONS THAT ARE NOT A SEPARATION MINIMA INFRINGEMENT [2]

The following examples are considered not to meet the definition of a Separation Minima Infringement.

Nr	Example	Explanations/Remarks
i	There is no SMI whenever procedural separation (based on time, SID, visual etc.) is in effect and applied to after Take-off from RWY(s).	Pilot deviations from procedures (SID, outside tolerances) are considered as being an Airprox (“inadequate separation”)
ii	visual climb/descend with correct use of procedure	not allowed at MUAC, BC

[2] Examples collected in SOMS SG

A.2. Runway Incursion (RI)

(Between aircraft and aircraft/vehicle/person, whether or not an actual avoiding action was necessary)

Definition (ICAO, DOC 4444):
Any occurrence at an aerodrome involving the **incorrect presence** of an aircraft, vehicle or person on the **protected area of a surface designated for the landing and take-off of aircraft**.

Rationale [3]

"Protected area of a surface designated for the landing and take-off of aircraft"
This is to be interpreted as the physical surface of a runway, from the centreline to the holding point appropriate to the type of runway. Where operations are being conducted during Low Visibility operations this should be the holding point appropriate to the procedures in force. The "protected surface" includes the ILS glide-path and localiser critical areas at all times and the ILS sensitive areas during Low Visibility Procedures.

"Incorrect presence"
This should be interpreted as the unsafe, unauthorised or undesirable presence, or movement of an aircraft, vehicle or pedestrian.

EXAMPLES OF SITUATIONS THAT ARE A RUNWAY INCURSION[4]
The following generic examples are considered to meet the definition of a runway incursion.

Nr	Example	Explanations/Remarks
1	Aircraft lands without clearance (except when evidence shows that the pilot was acting appropriately in accordance with Loss of Communication procedures due to R/T failure).	Normally aircraft would squawk a 7600 code during such a situation, except when LoC occurs late in the approach. Note that an occupied radio frequency is not considered to be a Loss of Communication. See also example iii).
2	Aircraft takes off without clearance.	This also applies for an aircraft that was already on the runway (e.g. after a line-up and wait instruction). The aircraft is not authorised to be on the remaining part of the runway.
3	Aircraft, vehicle or pedestrian enters runway without clearance.	Aircraft, vehicle or pedestrian is not authorised to be on the runway.
4	Aircraft, vehicle or pedestrian is cleared to enter the runway and does so as instructed and intended,	There is no rule but a recommendation in EAPPRI; ICAO 9870 4.4.1 recommends not to

[3] Guidance to RI definition mainly taken from EAPPRI
[4] Examples mainly taken from EAPPRI with some additional cases by SOMS SG

Nr	Example	Explanations/Remarks
	but before the red stop bar has been switched off (this also applies to a red traffic light where so positioned).	cross red stop bars, except if contingency procedures are in force. Problem is the active red stop bar / red traffic light with a contradicting clearance. At FABEC level such an event is judged as RI. *At LVNL such an event is judged as a 'stop bar violation' only, not a runway incursion, because the aircraft has been authorised and desired to enter that particular part of the runway. (but will count it as an RI as required at FABEC level)*
5	Aircraft, vehicle or pedestrian enters runway without clearance, and crosses a red stop bar (this also applies to a red traffic light where so positioned).	This is actually a particularised case of example 3. It is judged as a stop bar violation and a runway incursion because the aircraft was not authorised and desired to enter that part of the runway. Note also examples v) and vi).
6	Aircraft, vehicle or pedestrian enters the runway at the incorrect holding point.	Aircraft, vehicle or pedestrian is not authorised to be on that part of the runway.
7	Controller incorrectly clears an aircraft, vehicle or pedestrian to enter or cross runway.	The presence of the aircraft, vehicle or pedestrian is undesired. It is considered to be a runway incursion when the aircraft, vehicle or pedestrian actually ends up within the protected surface.
8	Controller incorrectly clears an aircraft to land or take-off.	In both situations landing and take-off it is considered to be a runway incursion when the aircraft actually ends up within the protected surface.
9	Aircraft lines-up out of instructed sequence.	Another aircraft was authorised to be on the runway at that particular period of time, not the concerned aircraft.
15	Crossing runway operations with emergency landing. AC cleared to land beyond rwy crossing point. Vehicle cleared to join the AC after landing. AC landed and stopped before crossing point. Vehicle crossed other runway without authorization.	Vehicle cleared on landing runway only.

EXAMPLES OF SITUATIONS THAT ARE NOT A RUNWAY INCURSION

The following examples are considered not to meet the definition of a runway incursion.

Nr	Example	Explanations/Remarks
i	Aircraft, vehicle or pedestrian is cleared, correctly, to enter or cross a runway and proceeds as cleared, but does not read-back the clearance.	The aircraft, vehicle or pedestrian is authorised and desired to be on that part of the runway.
ii	Aircraft is cleared, correctly, to land or take off and proceeds as cleared, but does not read-back the clearance.	The aircraft is authorised and desired to be on the runway.
iii	Aircraft lands without clearance and evidence shows that the pilot was acting appropriately in accordance with Loss of Communication procedures due to R/T failure.	See also example 1).
iv	Aircraft, vehicle or pedestrian vacates at the incorrect holding point.	This may become a safety issue, but the occurrence takes place outside the protected area of the runway.
v	Aircraft, vehicle or pedestrian crosses a red stop bar but stays outside the protected area of a runway.	For instance this may be the case when crossing a 24H stop bar in other than reduced visibility conditions.
vi	Aircraft lands or takes off, with correct clearance, on taxiway.	This may become a safety issue, but the occurrence takes place outside the protected area of the runway.

A.3. ATM Specific Technical Event (ATM-STE)

"ATM-STE" is assumed to be the same as „ATM-specific occurrences" defined by Eurocontrol, ESARR 2.

The occurrence types under this category are failures of technical functions that have an effect on the safe provision of ATM services (ATS, ATFM, and ASM) The following ATM-STE fall under this occurrence type:

- **Failure of COMMUNICATION Function**

Definition (ESARR 2): A situation, in which communication by the ground ATM system is lost, partially lost or corrupted so that continuously required communication is prevented.

Ref.: The communication function is the aggregation of organizations, people, infrastructure, equipment, procedures, rules and information used to provide communication services in order to facilitate the safe conduct of flights and systems operations. (EUROCONTROL IETF/DP/0043)

- **Failure of SURVEILLANCE Function**

Definition (ESARR 2): A situation, in which surveillance by the ground ATM system is lost, partially lost or corrupted so that continuously required surveillance by ATS is prevented.

Ref.: The surveillance function is the aggregation of organizations, people, infrastructure, equipment, procedures, rules and information used to provide surveillance services in order to facilitate the safe conduct of flights and systems operations by tracking and monitoring the progress of aircraft movements (EUROCONTROL IETF/DP/0043).

- **Failure of NAVIGATION Function**

Definition (ESARR 2): A situation, in which navigation aids in the ground ATM system is lost, partially lost or corrupted so that continuously required navigation performance provided to the aircraft is prevented.

Ref.: A navigation service for en route and/or landing purposes, provided to the Airspace User via ground or spatial based aids. (EUROCONTROL IETF/DP/0043).

- **Failure of Data Processing and Distribution Function**

Definition (ESARR 2): A situation in which Data Processing and Distribution by the ground ATM system is lost, partially lost or corrupted so that continuously required data exchange within ATS and/or between ATS and aircraft is prevented.

E.g. loss of flight data processing.

FABEC Implementation Phase

FABEC Safety Performance Management Handbook

EC Information

Attachment L.3

Co-financed by the European Union
Trans-European Transport Network (TEN-T)

FABEC

Objective:
➢ The objective of this document is to describe how the FABEC Air Navigation Services Providers will manage the data gathering, reporting process and organisation of the Safety Performance Indicators within FABEC.

Origin:
➢ Safety Performance Management Sub-group

Audience:
➢ FABEC SC-SAF

Title:
➢ FABEC Safety Performance Management Handbook

Reference			
➢ EC n°42/2003 of 13 June 2003 on occurrence reporting in civil aviation ➢ EC n°549/2004 of 10 March 2004 laying down the framework for creation of the single European sky ➢ EC n°2096/2005 of 20 December 2005 laying down common requirements for the provision of air navigation services ➢ EC n°691/2010 of 29 July 2010 laying down a performance scheme for air navigation services and network functions and amending Regulation (EC) No 2096/2005 laying down common requirements for the provision of air navigation services ➢ Regulation (EC) 550/2004 Article 8a 4, and 8a 5. Before formal notification of the establishment of the FABEC - provide adequate information to the commission. ➢ Regulation (EC) 1070/2009 of 21 October 2009 amending Regulation (EC) 550/2004 Functional Airspace Blocks shall be implemented by 4th December 2012.			
Version: 1.	Date: February 20th, 2012	Status:	Draft: ☐ Released: ☒

Classification:	Public ☐ FABEC limited ☐ FABEC SC-Safety ☒

Document Change Record			
Version:	Date:	Reason of changes:	Author of changes:

Document Approval:					
Version:	Authority	Name	Function	Date	Signature
V1.0	Author	H. Forestier	Chair WG Safety Performance	23.07.2012	
	Approval	J. Brüggen	Chair SC SAF	23.07.2012	

Point of Contact:			
Name	Telephone	Unit	Email
H. Forestier	+33 1 58 09 38 98	DSNA	Herve.forestier@aviation-civile.gouv.fr

FABEC

Table of contents

1. Foreword

This manual aims to develop and to implement an approach for Safety Performance Management suitable for the FABEC organization paving the way:

- For exchanges between FABEC ANSPs in the domain of Safety performance management in order to enhance mutual understanding, knowledge and results.
- For the establishment for a data reporting chain including; collection of trustworthy and meaningful data, Data processing, Data storage and Data reporting.
- For the coordination with the FABEC Performance Management Group, when needed, in order to provide timely the expert views of the SC-SAF, and prepare the Safety elements of the FABEC Performance Plan.

At FABEC level the monitoring of Safety Performance Indicators will be done by the FABEC Finance & Performance Committee.

NB: This document does not take under consideration targets / thresholds which could be set at one ANSP and/or one state level.

2. Scope

The objective of this document is to describe how the FABEC Air Navigation Services Providers will manage the data gathering, reporting process and organisation of the Safety Performance Indicators within FABEC and to be compliant with regulation EC691 and FABEC performance plan.

It is stressed that safety performance indicators will be used to monitor trends and to demonstrate that safety is managed effectively. It is not the purpose of safety performance measurements to benchmark individual ANSPs safety performance

It has to be recognised that any gathered data is based on each ANSPs reporting system and is linked with just culture.

Data gathering includes leading and lagging safety performance indicators.

3. Leading Performance indicators

3.1. Effectiveness of Safety Management System

This indicator is measured by a methodology based on ATM safety maturity survey framework[1] and consists of the measurement of the following studies areas and their distinct objectives:

3.1.1. Safety culture:

- SA1 - Development of a positive and proactive safety culture.

[1] Cf. ATM Safety Framework Maturity Survey - Methodology for ANSPs V.1, 31st August 2009

- Domain covered by 3 objectives.

3.1.2. Safety policy:

- SA2 - Organisational and individual safety responsibilities.
  - Domain covered by 4 objectives.
- SA3 - Timely compliance with international obligations.
  - Domain covered by 2 objectives.

3.1.3. Safety achievement:

- SA4 - Safety standards and procedures.
  - Domain covered by 3 objectives.
- SA5 – Competency.
  - Domain covered by 1 objective.
- SA6 - Risk management.
  - Domain covered by 1 objective.
- SA7 - Safety interfaces.
  - Domain covered by 2 objectives

3.1.4. Safety assurance:

- SA8 - Safety reporting, investigation and improvement.
  - Domain covered by 3 objectives.
- SA9 - Safety performance monitoring.
  - Domain covered by 3 objectives.
- SA10 - Operational safety surveys and SMS audits.
  - Domain covered by 1 objective.

3.1.5. Safety promotion:

- SA11 - Adoption and sharing of best practises.
  - Domain covered by 3 objectives.

For each objective of these domains, five levels of achievement exist:

- Initiating;
- Planning/initial implementation;
- Implementing;
- Managing & measuring;
- Continuous improvement.

3.2. Usage of the RAT

According to the regulation 691/2010, only the application of the severity classification of the Risk Analysis Tool shall be taken under consideration.

Consequently, this severity classification is being applied to the following occurrences:

- SMI
- RI
- ATM specific technical events.

NB: FABEC partners made the decision to apply the same severity scheme whatever is the number of commercial air transport movements handled in their Air Traffic Control Unit (UAC, ACC, APP, TWR).

3.3. Just culture

This indicator consists in the measurement of the following issues[2] :

- Just culture Policy;
  - P-1 - There an explicit Just Culture policy, which is formally endorsed by management and staff representatives and made public.
  - P-2 - The Just Culture policy contain a description of what is considered to be unacceptable behaviour.
  - P-3 - The Just Culture policy guarantees that no disciplinary action will be taken regarding the reporter by the service provider for self-reported occurrences (except for the cases defined above in question P.2).
  - P-4 - The ANSP provides legal support for its own staff in case of prosecution / legal action related to a safety occurrence.
  - P-5 – There an established and well known Critical Incident Stress Management programme.
  - P-6 - There is an established and well known Critical Incident Stress Management programme.

- Roles and Responsibilities clearly defined and implemented;
  - P-7 - The service provider's safety investigators are completely independent and separate from any line, competency or ops management.
  - P-8 - The service provider's safety investigators have full, unimpeded access to all relevant data for investigations.
  - P-9 - Access to safety data clearly is defined and confidentiality ensured?
  - P-10 - The staff providing Critical Incident Stress Management is clearly nominated and adequately trained.

- Training;
  - P-11 - There is regular training and/or briefings on relevant legislation for safety in the context of Just Culture..
  - P-12 - The principles of Just Culture are included in all training curricula (ab-initio and recurrent training).
  - P-13 - Qualifications and training requirements as regards Just Culture for the ANSP's safety investigators are clearly defined.

- Legal/judiciary:
  - L-1 - The spirit of Directive 2003/42/EC on occurrence reporting in civil aviation and in particular the provisions of its Article 8 (Protection of information) is fully transposed into internal procedures.
  - L-2 - There are agreements between ANSPs and judicial/police authorities to ensure protection of reported incident data and involved individuals.

[2] Based on a working material from E3 group/ To be endorsed by the Single Sky Committee on 27th of September 2011

- L-3 - there is an agreed process to deal with incident matters between the ANSP and its national aviation authorities

- Occurrence reporting and investigation

  - O-1 - the identity of personnel involved in occurrences is protected by staff regulations.
  - O-2 – Staff subject to investigations based on occurrence reports have access to related information.
  - O-3 – There is a requirement for staff subject to investigation to sign their agreement / disagreement with the findings of investigations
  - O-4 – There is a formal procedure to inform staff having reported an occurrence of the progress of the investigation.
  - O-5 – The ANSP provides regular feedback to staff based on occurrence reports.
  - O-6 - The public annual report of the service provider provides statistical feedback on occurrence reports.
  - O-7 – Automated reporting has been accepted by staff and implemented by the service provider.
  - O-8 - There is a separate body, involving nominated Subject Matter Experts, making the decision on whether a case is an "honest" mistake or it falls under the "unacceptable behaviour" category

For each of these queries it exits:

- two answers:
  - Yes
  - No)
- and four levels of achievement:
  - To be initiated;
  - Initiated;
  - Dead locked;
  - In force.

4. Lagging Performance Indicators

4.1. ATM occurrences

4.1.1. Separation minima infringements

This indicator consists of:

- The total number of reported SMI (Separation Minima Infringements) at FABEC level. This occurrence category includes any infringement of prescribed separation.
- The total number within these SMI reported where ANSPs recognized a level of ATM Ground contribution, later on this level of ATM Ground Contribution will be distributed in three levels.
- The total number of IFR flights & the total number of IFR flights hours handled during the same period, these figures will be those provided by Eurocontrol.

4.1.2. Runway incursions

This indicator consists of:

- The total number of RI (Runway incursions) reported by each FABEC ANSPs.
- The total number within these RI reported where ANSPs recognized a level of ATM Ground contribution. Later on this level of ATM Ground Contribution will be distributed in three levels.
- The total number of the airport movements handled during the same period. These figures will be those provided by each ANSP.

4.2. ATM specific technical events

4.2.1. Communication function

This indicator consists of:

- The total number of failures related to this communication function domain which had an effect on provision of safe ATM services. Later on, this level of severity will be distributed in four levels (eg. "AA", "A", "B" or "C")

4.2.2. Navigation function

This indicator consists of:

- The total number of failures related to this navigation function domain which had an effect on provision of safe ATM services. Later on, this level of severity will be distributed in four levels (eg. "AA", "A", "B" or "C")

4.2.3. Surveillance function

This indicator consists of:

- The total number of failures related to the surveillance function domain which had an effect on provision of safe ATM services. Later on, this level of severity will be distributed in four levels (eg. "AA", "A", "B" or "C")

4.2.4. Data processing & distribution functions

This indicator consists of:

- The total number of failures related to the Data processing & distribution function domains which had an effect on provision of safe ATM services. Later on, this level of severity will be distributed in four levels (eg. "AA", "A", "B" or "C")

5. Data collection process

5.1. Data collection process for lagging Indicators

Every six months, in June and December using a template (see annexes - Paragraph 11.1.) the ANSPs will release the figures (with comments and/or explanations if there is a need[3]).

- In June (year N), with a monthly step, the figures from June to December (Year N-1).
- In December (year N), with a monthly step, the figures from January to June (year N).

Then, the aggregated safety data on FABEC level will be transmitted to the FABEC Finance & Performance Committee via the FABEC Performance Management Group.

NB: To enable valid trends to be built for monitoring purposes, for these indicators the reference period will commence from January 2006.

[3] Elements which could explain a change whatever it is (procedure, airspace, method, safety net, just culture,. . .)

5.2. Data collection process for leading Indicators

5.2.1. Effectiveness of Safety Management System

Once a year, in June using a template (see annexes - Paragraph 11.2.) the ANSPs will release the results from the Safety Maturity Survey including the comments from the interviews (with comments and/or explanations if there is a need).

- In June (year N), the results from the last SMS maturity survey conducted (Year N-1).

NB: A new ATM Safety Maturity Methodology for ANSP has been implemented in 2010, thus the results from the analysis of the answers to this new questionnaire will be aggregated from 2011 onwards.

5.2.2. Usage of the RAT

Every six months, in June and December using a template (see annexes - Paragraph 11.3.) the ANSPs will indicate if they internally use the severity classification of the RAT (Yes/No).

 Work in progress (Yes / No or level of implementation)

Additionally FABEC ANSPs will indicate the level of implementation using the same philosophy as used in the safety maturity scheme:

- Initiating;
- Planning/initial implementation;
- Implementing;
- Managing & measuring;
- Continuous improvement.

For those who plan to use the RAT:

- The types of occurrences for which the RAT is currently on trial phase.

For those using the RAT, following details will come with:

- The types of occurrences currently assessed with the RAT.
- When the RAT is not used for all the occurrences, ANSP should provide the eventual limitation. (e.g. SMI<66% only, RI with avoiding action only, …).

5.2.3. Just Culture

Once a year; in June the ANSPs, December using a template (see annexes - Paragraph 11.4.), will release the results concerning this PI. Data which may come along with comments and/or explanations.

6. Data display

The Aerospace Performance Factor, or another handy mean will be used to display the results.

As far as practical, regression lines, taking under consideration the results of the historical data on the last five years[4], will be visualized.

[4] To allow analyses changes in performance over the last five years, or analyses of forward-looking projections (Article 3 paragraph6. b) EC 691/2010).

For future FABEC reports the feasibility of using the Aerospace Performance Factor will be analysed.

7. Data monitoring process

A dedicated subgroup of FABEC SC-SAF, will be in charge of the analysis of these safety performance results.

- To spread out the enablers / best practices which are locally put up and had already significantly improved the results.
- To prepare the comments to go along with the figures before external publication.
- To trigger the attention of the PMG towards the ANSPs:
  - If there are any results below the "implementing" level.
  - If there is a drift of the results from an ANSP perspective.
  - If there are significant differences between FABEC partners.
  - If there are issues holding up the further expected improvements.
  - If external inhibitors preventing improvements have been identified.

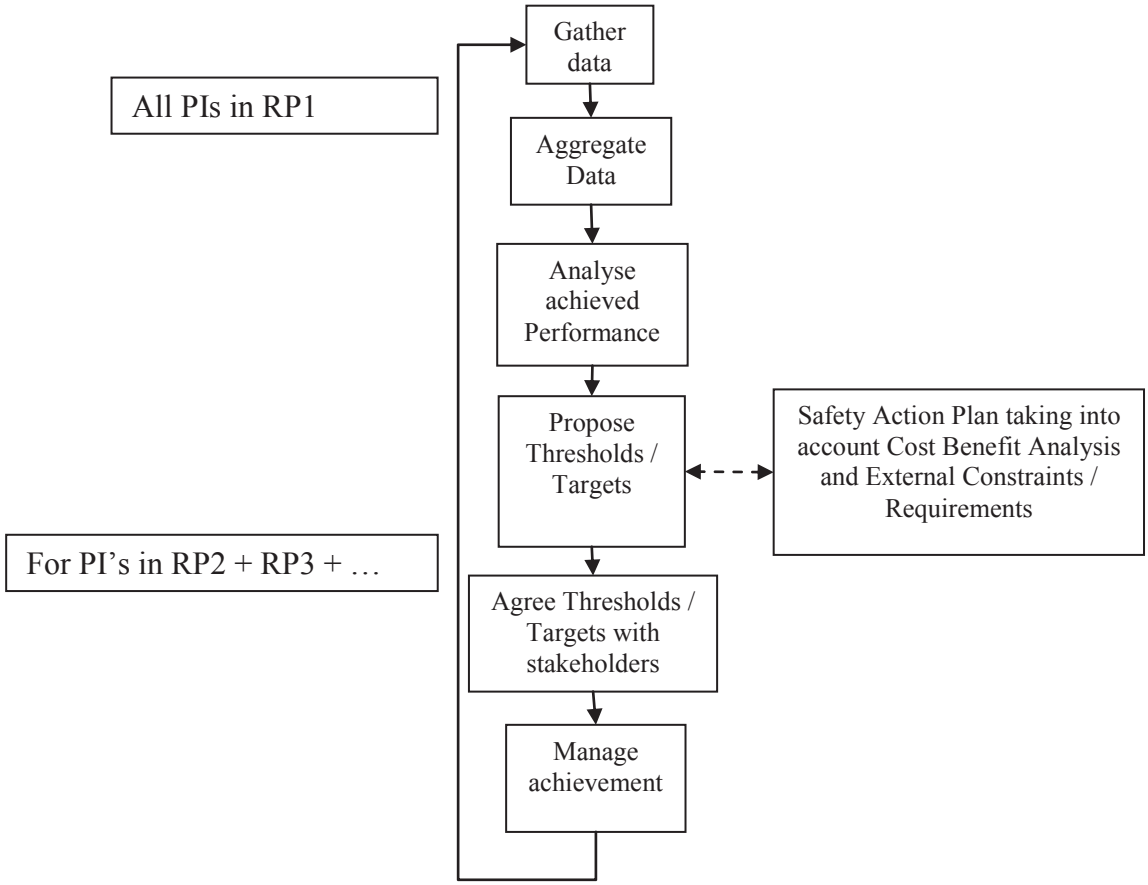
- To trigger the attention of the FABEC Finance & Performance committee:
  - If there is a drift which is coming
    - from the aircraft operators and/or the airport authorities;
    - from external providers (i.e. communication providers, power suppliers with monopole, . . .);
    - from non ATM operators generating jamming and/or interferences (i.e. wind farm operators, . . .);
  - If there is a need to address the issue toward International Telecommunication Union (ITU).
  - If external inhibitors preventing improvements have been identified.
  - If the target/threshold cannot be achieved timely[5].
  - If there is a need to enhance the RAT (weighting discrepancies, adaptations modifications to improve the tool . . .).

8. Thresholds / Target Setting Process

To assist in the preparation of next phases this section defined a pragmatic approach to elaborate a common position concerning more specific indicators and target setting.

Based on the analysis of the safety results and the given objectives, a bottom up approach will be adopted to make proposal to be endorsed by concerned stakeholders (SC-SAF, PMG, FABEC Financial & Performance Committee, NSA Committee).

[5] Alert thresholds beyond which the alert mechanisms referred



1. Data Gathering & Aggregation (Cf. § Data collection Process)
2. Analysis achieved performance / Propose Thresholds - Targets (Standing Committee of Operation and Safety, Concerned Stakeholders) TBD
3. Agree Thresholds / Targets with stakeholders (ASB / Financial & Performance Committee via PMG)
4. Manage achievement (ANSPs)

8.1. Lagging Indicators

Before targets could be set at the FABEC level for the lagging indicators (SMI, RI), it is required to define a mature and common baseline.
To that end, ANSPs are committed to harmonize a set of definitions, working processes and build historical data during RP1, following the safety objective 5 of the FABEC Performance Plan. Therefore, targets on lagging indicators are not applicable during RP1.

8.2. Leading Indicators

8.2.1. Effectiveness of Safety Management System

Based on the FABEC ATM Safety Maturity Survey scores from the 7 ANSPs, a baseline shall be defined during 2012, and an objective shall be set for the 2013-2014 period, on the level to be achieved at the end of RP1.

As soon as one level is achieved by all the FABEC partners, the next level will be pursue and a new dead line - taken under consideration the investment and its related timeframe – suggested by the SC-SAF will be delivered for endorsement to the ASB.

In between two levels, with the knowledge of the extent of progress made within each area by each FABEC ANSP the SC-SAF will deliver, to the ASB for decision, the hierarchical priorities to be introduced in the business plan and/or the annual plan (Ref.: EC n°2096/2005 of 20 December 2005 laying down common requirements for the provision of air navigation services) endorsed and supported by each ANSP, in order to capitalize on the investments and to reduce when practical the gap between FABEC partners if any.

8.2.2. Usage of the RAT

During this period, at the FABEC level no target/threshold will be settled.
Nevertheless a monitoring of the usage of the RAT will be done by the SC-SAF and reported to the NSAC twice a year via the PMG.

8.2.3. Just culture

During this period, for each study area, FABEC partners are committing to reach the "initiating" level at least by the end of 2014.

As soon as this level is achieved by all the FABEC partners, the next level will be pursued and a new deadline - taken under consideration the investment and its related timeframe – suggested by the SC-SAF will be delivered for endorsement to the ASB.

In between two levels, with the knowledge of the extent of progress made and the difficulties encountered within each area by each FABEC ANSP the Safety Performance Management sub-group will deliver, to the SC-SAF for decision, the hierarchical priorities to be introduced in the business plan and/or the annual plan (Ref.: EC n°2096/2005 of 20 December 2005 laying down common requirements for the provision of air navigation services) endorsed and supported by each ANSP, in order to capitalize on the investments and to reduce when practical the gap between FABEC partners if any.

9. Acronyms

ANSP	Air Navigation Service Provider
EASA	European Aviation Safety Agency
ESARR	European SAfety Regulatory Requirement
ITU	International Telecommunication Union
KPI	Key Performance Indicator
NSAC	National Supervisory Authority Committee
RAT	Risk Analysis Tool
RI	Runway Incursion
SC-SAF	Standing Committee of SAFety
SMI	Separation Minima infringement
SPTF	State Performance Task Force

10. References

- EC n°42/2003 of 13 June 2003 on occurrence reporting in civil aviation

- EC n°549/2004 of 10 March 2004 laying down the framework for creation of the single European sky
- Regulation (EC) 550/2004 Article 8a 4, and 8a 5. Before formal notification of the establishment of the FABEC - provide adequate information to the commission.
- EC n°2096/2005 of 20 December 2005 laying down common requirements for the provision of air navigation services
- Regulation (EC) 1070/2009 of 21 October 2009 amending Regulation (EC) 550/2004 Functional Airspace Blocks shall be implemented by 4 December 2012.ATM Safety Framework Maturity Survey – Methodology for ANSPs – ESP/2009-78 Released – Edition 1
- EC n°691/2010 of 29 July 2010 laying down a performance scheme for air navigation services and network functions and amending Regulation (EC) No 2096/2005 laying down common requirements for the provision of air navigation services
- FABEC Implementation Phase – FABEC Performance Plan - RP1 – 2012 – 2014 V1.0 28 June 2011.
- Risk Analysis Tool Guidance material – ESP/2009-81 Released – Edition 1
- The Aerospace Performance Factor (APF) developing the Eurocontrol ESARR-2 APF – 14 September 2009 –

11. Annexes

11.1. Lagging indicators' template - ATM occurrences & ATM-STE

Half-yearly report – End of Junes/Decembers	Jan./July*	Feb./Aug.*	March/Sept.*	April/Oct.*	May/Nov.*	June/Dec.*
ATM occurrences						
Nr of SMI between IFR reported						
Nr of SMI between IFR reported with an ATC contribution						
ATM ground Cat "A"	**Distribution to be implemented later on**					
ATM ground Cat "B"						
ATM ground Cat "C"						

Half-yearly report – End of Junes/Decembers	Jan./July*	Feb./Aug.*	March/Sept.*	April/Oct.*	May/Nov.*	June/Dec.*
ATM occurrences						
Nr of RI reported						
Nr of RI reported with an ATC contribution						
ATM ground Cat "A"	**Distribution to be implemented later on**					
ATM ground Cat "B"						
ATM ground Cat "C"						
Nr of airport movements (DEC=1, ATT=1, Go around=1)						
Total Nr of airports						

Half-yearly report – End of Junes/Decembers	Jan./July*				Feb./Aug.*				March/Sept.*				April/Oct.*				May/Nov.*				June/Dec.*			
ATM-STE																								
	AA	A	B	C	AA	A	B	C	AA	A	B	C	AA	A	B	C	AA	A	B	C	AA	A	B	C
Nr of communication failures																								
Nr of Navigation failures																								
Nr of Surveillance failures																								
Nr of data processing & distribution function failures																								

* cross out the wrong answer

11.2. Leading indicators' template - Effectiveness of SMS*

Yearly report – End of Junes								
	Results: A, B, C, D or E						Level: 1, 2, 3, 4 or 5	Percentage: %
I - Development of a positive and proactive safety culture	SA-1-1							
	SA-1-2							
	SA-1-3							
II - Organisational and individual safety responsibilities	SA-2-1							
	SA-2-2							
	SA-2-3							
	SA-2-4							
III - Timely compliance with international obligations	SA-3-1							
	SA-3-2							
IV - Safety standards and procedures	SA-4-1							
	SA-4-2							
	SA-4-3							
V - Competency	SA-5-1							
VI - Risk management	SA-6-1							
VII - Safety interfaces	SA-7-1							
	SA-7-2							
VIII - Safety reporting, investigation and improvement	SA-8-1							
	SA-8-2							
	SA-8-3							
IX - Safety performance monitoring	SA-9-1							
	SA-9-2							
	SA-9-3							
X - Operational safety surveys and SMS audits	SA-10-1							
XI - Adoption and sharing of best practises	SA-11-1							
	SA-11-2							
	SA-11-3							

* Surveys are conducted during year "n" results are delivered year "n+1" and displays have a caption year "n".

11.3. Leading indicators' template - Usage of the RAT

Half-yearly report				
Usage of the RAT	Yes	No	Trial phase*	
SMI	Yes	No	Yes	No
RI	Yes	No	Yes	No
ATM-STE	Yes	No	Yes	No

* cross out the wrong answer

11.4. Leading indicators' template - Just Culture (1/4)

Policy and its implementation		Yes	No	To be initiated	initiated	Deadlock	In force
P-1	Is there an explicit Just Culture policy, which is formally endorsed by management and staff representatives and made public?						
P-2	Does the Just Culture policy contain a description of what is considered to be unacceptable behaviour?						
P-3	Does the Just Culture policy guarantee that no disciplinary action will be taken regarding the reporter by the service provider for self-reported occurrences (except for the cases defined above in question ANSP.P.2)?						
P-4	Does the ANSP provide legal support for its own staff in case of prosecution / legal action related to a safety occurrence?						
P-5	Is there an established and well known Critical Incident Stress Management programme?						
P-6	Are safety actions taken in respect to staff after an occurrence without impact on pay of the staff member concerned until the end of the investigation?						

11.4. Leading indicators' template - Just Culture (2/4)

Roles and Responsibilities clearly defined and implemented		Yes	No	To be initiated	initiated	Deadlock	In force
P-7	Are the service provider's safety investigators completely independent and separate from any line, competency or ops management?						
P-8	Do the service provider's safety investigators have full, unimpeded access to all relevant data for investigations?						
P-9	Is access to safety data clearly defined and confidentiality ensured?						
P-10	Is the staff providing Critical Incident Stress Management clearly nominated and adequately trained?						

Training		Yes	No	To be initiated	initiated	Deadlock	In force
P-11	Is there regular training and/or briefings on relevant legislation for safety in the context of Just Culture?						
P-12	Are the principles of Just Culture included in all training curricula (ab-initio and recurrent training)?						
P-13	Are qualifications and training requirements as regards Just Culture for the ANSP's safety investigators clearly defined?						

11.4. Leading indicators' template - Just Culture (3/4)

Legal/Judiciary		Yes	No	To be initiated	initiated	Deadlock	In force
L-1	Is the spirit of Directive 2003/42/EC on occurrence reporting in civil aviation and in particular the provisions of its Article 8 (Protection of information) fully transposed into internal procedures?						
L-2	Is there any agreement between ANSPs and judicial/police authorities to ensure protection of reported incident data and involved individuals?						
L-3	Is there an agreed process to deal with incident matters between the ANSP and its national aviation authorities?						

11.4. Leading indicators' template - Just Culture (4/4)

Occurrence reporting and investigation		Yes	No	To be initiated	initiated	Deadlock	In force
O-1	Is the identity of personnel involved in occurrences protected by staff regulations?						
O-2	Does staff subject to investigations based on occurrence reports have access to related information?						
O-3	Is there a requirement for staff subject to investigation to sign their agreement / disagreement with the findings of investigations?						
O-4	Is there a formal procedure to inform staff having reported an occurrence of the progress of the investigation?						
O-5	Does the ANSP provide regular feedback to staff based on occurrence reports?						
O-6	Does the public annual report of the service provider provide statistical feedback on occurrence reports?						
O-7	Has automated reporting been accepted by staff and implemented by the service provider?						
O-8	Is there a separate body, involving nominated Subject Matter Experts, making the decision on whether a case is an "honest" mistake or it falls under the "unacceptable behaviour" category?						

Page intentionally left blank

FABEC Implementation Phase

FABEC Safety Case Report

EC Information

Attachment L.4

Co-financed by the European Union
Trans-European Transport Network (TEN-T)

Document Title	FABEC Safety Case Report
Document Context	FABEC Safety Management System
Branch	Standing Committee for Safety
Section	Overall Safety Case
Document Identification	FABEC.SCR
Version (Edition-Revision)	01-00
Version Date	10/02/12
Document Owner	OSCAR Sub Group Leader
Process Owner	Chairman Standing Committee for Safety
Template	MMS.FSP.DTS.SSC 01-01
Class	Restricted
Status	Approved
Available in	MS-WORD97

ABSTRACT

The objective of this FABEC safety case is to demonstrate how the development and establishment of the Functional Airspace Block Europe Central (FABEC) will be conducted safely in accordance with the Single European Sky (SES) legislation.

This safety case is a legal document, which provides structured and logical arguments, supported by evidence, to back up the claim that FABEC is and will remain adequately safe as of June 2012. This claim is supported by evidence to show that the regulatory framework is appropriate, that there is adequate safety oversight, and that the service provision within the FABEC is and will remain safe.

CONTENTS

1 INTRODUCTION

This chapter introduces:

- The purpose of this Functional Airspace Block Europe Central (FABEC) safety case;
- Why FABs are required by the European Commission (EC), and what they are meant to deliver (in broad terms)
- The requirements that this FABEC safety case is aimed at satisfying;
- An overview of the construction of the FABEC safety case report.

The objective of this Functional Airspace Block Europe Central (FABEC) safety case is to demonstrate how the development and establishment of the FABEC will be conducted safely in accordance with the Single European Sky (SES) legislation.

1.1 SINGLE EUROPEAN SKY BACKGROUND

At present, the European air traffic management system is fragmented.

Air traffic control in Europe is provided by 36 different air navigation service providers. European airspace is mainly organised on a national, rather than multinational, basis.

This fragmentation has the potential to allow for improvements to be made regarding efficiency, cost effectiveness and reducing the flight length for the airlines, hence reducing gas emissions. In spite of the current economic downturn, experts predict that air traffic in the FABEC area will continue to grow to reach close to 8 million flights/year by 2018 (compared to 6 million flights in 2007).

The European Commission has called for the rationalisation of the European network to take place without delay to accommodate the predicted traffic levels in a safe, effective, and environmentally friendly manner – whilst reducing costs. This improvement must ensure effective cooperation between civil and military users who share the airspace.

The restructuring of European airspace into **functional airspace blocks** (FAB) is the backbone of the Single European Sky (SES), Europe's air traffic management rationalisation programme.

A functional airspace block is a portion of airspace extending over several countries that is managed in an integrated fashion, in line with the actual needs of the airspace users. In a FAB, the provision of air navigation services and related ancillary functions are optimised and/or integrated. Air traffic flows are not constrained by national boundaries. This leads to greater efficiency. They will allow for flexible forms of cooperation between air navigation service providers. In a FAB, States retain their respective national sovereignty.

1.2 APPLICABLE SINGLE EUROPEAN SKY LEGISLATION

The first SES legislative package was adopted in 2004, and amended by SES II in 2009. SES II requires air navigation service providers (ANSPs) to meet a series of binding performance targets involving safety, flight and cost-efficiency, environmental and capacity issues. SES II requires that States shall implement their respective FABs by 04 December 2012.

According to the amending Regulation (EC) 1070/2009 Ref [1] of 21 October 2009 which amended EC550/2004 Art. 9a Ref [3], Functional Airspace Blocks must meet the following **9 basic requirements**:

1. A Safety Case
2. Optimum Use of Airspace taking into account air traffic flows
3. Ensure consistency with the European route network
4. Be justified by their overall added value
5. Ensure a smooth and flexible transfer of responsibility for air traffic control
6. Ensure the compatibility between the different airspace configurations
7. Comply with conditions stemming from regional agreements concluded within the ICAO
8. Respect regional agreements in existence, in particular those involving European third countries
9. Facilitate consistency with Community-wide performance targets

Additional SES legislation applicable to FABs was developed after 2004 and is also taken into account (in particular Regulations (EC) 1035/2011 Ref [8] and 1034/2011 Ref [5]).

The SES II regulation (EC) No 550/2004 (Airspace Regulation) Ref [3] specifies in article 9a:

1. By ...* Member States shall take all necessary measures in order to ensure the implementation of functional airspace blocks with a view to achieving the required capacity and efficiency of the air traffic management network within the Single European Sky and maintaining a high level of safety and contributing to the overall performance of the air transport system and a reduced environmental impact. Member States shall cooperate to the fullest extent possible with each other, in particular Member States establishing neighbouring functional airspace blocks, in order to ensure compliance with this provision. Where relevant, cooperation may also include third countries taking part in functional airspace blocks.

2. Functional airspace blocks shall, in particular: (a) be supported by a safety case (this document);

See context C1 of the safety argument in chapter 6. Commission Regulation 176/2011 Ref [7] on FAB Information requirements was developed and released in early 2011, and specifies in article 3 and part II of the Annex the minimum requirements for demonstration of compliance with article 9a of 550/2004 Ref [3]. These requirements are listed in chapter 9 of this safety case, and a traceability matrix has been added which maps each requirement to the evidence provided in this document.

The process for constructing this safety case is explained in more detail in chapter 4.

This safety case forms part of the deliverables that will be submitted to the European Commission to meet regulatory requirements.

1.3 SUMMARY OF APPLICABLE REGULATIONS

The following regulations are deemed applicable to this FABEC Safety Case:

- EC 549/2004 Ref [2] (amended by 1070/2009);
- EC 550/2004 Ref [3] (amended by 1070/2009);
- EC 551/2004 Ref [4] (amended by 1070/2009);
- EC 1034/2011 Ref [5], which replaced 1315/2007 Ref [6];
- Commission Regulation 176/2011 Ref [7]
- EC 1035/2011 Ref [8], which replaced 2096/2005 Ref [9] ;
- Commission Regulation 691/2010 Ref [10] (amended by 1216/2011) Ref [11].

1.4 SAFETY CASE ROADMAP

A safety case is a legal document, which provides structured and logical arguments, supported by evidence, to back up a claim regarding the safety of a subject. In this safety case, the claim is that FABEC is and will remain adequately safe as of June 2012.

Further details of the claims, arguments and evidence are contained in chapters 5 and 6.

Chapter 2 of this safety case defines the scope of the safety arguments, and the time boundaries that are being considered within that scope.

Chapter 3 contains a description of the FABEC airspace, the parties involved in undertaking regulation and oversight of the FABEC, as well as the parties responsible for providing safe services within the affected airspace.

Chapter 4 provides a description of the process used to develop this safety case, and the process that will be used to maintain the safety case beyond June 2012.

The high level safety claim that is used to demonstrate that FABEC is safe is provided in chapter 5.

Chapter 6 contains the decomposition from the higher level safety claim to the evidence required to demonstrate that the FABEC is safe to implement.

Any assumptions made during the drafting of this safety case are described in chapter 7.

Chapter 8 states the conclusion of the safety case, and provides a status as to the level of completion of the different chapters.

Chapter 9 contains a traceability table from the applicable Implementing Rule requirements to the safety case arguments and evidence.

Chapter 10 provides details regarding any recommendations that should be fulfilled after the implementation of the FABEC.

The glossary is contained in chapter 11, and the references are provided in chapter 12.

2 SCOPE & TIME BOUNDARIES

This chapter describes:

- The scope of the safety case arguments;
- The time limitations that the safety case arguments apply to.

As stated earlier, this safety case will form a part of the file that will be submitted to the European Commission for the FABEC. It is therefore limited to arguing that those elements of safety that are required to ensure compliance with all applicable safety regulations are adequately addressed within the FABEC development, as of June 2012.

This safety case covers:

- The Framework for safety regulation from the States perspective;
- Safety oversight of the FABEC ANSPs and arrangements for NSAs cooperation;
- Safety management arrangements intra FABEC, and within each ANSPs, and how this is developing, including interfaces with NSAs and adjacent FABs.

The scope of the FABEC for which the safety must be argued is as described in the System Description in chapter 3.

The oversight of ANSPs within FABEC is included within the scope of the safety case.

It was agreed within the Overall Safety Case Assembly and Report (OSCAR) subgroup and with the Standing Committee for Safety (SC Saf) and Provisional FABEC National Supervisory Authority Committee (PFNSAC) that the introduction of FABEC is not a “safety related change” as defined by EC 1315/2007. As a consequence, the FABEC safety case does not need to be approved by the FABEC NSAC and the creation of FABEC does not require the formal acceptance of the FABEC NSAC within the framework of regulation (EC) 1315/2007 Ref [6].

This safety case excludes quantified arguments of safety for FABEC. The reason being that the FABEC is considered to be an institutional change to regulations, airspace, and ANSPs, and how they cooperate, hence quantified claims are not applicable within this context.

Likewise, this safety case does not claim that FABEC will be a factor of 3 or more safer than what existed prior to the FABEC creation. This is because it is not possible to substantiate such a claim at this stage. It will, however, address the safety management processes that will be established and refined within FABEC in order to enable such claims to be made as the FABEC continues to develop and mature.

The arrangements for maintenance of this safety case after the establishment of the FAB are described in chapter 4.

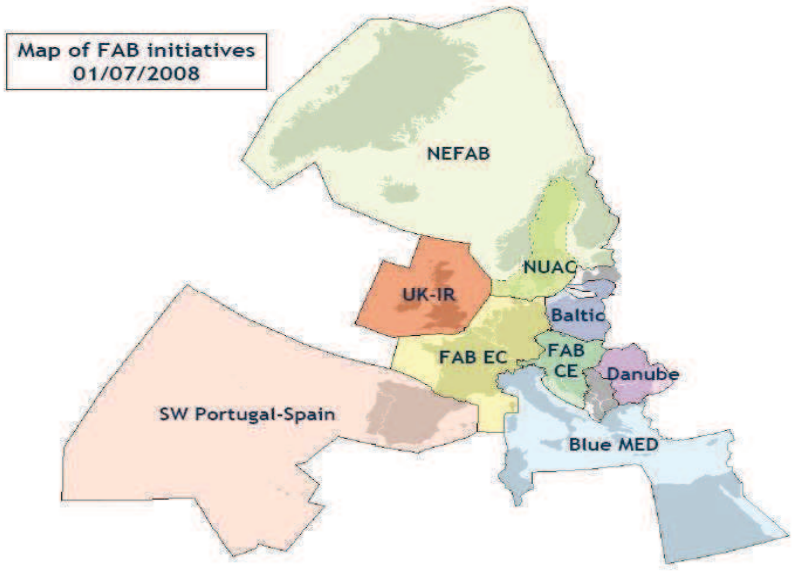
3 FABEC DESCRIPTION

This section describes the context C2 (see chapter 5) for the safety argument of the FABEC, i.e.:

- The different FAB initiatives in Europe, and places FABEC in context with the other FABs
- The FABEC airspace
- The Air Navigation Services provided, at a high level
- A brief description of the different parties involved in safety within FABEC and their safety roles.

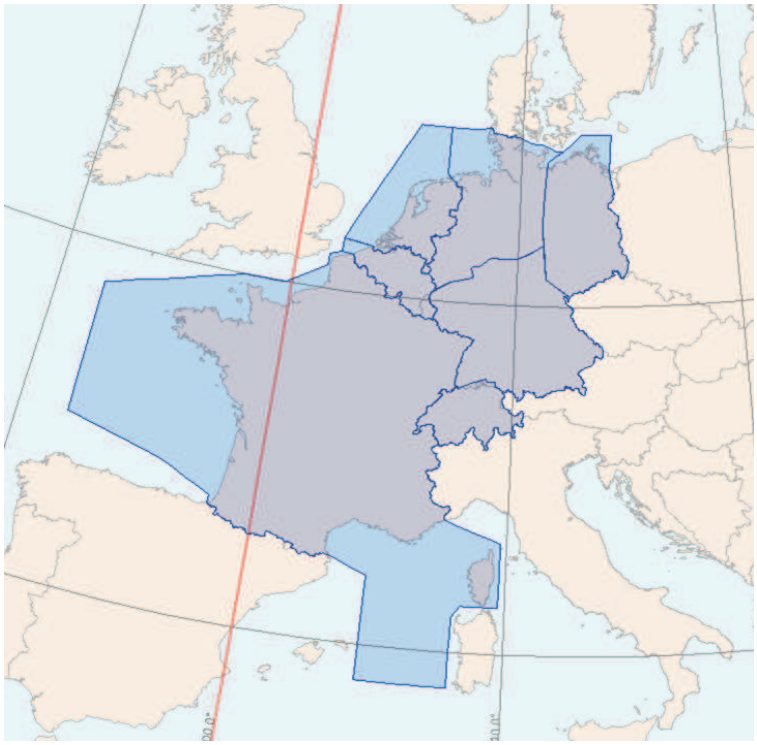
3.1 EUROPEAN FAB DEVELOPMENTS

The diagram below shows FABEC and its relationship to other FAB developments within Europe.



3.2 THE FABEC AREA

The **Functional Airspace Block Europe Central – FABEC –** covers the airspace of six States (**Belgium, France, Germany, Luxembourg, the Netherlands and Switzerland**) located in the core of the European continent. This airspace is one of the busiest and most complex in the world. Most of the large European airports and major civil and military airways are located in this area. Owing to its size and central position in Europe, FABEC is a cornerstone of the Single European Sky.



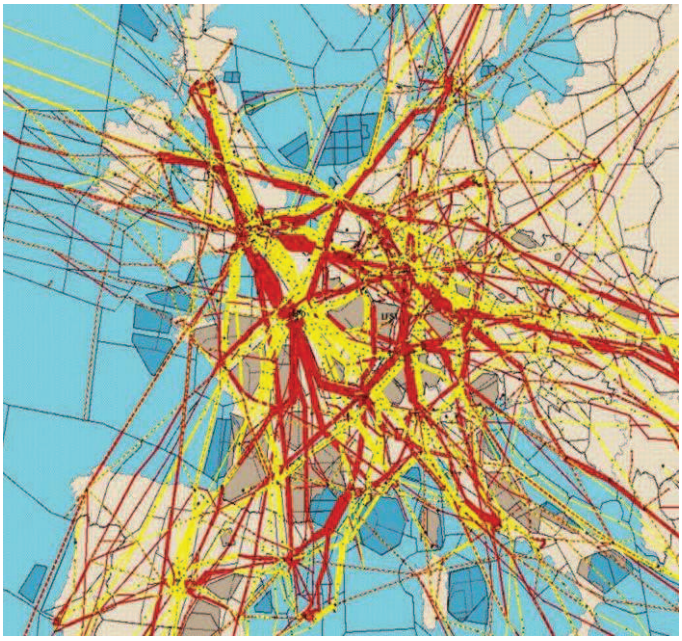
3.3 FABEC AIRSPACE CHARACTERISTICS

The FABEC airspace is characterised as follows:

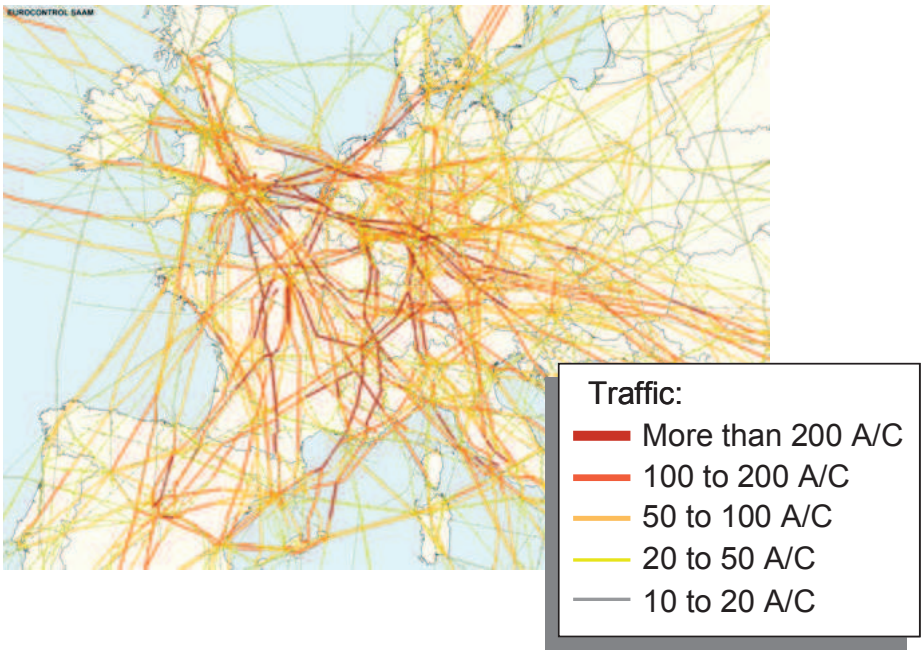
- a **complex and dense ATS route network;**
- a dimension of **1.7 million km²,** equating to **9%** of the surface area of the European continent;
- **6 million flights** per year, equating to **55%** of all European air traffic;
- a forecast **traffic growth of 50%** between 2006 and 2018, resulting in **close to 8 million flights by 2018;**
- about **410 military/special areas;**
- circa **370 control sectors;**
- **14 air traffic control centres** (Brussels, Bordeaux, Brest, Marseille, Paris, Reims, Bremen, Munich, Karlsruhe, Langen, Maastricht, Amsterdam, Geneva and Zürich);
- **circa 240 airports** operating instrument flight rules (IFR);
- **3 major intercontinental hub airports** (Paris, Amsterdam, Frankfurt) **and proximity to the London airports;**

The core area of Europe has one of the highest air traffic densities in the world and is characterised by closely interlaced civil and military routes.

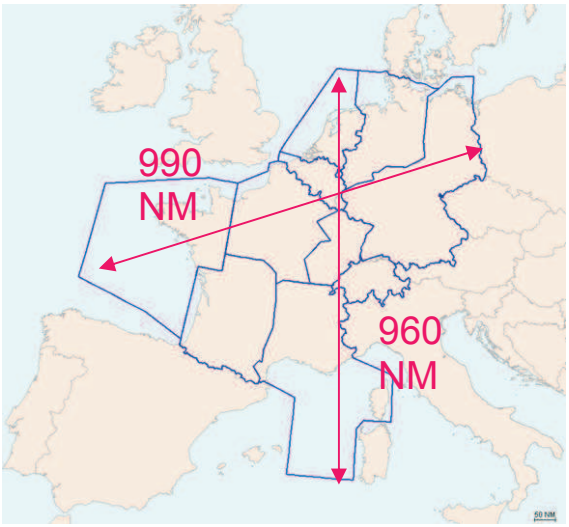
(Source: EUROCONTROL SAAM)



Traffic flows on route network - The complex and dense FABEC ATS route network records particularly dense traffic on some routes. The chart shows high traffic density in the central core area and also surrounding the major airports in Paris, Amsterdam, Frankfurt, Munich, Brussels and Zürich.



Airspace dimensions, FIRs and UIRs



With a total dimension of 1.7 million km^2, the FABEC airspace has a dimension of 960 nautical miles (or 1'780 km) from north to south and 990 nautical miles (or 1'835 km) from eastern Germany to western France.

FIRS and UIRs

The FABEC airspace comprises the flight information regions (FIRs) of Bremen, Langen, Munich, Amsterdam, Brussels, Paris, Reims, Marseille, Bordeaux, Brest, the upper information regions (UIRs) of Hannover, Rhein, Brussels, France and the FIR/UIR of Switzerland.

This is confirmed in FABEC Treaty Ref [12].

These FIRs and UIRs contain around 240 airports with instrument flight rules (IFR) operations, some 410 military/special areas and around 370 control sectors.

3.4 FABEC AIR NAVIGATION SERVICES

The FABEC air navigations services include:

- ❑ Air Traffic Services
- ❑ Communications, Navigation and surveillance services
- ❑ Aeronautical Information Services
- ❑ Meteorological services

3.5 FABEC INSTITUTION AT 2010

The FABEC Treaty Ref [12] states that a functional airspace block is created by mutual agreement of the six States listed in section 3.6. It also creates a FABEC Council and 5 bodies (Airspace Committee, Harmonisation & Advisory Committee, Financial & Performance Committee, NSA Committee and ANS Consultative Board) to govern the FABEC. The treaty does not create an international organisation with an international personality.

For the purposes of this safety case, it is assumed that the FABEC NSAs will follow a cooperation/coordination approach, and likewise the FABEC ANSPs will follow a cooperation/coordination approach, possibly evolving to an integrated approach over the longer term.

3.6 THE PARTNERS

The FABEC programme is driven by civil and military partners of six States:

- High-level officials from the Ministries of Transport and Defence of Belgium, France, Germany, Luxembourg, the Netherlands and Switzerland
- The seven civil air navigation service providers designated in these countries:
  - Belgocontrol, Belgium
  - Direction des services de la Navigation aérienne (DSNA), France
  - DFS Deutsche Flugsicherung, Germany
  - Administration de la Navigation aérienne (ANA), Luxembourg
  - Luchtverkeersleiding Nederland (LVNL), the Netherlands
  - EUROCONTROL Maastricht Upper Area Control Centre (MUAC)
  - Skyguide, Switzerland.
- The **military air navigation service providers** (Skyguide (CH); DFS and the German Air Force (D); the Royal Netherlands Air Force (NL); the Belgian Defence (B and LUX) and DIRCAM (FR).
- State/Regulatory Authorities responsible for:
  - State arrangements for regulation of military air navigation service providers
  - Designation of ATS & Met providers Ref [3] arts 8 & 9.

- National Supervisory Authorities responsible for:

  - To closely co-operate on the supervision of air navigation service providers within FABEC
  - To perform appropriate oversight of the ANSPs providing services within their Airspace.
  - Supervision of military where conducted in States according to National procedures
  - Supervision of certified MET and AIS providers

The NSAa of each FABEC State are:

- **Luxemburg:** Direction de l'Aviation Civile
- **Germany:** Bundesaufsichtsamts für Flugsicherung
- **Belgium:** Belgium Civil Aviation Authority
- **The Netherlands:** National Supervisory Authority the Netherlands
- **Switzerland:** Federal Office Of Civil Aviation (FOCA)
- **France:** Direction de la Sécurité de l'Aviation Civile (DSAC) Direction du Transport Aérien (DTA)

An up to date list is available at:
http://ec.europa.eu/transport/air/single_european_sky/national_supervisory_en.htm

The NSAs cooperated through the FABEC NSA task force, prior to the signature of the FABEC Treaty Ref [12], and since then through the Provisional NSA Committee.

Note: All provisional FABEC States bodies will remain provisional until the formal establishment of the FABEC, namely on the first day of the second month following the deposit of the last instrument of ratification with the Depository as stated in Art 38 of the FABEC Treaty.

4 SAFETY CASE DEVELOPMENT PROCESS

This chapter provides a description of the process that was used to develop this overall FABEC safety case. It describes:

- ❑ How the safety claims and arguments were constructed;
- ❑ The role of the OSCAR sub-group and its membership;
- ❑ How the evidence has been gathered and documented;
- ❑ How stakeholders have been consulted to verify and validate that this safety case is adequate and representative and makes sense;
- ❑ How this safety case will be maintained post FABEC implementation.

The FABEC Safety Case Report was constructed using the following steps:

- The requirement for a FABEC safety case was identified during a FABEC Standing Committee for Safety (SC Saf) strategy meeting held in early 2010.
- As a result of identifying this requirement, a decision was taken to establish a sub group of the SC Saf to start developing the FABEC overall safety case. When this decision was communicated by the chairman SC Saf to the FABEC NSA Task Force, they also expressed an interest to be involved in the safety case development activities.
- A sub-group of both the SC Saf and the NSA Task Force, called the Overall Safety Case Assembly and Report (OSCAR) was established in March 2010. The ToRs of this group are contained in Ref [13]. This sub-group is represented by selected core members from the NSAs of France and the Netherlands, along with core members of the safety departments of the ANSPs of Belgocontrol, DFS, DSNA, LVNL, MUAC, and Skyguide.
- The OSCAR sub-group met several times to develop the high and low level claims and arguments, and to gather the evidence to support the claims. A plan was also assembled to manage the development and delivery of this safety case. Ref [14]
- In parallel to the above activities, the European Commission developed regulation no 176/2011 Ref [7] on the information to be provided before the establishment and modification of a functional airspace block, which contains more specific requirements on the content of a FAB safety case.
- The OSCAR sub-group also identified several regulatory and other requirements documents which could be applicable to the content of this safety case. These documents were reviewed and requirements captured in the OSCAR Requirements document.
- As the safety case has been developed, it has been reviewed for clarity, brevity, consistency and accuracy by various stakeholders including members of:
  - The OSCAR sub group;
  - The Standing Committee for Safety;
  - The NSA Task Force and the Provisional FABEC NSA Committee;
  - The AFG
  - The ANSP Strategic Board
  - The 6 States FABEC Group
  - States Performance Task Force
- The template for the safety case report has been adapted from that used within the MUAC Safety Management System to develop System Safety Cases. The use of this template helped to trigger key questions about what must be considered within the safety case, and how these considerations should be applied within the subject area of FABEC.

- Goal Structured Notation has been used to develop the safety claims, arguments and evidence. This technique enables the developers to concentrate on the key elements that support a valid and logical argument. The technique also provides readers and reviewers of the safety case with an improved clarity of the overall safety case argument structure, for what is potentially a very complex change.
- The safety case has been developed incrementally according to a schedule agreed by the OSCAR members. Evidence has been gathered by members of the OSCAR subgroup, and inserted into the different incremental versions of this safety case. Hence, the safety case is building up the foundation backed by evidence to satisfy the claim that FABEC will be safe to implement in 2012, and will remain safe beyond implementation.
- EUROCONTROL, through its SASI programme, held two workshops on FAB safety cases in 2011, one in Sarajevo, and one in Bled. The safety cases of the differing FABs were presented, and the resulting approaches collated by EUROCONTROL. This argument structure has been assessed against the EUROCONTROL consolidated FAB safety case approach to ensure consistency.
- The safety case was also presented to EASA in 2011 for an informal review. They stated that it is important that the NSA(s) verify that the evidence presented/referenced in this safety case is in place and meets the claims. This resulted in the FABEC NSA committee conducting a formal review in 2012 to verify the evidence. The chairman of the FABEC NSA committee is a signatory to this safety case to verify the evidence presented.

4.1 SAFETY CASE MAINTENANCE

The FABEC safety case may need updating as the FABEC continues to develop beyond its inception in December 2012, in order to provide continued assurance to the European Commission of the continued safety of FABEC. Such updates may be needed when:

- A major change in the applicable regulatory framework/legislation occurs;
- A major change to the FABEC governance structure, organization, airspace structure or Route Network is planned;
- When there are new or changed evidence items;
- When verification of the goals, context, assumptions and recommendations are still applicable, or need revision.

It has been agreed to keep the OSCAR group running, and this group will meet periodically to review whether an update to the safety case is needed, then generate and manage these updates.

The Terms of Reference of the OSCAR sub group Ref [13] reflect this safety case maintenance responsibility, and define the process that will be followed to generate the safety case updates, and obtain subsequent agreement and distribution.

5 SAFETY ARGUMENT

This chapter provides a brief description of the overall argument structure, and the use of Goal Structured Notation.

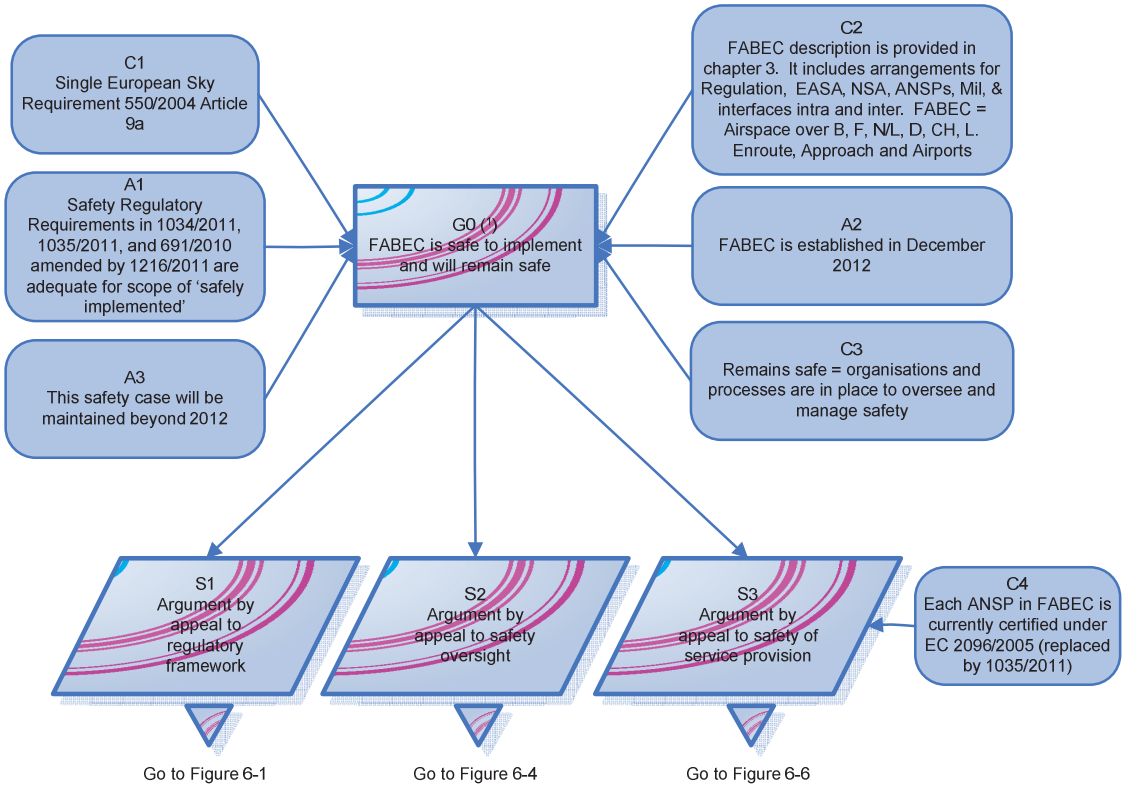


Figure 5-1

5.1 GOAL G0 – FABEC IS SAFELY IMPLEMENTED AND WILL REMAIN SAFE

The GSN above provides the structure and top-level view of the safety argument that the FABEC is safe to implement and will remain safe. The context C2 is described in Chapter 3.

The assumption A1 relates to the FABEC being an organisational change, and hence, in order to argue the FABEC is implemented safely, compliance with these high level safety regulatory requirements needs to be shown. This assumption is developed further in Chapter 7.

The three pillars of the safety strategy relate to the regulatory framework for the FABEC, the safety oversight of FABEC ANSPs, and the safety of services provided by those ANSPs. This includes inter and intra coordination between the regulators, NSAs, ANSPs and adjacent airspace users. These safety arguments are further developed as follows in chapter 6:

- Section 6-1: Safety Argument – The regulatory framework is appropriate for the FABEC
- Figure 6-4: Safety Argument – There is appropriate and coordinated safety oversight
- Figure 6-6: Safety Argument – The service provision within States is safe and will remain safe.

(1) G: Goal – A: Assumption – C: Context – S: Solution – E: Evidence (Blue = complete, yellow = incomplete, white = not needed prior to FABEC implementation.

6 SAFETY ARGUMENT DESCRIPTION

This section describes the strategy for each first level goal (G1 to G3) referred to in figure 5-1, and provides the associated lower level details. The safety arguments are always defined with reference to 'Evidence', which is provided in tables below the main argument. For example, "(E12)" refers to Evidence item 12 in a table.

6.1 GOAL G1 – FABEC REGULATORY FRAMEWORK IS APPROPRIATE

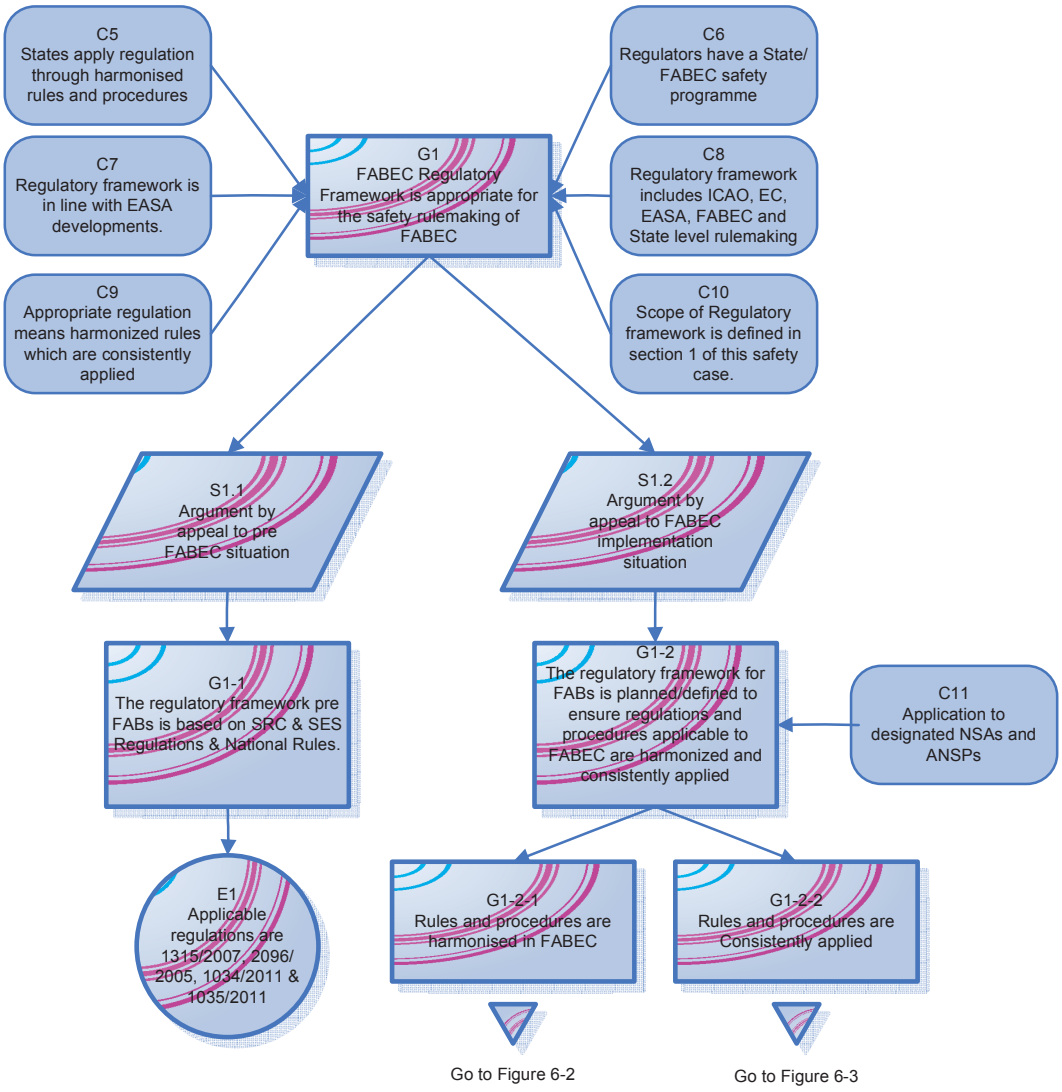


Figure 6-1

Goal: FABEC Rulemaking framework is appropriate for the safety rule making of FABEC.

See Figure 6-1.

This goal is further developed along 2 specific strategies: the pre FAB situation, and the FAB implementation situation.

Evidence	
E1	For the pre FAB situation, the regulatory framework is defined as utilising safety oversight through EC 549/2004, EC 550/2004, EC 1315/2007 (replaced by EC1034/2011) and ensuring ANSP compliance under the Single European Sky Regulation EC 2096/2005 (replaced by EC1035/2011). These are referred to from section 1.3. National Rules and Regulations (e.g. License requirements) may apply depending on the national situation.

6.1.1 Harmonised FABEC Rulemaking Processes

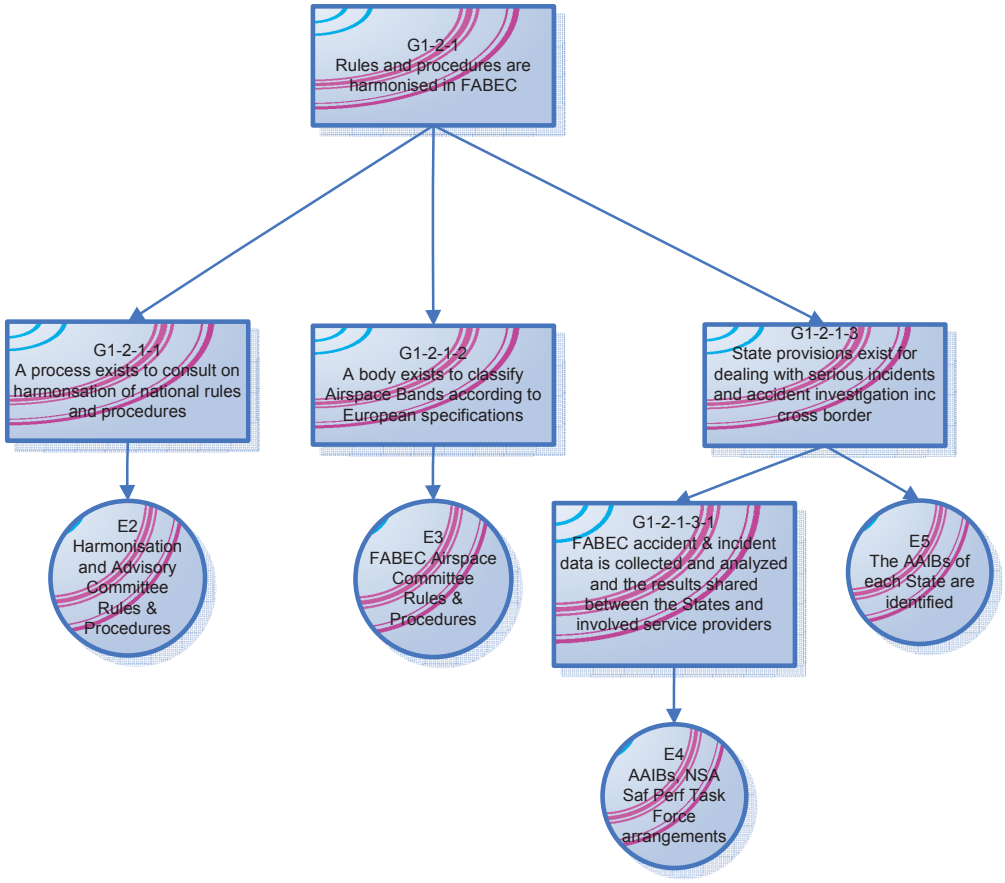


Figure 6-2

Evidence	
E2	Article 24 of the FABEC Treaty Ref [12] calls for a Harmonisation & Advisory Committee. The Harmonisation & Advisory Committee is the body established, reporting to the FABEC council, which will establish and implement processes to oversee the consultation and harmonisation of national rules and procedures. The Rules of Procedure and Tasks and Competencies of this body are defined in section 5.3 of FABEC Implementation Phase [Provisional] State Governance Manual Ref [15].
E3	Article 24 of the States Agreement calls for an Airspace Committee Ref [12]. The Rules of Procedure and Tasks and Competencies of the Airspace Committee are defined in section 5.2 of the FABEC Implementation Phase [Provisional] State Governance Manual Ref [15]. This includes the classification of Airspace bands.

Evidence	
E4	**States** are responsible to handle the investigations of all accidents (there is a binding EU regulation EC2003/42 and the ICAO annex 13). For this purpose dedicated structures exist (Air Accident Investigation Board / Bureau Enquêtes Analyse, Defence Investigation Board). The final reports are public access free (usually they are online). Currently there are existing arrangements for collection of accident and serious incident investigation data between individual States and there respective ANSPs. However, in the FABEC situation, there are advantages to be gained to the safety lifecycle by wider sharing of information across the States and ANSPs. See Recommendation 1. The FABEC Treaty Art 31 defines the arrangements at FABEC level regarding the investigation of accidents and serious incidents applicable for all FABEC Member States. The NSA Safety Performance Task Force is, commencing January 2012, ensuring liaison with the Aviation Accident Investigation Boards in order to collect relevant safety recommendations that make sense for the performance improvements of both States and ANSPs safety management.
E5	The AIBs for each State within the FABEC are as follows: ▪ **Luxemburg:** Administration des Enquêtes Techniques ▪ **Germany:** Bundesstelle für Flugunfalluntersuchung (BFU) ▪ **Belgium:** Service public fédéral mobilité et transports ▪ **Nederland:** De Onderzoeksraad voor veilgheid ▪ **Switzerland:** Aircraft Accident Investigation Bureau ▪ **France:** Bureau d'Enquètes et d'analyses pour la sécurité de l'aviation civile (BEA)

6.1.2 FABEC Rules and Processes are consistently applied

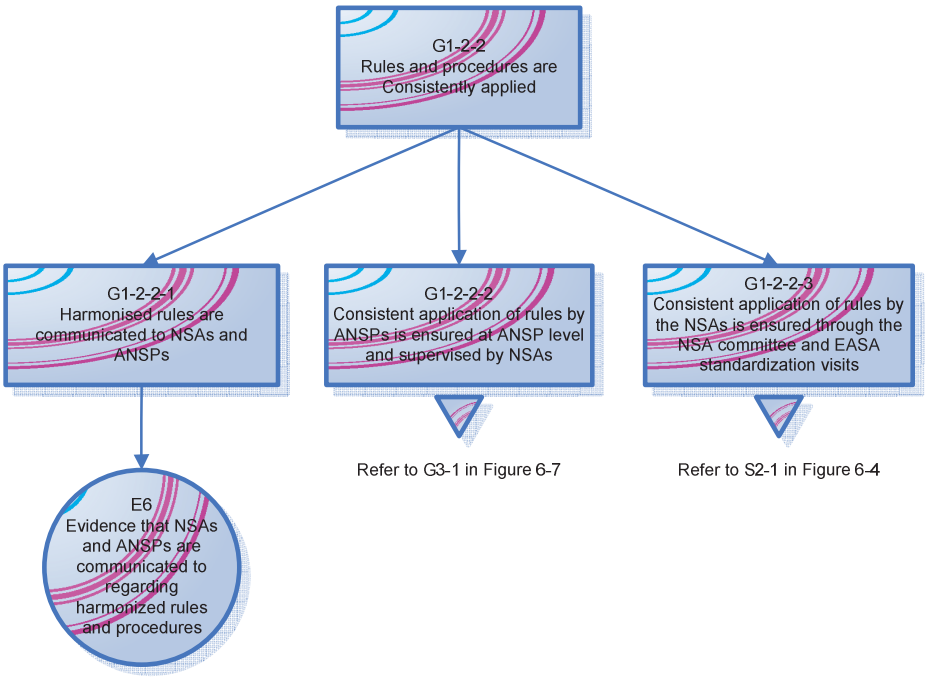


Figure 6-3

Evidence	
E6	The rules applicable at European level are equally applicable at FABEC level, Refer to the 'comitology process' of European Commission contained in Ref [16]. EASA has developed a rule making process which utilises rule making groups and consultative bodies. Notices of Proposed Amendments are issued which are available for public consultation on the EASA website www.easa.europa.eu/ATM. Such consultations are also promulgated via individual State mechanisms, CANSO, EUROCONTROL Safety Team etc. The Harmonisation and Advisory Committee will consult with ANSPs concerning the harmonisation of regulations (including national regulations) that concern them. Ref [15].

6.2 GOAL G2 – THERE IS APPROPRIATE SAFETY OVERSIGHT OF ANSPS AND COORDINATED OVERSIGHT OF THE FABEC

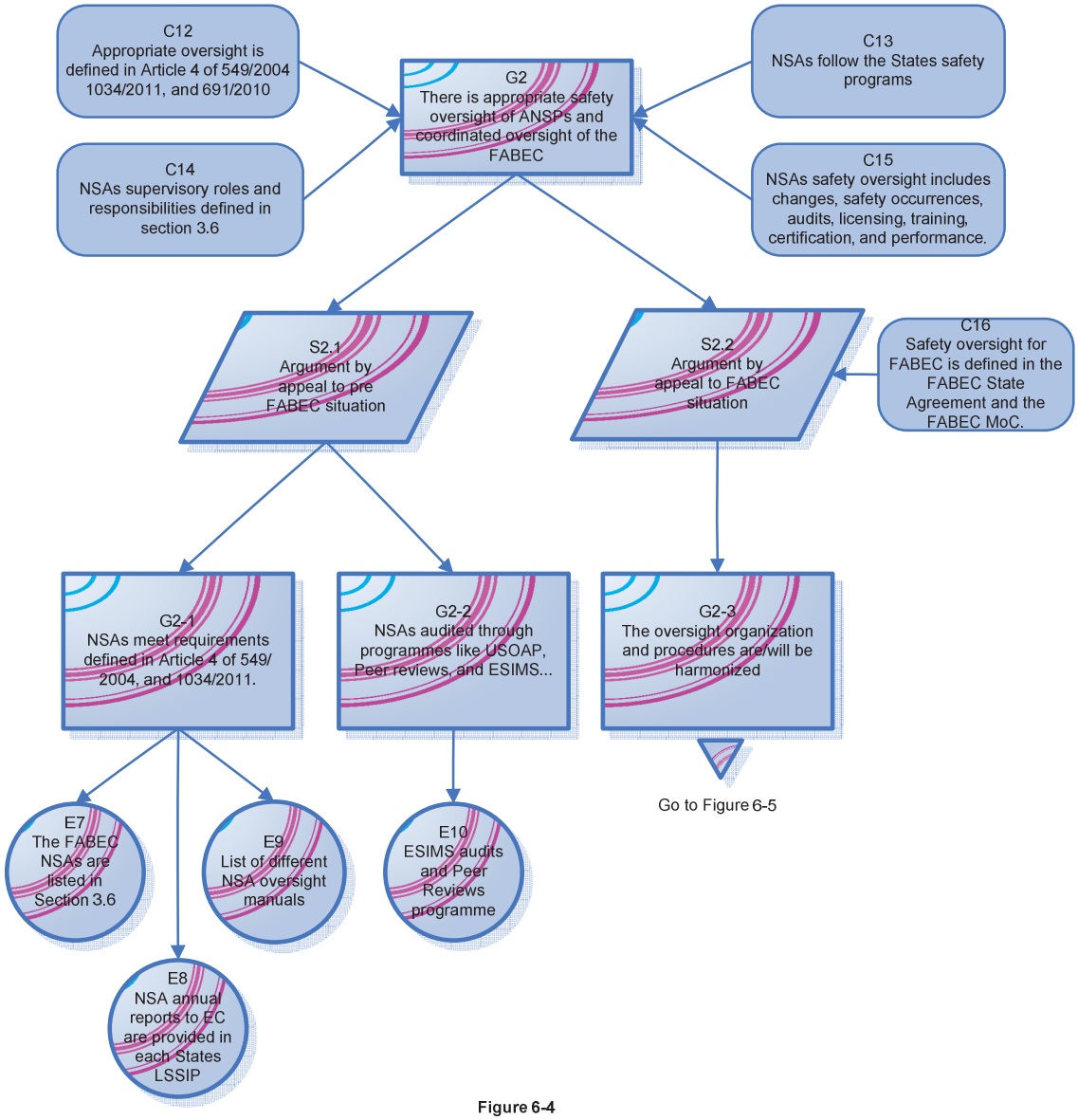


Figure 6-4

Goal: There is appropriate safety oversight of ANSPs and coordinated oversight of the FABEC.

See Figure 6-4.

This goal is further developed along 2 specific strategies: the pre-FABEC situation (See Figure 6-4); and the FABEC situation itself. (See Figure 6-5).

Evidence	
E7	The NSAs of each State are listed in section 3.6.
E8	Annual reports of each NSA are provided annually to Eurocontrol through the Local Single Sky Implementation/Local Convergence and Implementation Plan program, as managed by Eurocontrol (on behalf of the European Commission). A

<table>
<tr><th colspan="2">Evidence</th></tr>
<tr><td></td><td>reference has been provided to the web site where the various reports of the FABEC States are stored.

http://www.eurocontrol.int/lssip/public/standard_page/LSSIP_Table.html] – see also E22.</td></tr>
<tr><td>E9</td><td>The following NSA oversight manuals exist per State:

<table>
<tr><th>State</th><th>NSA</th><th>Manual</th></tr>
<tr><td>CH</td><td>FOCA</td><td>Safety Oversight in ANS Provision (SOAP)</td></tr>
<tr><td>CH</td><td>FOCA</td><td>Safety Oversight in ANS Provision Guidance Material (SOAP GUI)</td></tr>
<tr><td>NL</td><td>NSA-NL</td><td>Agreement of the 4 States NSAs regarding the oversight activities on Maastricht UAC v3-0</td></tr>
<tr><td>NL</td><td>NSA-NL</td><td>Kwaliteitsysteem Luchtvaart</td></tr>
<tr><td>GE</td><td>BAF</td><td>Handbuch des Bundesaufsichtsamtes für Flugsicherung</td></tr>
<tr><td>GE</td><td>BAF</td><td>Geschäftsordnung des Bundesaufsichtsamtes für Flugsicherung</td></tr>
<tr><td>FR</td><td>DSAC</td><td>Manuel de l'autorité de surveillance des prestataires de la Navigation aérienne, MCTNA, MANA.</td></tr>
<tr><td>BE</td><td>BSA</td><td>BSA-ANS Manual</td></tr>
<tr><td>LU</td><td>DAC</td><td>NSA Handbook - Operations manual of the Luxembourg Air Navigation National Supervisory Authority (DAC)</td></tr>
<tr><td>LU</td><td>DAC</td><td>NSA Audit Manual</td></tr>
</table></td></tr>
<tr><td>E10</td><td>The ESARR Implementation Monitoring and Support (ESIMS) Programme was established in 2002 to monitor the rate of ESARR adoption by States. In 2005 a formal audit approach in line with the ICAO Universal Safety Oversight Audit Programme (IUSOAP) was developed.

Since 2005, the ESIMS Programme has focused on auditing States' ATM safety oversight capabilities. The audits cover the relevant legislative and institutional arrangements as well as the ATM safety regulations in place, the safety regulatory arrangements and their capacity (policy and principles, rulemaking procedures, safety oversight and personnel licensing, and resources and staff competency). On-site audits are followed by the development of a State Corrective Action Plan which is incorporated into the Final Audit Report.

The States participating in the ESIMS Programme are EUROCONTROL Member States and those ECAC Member States who are not members of EUROCONTROL but who have agreed to participate in the Programme.

The European Commission has investigated with Member States and EUROCONTROL practical ways to implement the Peer Reviews of National Supervisory Authorities (NSA) as prescribed in Article 9.1 of Regulation (EC) N°. 1035/2011 – Common Requirements [Ref 8].

Peer Reviews are intended to promote and implement best practices used by NSAs for supervisory tasks, to arrange for a common approach to the supervision of ANSPs (notably as regards cross-border service provision), and to lead to harmonisation of NSAs' arrangements throughout the European Community. While the process brings added value, it does not replace the audits of States / NSAs, nor can it provide assurance about the compliance of NSAs with safety mandatory provisions.

It is the Commission's intention to achieve a Peer Review of the NSAs between early 2010 and the end of 2012, principally making use of the Functional Airspace Block (FAB) context. The grouping of Peer Reviews according to FAB structures brings benefits in terms of capitalising on lessons learnt, and is considered to be</td></tr>
</table>

	Evidence
	the most cost-efficient and effective means to achieve the objectives. Furthermore, certain FABs are composed of both EU and non-EU States. Hence, the FAB Peer Review mechanism could be utilised as a tool to assist the Community and its Member States to support the extension of SES to States that are not members of the EU. NSA Peer Reviews are executed FAB-to-FAB and are scheduled through 2011. The ESIMS programme terminates at end 2011 and from then on is transferred to EASA Standardisation visits. The scheduled ESIMS audits and the past results for each Member State can be found on the Eurocontrol website: http://www.eurocontrol.int/src/public/standard_page/esimsprogramme.html This website also contains information regarding the Peer review programme.

6.2.1 The oversight organisation and procedures are/will be harmonised

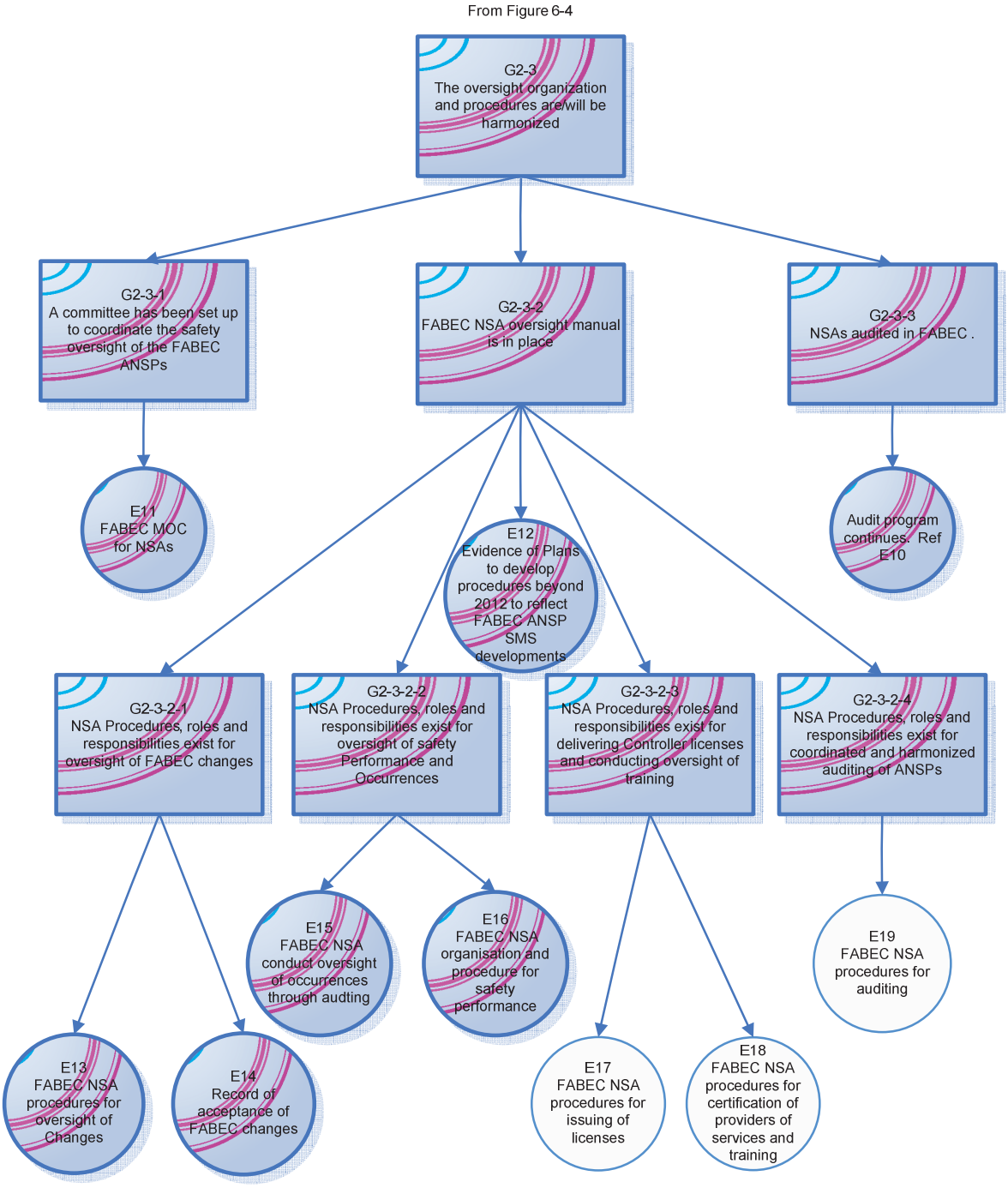


Figure 6-5

Evidence	
E11	FABEC NSA Cooperation Agreement Ref [17] stipulates that the 6 States of the FABEC will cooperate on the supervision of the ANSPs within the FABEC The NSA Committee is the body established, reporting to the FABEC council, which will supervise the air navigation service providers. The Tasks and Competencies of this body are defined in section 5.5 of FABEC Implementation

Evidence	
	Phase [Provisional] State Governance Manual Ref [15].
E12	The plan for dealing with subsequent NSA procedures that need to be developed is defined in the Terms of Reference of FABEC NSA Manual working Group. Ref [18].
E13	Procedure for the notification & review of FABEC changes. Ref [19].
E14	Annex 1 of the procedure for the notification & review of FABEC changes states that a record of the acceptance letters for NSA accepted FABEC changes is kept in a dedicated folder. Ref [19]
E15	This NSA procedure for oversight of occurrence management is covered by the audit procedures of each NSA. Refer to E19.
E16	Safety performance is monitored by the PFNSA Committee. The National Supervisory Authority Committee has therefore established the safety performance task force to develop and maintain safety performance monitoring at FABEC level Ref [20]. This task force has membership of the Financial & Performance Committee (F&PC) and deals with the safety elements of the FABEC Performance Plan on behalf of the NSAC. It will provide the Finance & Performance Committee with the safety elements of the FABEC performance plan as of 2012. Ref [15] Coordination between NSAC and F&PC is described into the States Performance Process description document. Ref [21]
E17	The issuing of Controller licences remains at State level.
E18	The procedure for certification of services and training providers is being developed by the Provisional NSA Committee/NSA manual working group. Refer to evidence item E12.
E19	The plan exists for the development of a harmonised NSA auditing procedure. However, for the establishment of FABEC in 2012, FABEC will consist of separate ANSPs, hence a harmonised auditing procedure is not required at FABEC implementation. Placeholder for post 2012 developments as part of safety case maintenance. For now, audits will be conducted by NSAs separately. In case of oversight of ANSPs providing cross border services, a procedure Ref [22] is drafted by the NSA manual working group, and approved by the PFNSAC.

6.3 GOAL G3 - SERVICE PROVISION WITHIN FABEC IS AND WILL REMAIN SAFE

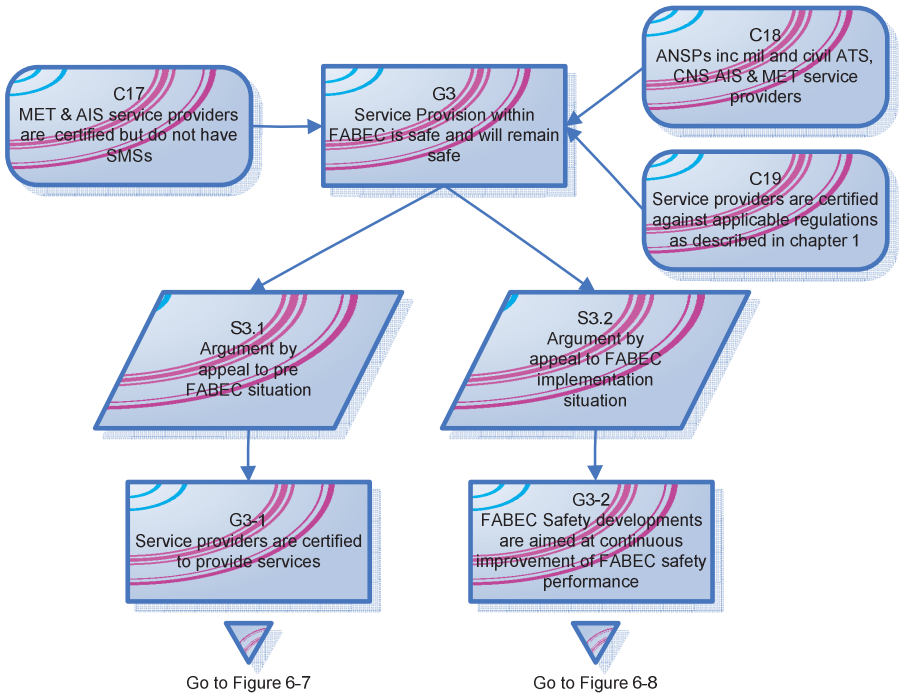


Figure 6-6

Goal: Service provision within FABEC is and will remain acceptably safe.

See Figure 6-6.

This goal is further developed along 2 specific strategies: the pre-FABEC situation (See Figure 6-7); and the FABEC implementation situation. (See Figures 6-8 and 6-9).

6.3.1 FABEC Service Providers are already certified

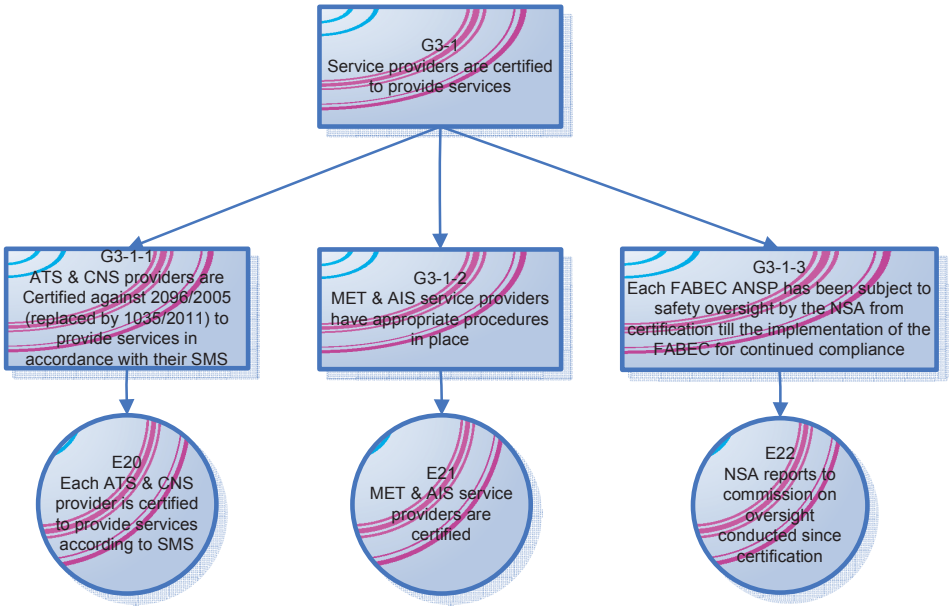


Figure 6-7

Evidence	
E20	The certified ANSPs of France are defined in LSSIP FR 2012-2016; The certified ANSPs of Belgium are defined in LSSIP BE 2012-2016; The certified ANSPs of Netherlands are defined in LSSIP NL 2012-2016; The certified ANSPs of Germany are defined in LSSIP DE 2012-2016; The certified ANSPs of Switzerland are defined in LSSIP CH 2012-2016; The certified ANSP of Luxembourg are defined in LSSIP LU 2012-2016
E21	The certification of MET & AIS service providers is stated in the respective State LSSIPs. Refer to the evidence supplied under E20.
E22	The NSA annual reports to the EC are part of the LSSIP reporting (chapter 14). As from 2009, these reports contain actual information on the certification, designation and ongoing compliance of the ANSPs of the State concerned. Furthermore it contains accurate information on NSA responsibilities and resources, as well as arrangements for cross-border ATS provision. Example References: LSSIP Belgium 2009-2013 (Chapter 2) LSSIP Belgium 2010-2014 (Chapter 14) LSSIP Belgium 2011-2015 (Chapter 14) LSSIP France 2009-2013 (Chapter 2) LSSIP France 2010-2014 (Chapter 14) LSSIP France 2011-2015 (Chapter 14) LSSIP Germany 2009-2013 (Chapter 2) LSSIP Germany 2010-2014 (Chapter 14) LSSIP Germany 2011-2015 (Chapter 14)

Evidence	
	LSSIP Luxembourg 2009-2013 (Chapter 2) LSSIP Luxembourg 2010-2014 (Chapter 14) LSSIP Luxembourg 2011-2015 (Chapter 14) LSSIP The Netherlands 2009-2013 (Chapter 2) LSSIP The Netherlands 2010-2014 (Chapter 14) LSSIP The Netherlands 2011-2015 (Chapter 14) LSSIP Switzerland 2009-2013 (Chapter 2) LSSIP Switzerland 2010-2014 (Chapter 14) LSSIP Switzerland 2011-2015 (Chapter 14)

6.3.2 Goal G3-2 FABEC developments are aimed at improving safety performance

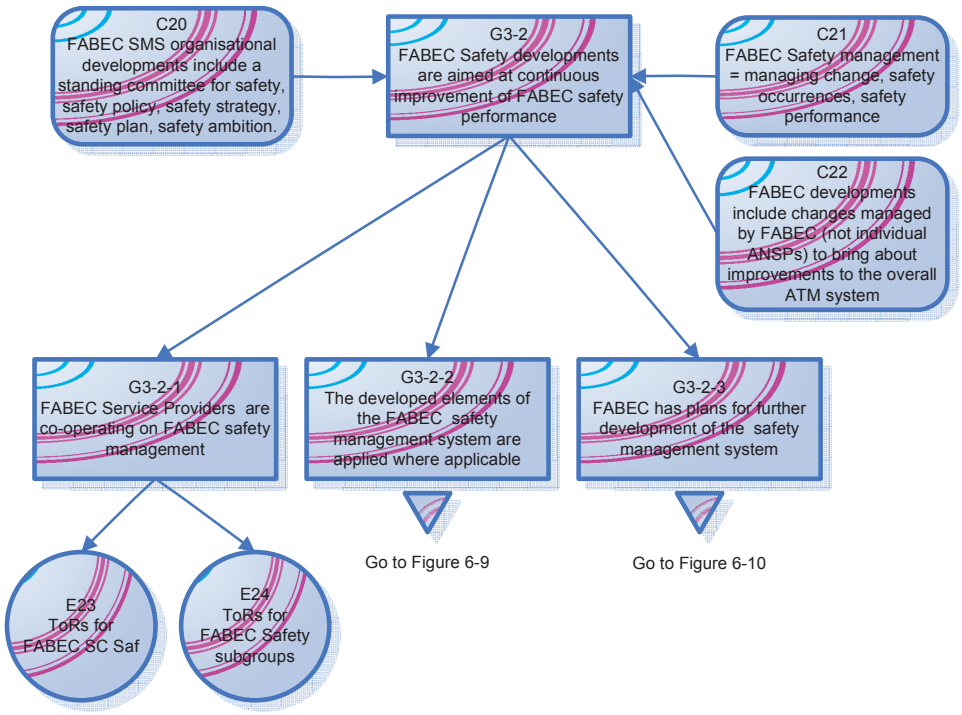


Figure 6-8

Evidence	
E23	The Terms of Reference of FABEC Standing Committee for Safety Ref [23] state that this is a body of the governance structure for the ATSPs to cooperation on safety within the FABEC program. It shows that the membership includes the different representative ATSPs safety directors/managers of the FABEC ATSPs. The SC SAF is assuring a joint implementation and operation of a safety management system (FABEC SMS).
E24	ToRs for safety sub groups: ❑ Safety Risk Assessment Process (SRAP) workgroup has been set up to establish the procedure for undertaking risk assessments. This workgroup has already delivered the SRAP process, excluding option 3, which is a common FABEC safety risk assessment methodology. The Terms of Reference of this

Evidence	
	group are available in Ref [24]. ❑ Safety Performance Monitoring sub group Terms of Reference Ref [25] state that this sub group is established to define a framework (methodology, indicators, reporting, target setting) for safety performance management, to define, organise and implement processes at FABEC level for gathering, monitoring and reporting on FABEC safety performance. The SPM-SG is preparing the ground for a harmonised / joint implementation and operation of the safety performance management processes within the safety management system (FABEC SMS) inside the ANSPs. ❑ The Safety Occurrence Management System (SOMS) subgroup Terms Of Reference Ref [26] state that this group is established to enable safety monitoring and improvement within FABEC and to define / propose the necessary standards for a harmonized approach and a centralized management of safety occurrences, including • Notification and reporting (internal and to institutional bodies, incl. KPI) • Investigation ➢ principles for occurrence analysis ➢ principles on contributory factors incl. human factors and contextual conditions ➢ principles for severity / risk analysis • Recommendations • Lesson dissemination • data repository • data exchange and measurement in a Just Culture environment. ❑ InTACT is an InTernational Audit Co-operation Team which shares resources and practices for auditing and surveying between DFS, Skyguide and DSNA. Its Terms of Reference are contained in Ref [27]. The other ANSPs have been invited to participate in this initiative, which they are considering. ❑ The Overall Safety Case Assembly and Report ToRs are described in chapter 4 – follow this link [13].

6.3.3 FABEC developed SMS is applied

Note: When the FABEC is implemented, it will consist of several ANSPs who will continue to apply their own Safety Management Systems. In addition, there will be additional elements to the SMS at FABEC level, which will cover the additional elements of safety necessary to be applied at the FABEC level, for example, safety assessments of FABEC changes, application of safety performance management etc. For this reason, the transition and continuing evolution of the FABEC SMS is described through 2 separate structures: Goal G3-2-2 explains the application of safety at the FABEC level, whilst Goal G3-2-3 in section 6.3.4 explains the plans for further development post FABEC implementation.

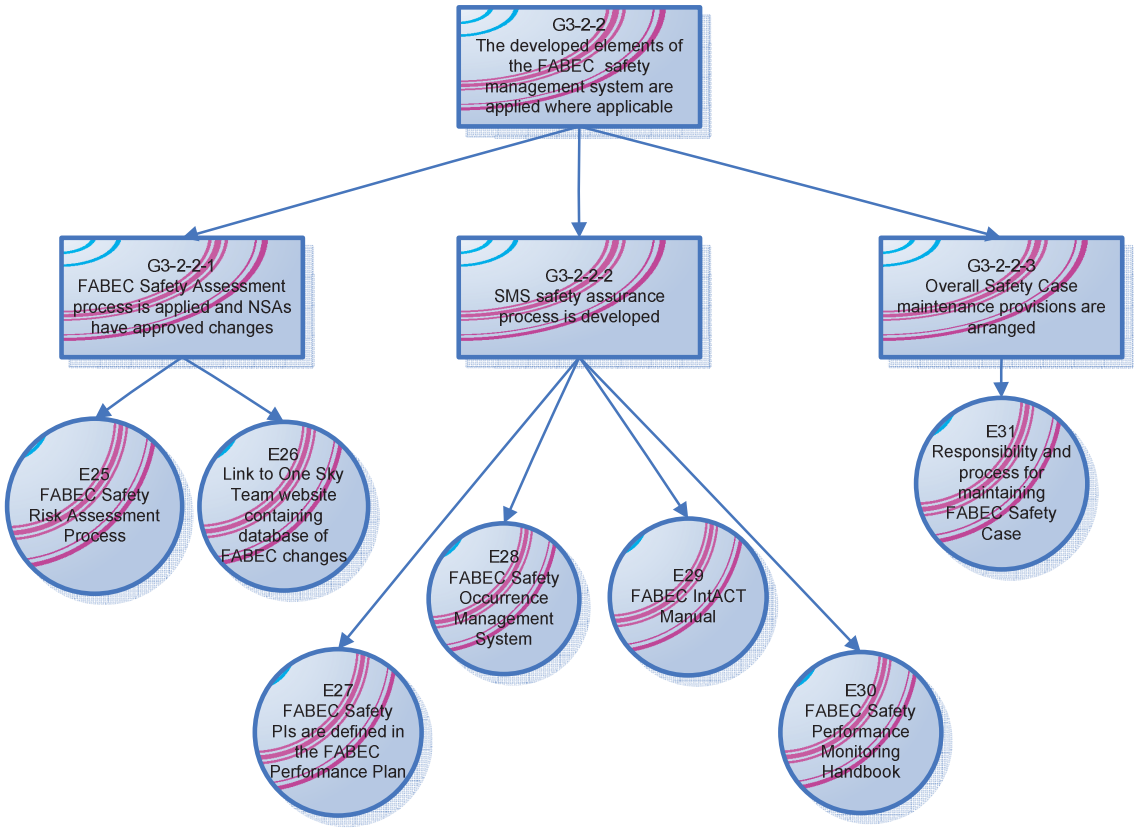


Figure 6-9

Evidence	
E25	FABEC SC Saf Implementation Phase Safety Risk Assessment and Mitigation Process describes how safety risks are identified and managed for FABEC related changes. This process is subject to further development and regular updates as the FABEC SMS develops. Ref [28].
E26	FABEC changes are documented i.e. FABEC Task Forces Safety Management Plans and associated safety cases, and archived using the restricted EUROCONTROL One Sky Teams website. This provides evidence that the FABEC SMS is applied for FABEC changes. See OneSky/OneSkyTeams/FABEC Implementation Phase/Library/AFG - FABEC Safety Case Preparation.
E27	Article 11 of the Framework Regulation Ref [2] contains the obligation to set up a performance scheme for air navigation services and network functions. Ultimate goal of this performance scheme is the improvement of the ANS performance in the key Performance Areas safety, environment, capacity and cost efficiency in the Single European Sky.

	Evidence
	The Performance Scheme Regulation [Ref 10] contains the detailed elaboration of the performance scheme concept. The Performance Scheme Regulation defines 3 reference periods, RP1, RP2 and RP3. The first reference period (RP1) of the performance scheme starts on 1st January 2012 and ends on 31st December 2014. In Section 1 it requires that three European wide Safety Key performance indicators are defined: ▪ Effectiveness of safety management (ANSP & State) as measured by a methodology based on the ATM Safety Maturity Survey Framework; ▪ The application of the severity classification of the Risk Analysis Tool to allow harmonised reporting of severity assessment; ▪ The reporting of just culture. There will be no European Union-wide targets for the above key performance indicators in the first reference period. These targets will be developed during RP2. It is the first reference period which is applicable to version 1.0 of this safety case. Subsequent versions may need revision to take account of the impacts of the RP2 developed targets. The FABEC Performance Plan RP1 - 2012 – 2014 Ref [29] defines in annex C the FABEC safety performance indicators that will be monitored. These indicators are in compliance with the Performance Regulations (EU) no 691/2010 Ref [10]. It will use the 3 safety Performance Indicators developed jointly by SC Safety and TF State Performance for the FABEC Performance Plan: ❑ PI1 : Effectiveness of SMS. Based on the FABEC ATM Safety Maturity Survey scores from the 7 ANSPs and 6 States, a baseline shall be defined during 2012, and if possible, a target shall be set for the 2013-2014 period, on the level to be achieved at the end of RP1; ❑ PI2 : Usage of RAT. To allow the harmonization of the reporting of severity assessment, FABEC ANSPs are committed to implement the RAT1 (Risk Analysis Tool) before the end of RP1. (Other tools shall be subject to approval by the NSAC to establish compliance with the regulation(s) requirements (esp. with regards to the assessment of the severity classification of occurrences and the ATM ground contribution assessment); ❑ PI3 : Just Culture; In addition, FABEC ANSPs are requested to perform a Cost Based Analysis and an initial feasibility study for the implementation of automated reporting systems, at least for En-Route traffic. The added value[2] of those automated systems shall be assessed and the objectives of those tools shall be clearly identified and stated in Just Culture policies. This is considered an objective which is applicable to RP1. The process for gathering and delivering the data to support these indicators is provided in the FABEC Safety Performance Management handbook (see E30). At FABEC level the monitoring of Safety Performance Indicators is the responsibility of the NSAC. Refer to E16.
E28	The Safety Occurrence Management System Reference document Ref [30] defines how the FABEC Air Navigation Services Providers will manage the

[2] The added value of automated reporting tools shall be based on an initial feasibility study including the assessment of the safety added value and including the impact and/or interactions with outside FABEC systems and with regards to third countries best practices and solutions.

Feasibility study shall be completed prior the end of RP1 and based on the results, the implementation phase should be considered for RP2.

Evidence	
	reporting, investigation and analysis of safety occurrences within FABEC.
E29	International Audit Cooperation Team Manual Ref [27] describes the methodology, scope of application, the IntACT organisational structure, etc, for undertaking audits of member organisations against safety, security and ISO requirements in support of international harmonisation. The participating organisations in this version are DFS, Skyguide and DSNA. Other organisations are looking into the feasibility of participating as FABEC develops.
E30	How the FABEC Air Navigation Services Providers will manage the data gathering, reporting process and organisation of the Safety Performance Indicators within FABEC is defined in the FABEC Safety Performance Management Handbook Ref [31]. This includes interfaces and relationships with other stakeholders. See E16.
E31	Safety Case maintenance process is defined in the updated ToRs of OSCAR. The process is described at overview level in section 4.1 of this safety case. This includes responsibilities for updating. Ref [13].

6.3.4 FABEC has plans for further SMS development

This section explains the plans for further development of safety post FABEC implementation.

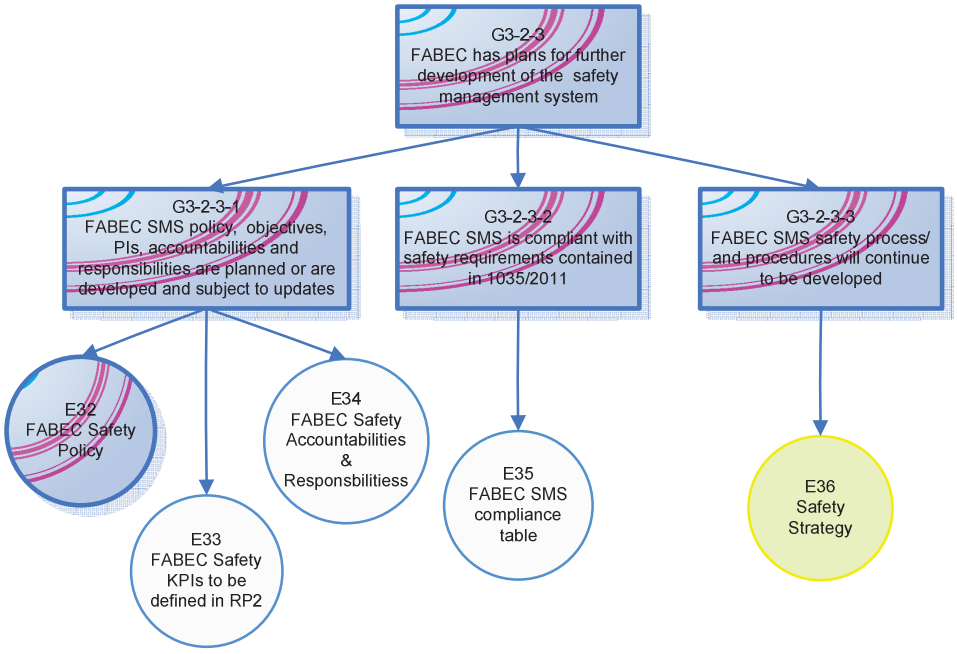


Figure 6-10

Evidence	
E32	FABEC ANSP Strategic Board Safety Policy describes the priorities for FABEC safety given the limitations of FABEC ASB responsibilities for service provision, and the safety responsibilities of existing FABEC ANSPs Ref [32]. The Standing Committee for Safety is responsible for proposing updates to this safety policy on a periodic basis and agreeing such changes with the ASB.
E33	The Performance Regulation Ref [10] contains the detailed elaboration of the performance scheme concept. The Performance Regulation defines 3 reference periods, RP1, RP2 and RP3. The first reference period (RP1) of the performance scheme starts on 1st January 2012 and ends on 31st December 2014.

Evidence	
	In Section 1 it requires that three European wide Safety Key performance indicators are defined: ▪ Effectiveness of safety management (ANSP & NSA) as measured by a methodology based on the ATM Safety Maturity Survey Framework; ▪ The application of the severity classification of the Risk Analysis Tool to allow harmonised reporting of severity assessment; ▪ The reporting of just culture. There will be no European Union-wide targets for the above key performance indicators in the first reference period. These targets will be developed during RP2. Subsequent versions of this safety case may need revision to take account of the impacts of the RP2 developed targets, and may result in an update to the FABEC Performance Plan and State and NSA implementations.
E34	Safety Accountabilities & Responsibilities will be further developed in line with the FABEC ANSP management system developments – Not needed for FABEC 2012 – placeholder for post 2012 developments as part of safety case maintenance.
E35	There is a plan to develop a compliance matrix against 1035/2011 for those parts of the SMS that are applied at FABEC level. Refer to FABEC SC Saf Strategy 2012+, which is under development by the SC Saf. This Is not needed for FABEC 2012.
E36	The FABEC SMS will continue to develop in line with FABEC institutional developments. The Safety Strategy 2012+ will define how these developments will be managed. This strategy document is work in progress, but is not yet available to be referenced in this version. This will be reviewed at the first FABEC Safety Case maintenance meeting scheduled for May 2012.

7 ASSUMPTIONS

This section describes the assumptions which have been made in preparing this safety case. These assumptions are precisely worded to enable each assumption to be validated as the safety case is developed.

There may also be assumptions made as a result of safety issues arising during the safety case development. The nature of the underlying safety issue will be clearly defined.

ID	Assumption	Validated (Yes/Partial/No)	Evidence / remarks
A1	The Safety Regulatory Requirements in EC 1035/2011,1034/2011 and 691/2010 amended by 1216/2011 are adequate for scope of 'safely implemented'	Yes	It is assumed that the FABEC implementation is an organisational change. As such, high level safety requirements such as those contained in EC 1035/2011 and EC 1034/2011 must be complied with in order to show that FABEC implementation is adequately safe. Validated through review and acceptance by stakeholders. EC 691/2010 amended by 1216/2011 is explicitly covered within the safety case argument structure.
A2	FABEC is established in December 2012	Yes	This is a planning assumption in order to be able to assemble the safety case. Should the date of establishment slip, the goals and evidence will likely need to be updated.
A3	This safety case will be maintained beyond 2012	Yes	Early versions of the IR on establishment and modification of FABs contained explicit requirements to describe the arrangements for updating the safety case. In the version of Nov 2010, this text was removed. However, it is stated in Article 5 para 2 that the commission shall be notified 6 months in advance of modifications, and that the information supplied to establish the FAB (including this safety case) shall be updated. A goal has been provided under G3 to describe the arrangements.
A4	In lieu of a decision, we assume (in order to develop the safety case arguments) that the approach for the FABEC development will be a cooperation/coordination model between the ANSPs and between the NSAs, potentially evolving to an integrated approach between ANSPs, and similarly between NSAs.	Yes	The long term situation may be a single ANSP, with a single yet separate NSA, supporting the 6 States who have responsibility for the Airspace above their respective territories. However, in order to progress with developing this safety case, it is assumed that the institutional arrangements in 2012 will be based on cooperation and coordination. This safety case will be maintained to reflect progress in the evolution. To be monitored as the FABEC institutional arrangements are developed. Validated through review and acceptance by stakeholders.

8 CONCLUSIONS

The degree to which this safety case version 1.0 is substantiated is as follows:

- The safety goals and claims are considered complete and have been reviewed by safety experts at States level and at ANSP level;
- The evidence to substantiate the claims is completed for this version. The exception is
  - Evidence E36 relates to an update to the FABEC ANSP safety strategy to cover SMS developments beyond 2012.

An informal review with EASA concluded that this safety case and the approach taken satisfy their requirements.

Based on the arguments and evidence provided, it is concluded that the FABEC is safe to implement and will remain acceptably safe.

9 TRACEABILITY TO 176/2011

A summary of the requirements on the content of the FAB Safety Case as described in the 'Commission Regulation number 176/2011 on the information to be provided before the establishment and modification of a functional airspace block' is provided below to aid traceability to show that the requirements have been addressed in this safety case.

	Reg (EC) No 550/2004 Art 9a	FAB IR (176/2011. Annex pt II)	Interpretation /(deliverable)	Safety Case Evidence Ref	Page
1.1	(a) **be supported** by a safety case	(a) the common safety policy	FABEC AFG Safety Policy Paper	E32	32
1.2		(b) description of arrangements for dealing with accident and incident investigations	All three safety argument pillars describe arrangements through AAIB, to NSA & ANSP processes.	E4, E5, E15, E28	19 25, 31
1.3		and plans how to address safety data collection, analysis and exchange	These are covered by the same processes as described above but just for NSAs and ANSPs	E4, E5, E15. E16, E24, E28.	19 25 28, 31
1.4		(c) a description of the way in which safety is being managed to avoid degradation of safety performance	See the complete Safety Argument described in **FABEC Safety Case Report.**		
1.5		(d) a description of arrangements allocating responsibilities for setting safety targets, safety oversight and accompanying enforcement measures	Safety Rulemaking, Oversight & enforcement covered by the regulatory and supervisory pillars of the safety case. Safety Target setting and safety performance are covered for both NSAs and ANSPs.	G1 & G2 E13, E16, E27 & E30.	17 & 21 25 30, 32
1.6		(e) safety assessments for operational changes resulting from the establishment of the FAB	**Safety Assessment**(s) for each FABEC operational change endorsed by NSAC.	E11, E13, E14, E25, E26, E36.	24, 25 25, 30 30, 33

10 RECOMMENDATIONS

This section contains a list of recommendations for the FABEC, traceable to the Safety Conclusions.

The following recommendations are made as a result of this Safety Case Report:

ID	Recommendations	Recommendation Owner
1	It is recommended that the States improve the formal exchange of information between States within FABEC, and between FABEC States and FABEC ANSPs, relating to accident and serious incident investigations, in order to promote wider dissemination of relevant recommendations and to systematically plan the required corrective actions	HLIB

11 GLOSSARY

All Abbreviations and Definitions used.

Abbreviations, Acronyms & Definitions	
AAIB	Air Accident Investigation Bureau
Accept	The chairman of the Standing Committee for Safety accepts that the presented arguments and evidence meet the requirements contained in IR176 plus any additional documented requirements of stakeholders.
AIS	Aeronautical Information Services
ANA	Administration de la Navigation aérienne
ANSP	Air Navigation Service Provider
Approve	The Chairman of the HLIP approves the safety case to be presented to the European Commission.
ASB	ANSP Strategic Board
ATS	Air Traffic Service
ATSP	Air Traffic Services Provider
BAF	Bundesaufsichtsamtes für Flugsicherung
BEA	Bureau d'Enquètes et d'analyses pour la sécurité de l'aviation civile
BFU	Bundesstelle für Flugunfalluntersuchung
CANSO	Civil Air Navigation Services Organisation
DFS	Deutsche Flugsicherung
DSAC	Direction de la Sécurité de l'Aviation Civile
DSNA	Direction des services de la Navigation aérienne
DTA	Direction du Transport Aérien
EASA	European Agency for Safety of Aviation
EC	European Commission
ECAC	European Civil Aviation Conference
Endorse	The chairman of the ASB endorses that the safety case is covering the requirements of the Implementing Rule 176.
ESIMS	ESARR Implementation Monitoring and Support
FAB	Functional Airspace Block
FABEC	Functional Airspace Block Europe Central
FIR	Flight Information Region
FOCA	Federal Office Of Civil Aviation
F&PC	Finance & Performance Committee
GSN	Goal Structured Notation
ICAO	International Civil Aviation Organisation
InTACT	InTernational Audit Co-operation Team
KPI	Key Performance Indicator
LSSIP	Local Single Sky Implementation Plan
LVNL	Luchtverkeersleiding Nederland
MET	Metereological
MoC	Memorandum of Cooperation

Abbreviations, Acronyms & Definitions	
MUAC	Maastricht Upper Area Control Centre
NSA	National Supervisory Authority
NSAC	Provisional NSA Committee
NSATF	National Supervisory Authority Task Force
OSCAR	Overall Safety Case Assembly and Report
Prepared	To take responsibility for the creation of the safety case, and ensure it is to a satisfactory standard
RAT	Risk Assessment Tool
RP	Reference Period
SASI	Support to ANSPs on Safety management systems Implementation
SES	Single European Sky
SC Saf	Standing Committee for Safety
SCR	Safety Case Report
SMS	Safety Management System
SOAP	Safety Oversight in ANS Provision
SPM	Safety Performance Monitoring
SRAP	Safety Risk Assessment Process
ToR	Terms of Reference
UIR	Upper Information Region
Verified	The chairman of the FABEC NSA committee verifies that the evidence presented is in place and is adequate to achieve the safety claims

APPROVALS

	Position / Name	Signature	Date
Prepared:	OSCAR Sub-Group Leader Keith Cartmale		
Accepted:	Chairman Standing Committee for Safety Job Brüggen		
Verified	Chairman FABEC NSA Committee Patrick VanHeyste		
Endorsed:	Chairman ASB Dany Weder		
Approved:	Chairman High Level Implementation Board Patrick Gandil		

CHANGE RECORD

Edition / Revision	Date	Pages Affected	Remarks
00-01	17/03/10	All	First draft of the Strawman safety case report
00-02	14/04/10	All	Further development
00-03	03/06/10	All	Update to incorporate review comments received from OSCAR members
00-04	05/11/10	All	Update of GSN – tidy up of references and up-issued to Robust Draft strawman status
00-05	02/02/10	All	Updated to reflect comments from AFG, NSA and SCS review. Evidence requirements defined and incorporated.
00-06	01/07/11	All	Updated to reflect comments from AFG, NSA and OSCAR review. Evidence requirements refined and revised, some evidence delivered and referenced.
00-07	11/11/11	All	Updated to add new evidence, and reflect agreements made in OSCAR meetings 9 & 10.
00-09	12/12/11	All	Updated to final for approval and to accelerate the finalisation of the safety case.
01-00	10/02/12	All	Updated to take account of latest developments, NSA verification of evidence, and for final approval.

12 REFERENCES

1 Regulation EC no 1070/2009 amending 549, 550, 551 & 552 in order to improve the performance and sustainability of the European aviation system

2 Regulation EC 549/2004 (The framework Regulation)

3 Regulation EC 550/2004 (The Service Provision Regulation)

4 Regulation EC 551/2004 (The Airspace Regulation)

5 Regulation EU 1034/2011 on safety oversight in air traffic management and air navigation services

6 Regulation EC 1315/2007 on safety oversight in air traffic management and amending Regulation (EC) No 2096/2005

7 Regulation EU no 176/2011 on the information to be provided before the establishment and modification of a functional airspace block

8 Regulation EC 1035/2011 laying down common requirements for the provision of air navigation services

9 Regulation EC 2096/2005 laying down common requirements for the provision of air navigation services

10 COMMISSION REGULATION (EU) No 691/2010 laying down a performance scheme for air navigation services…

11 EU1216 amending 691 performance scheme regulation

12 TREATY RELATING TO THE ESTABLISHMENT OF THE FUNCTIONAL AIRSPACE BLOCK "EUROPE CENTRAL" BETWEEN THE FEDERAL REPUBLIC OF GERMANY, THE KINGDOM OF BELGIUM, THE FRENCH REPUBLIC, THE GRAND DUCHY OF LUXEMBOURG, THE KINGDOM OF THE NETHERLANDS AND THE SWISS CONFEDERATION

13 Overall Safety Case Assembly & Report Terms of Reference

14 OSCAR plan

15 FABEC Implementation Phase [Provisional] State Governance Manual_Vers1.0

16 Regulation EU 182/2011 rules and general principles concerning mechanisms for control by Member States of the Commission's exercise of implementing powers

17 FABEC NSA Cooperation Agreement

18 FABEC NSA Manual working Group ToRs

19 Procedure for the notification and review of FABEC changes

20 FABEC NSA Committee Safety Performance Task Force Terms of Reference

21 FABEC States Performance Process description Vers2.0

22 FABEC NSA Procedure on oversight of cross border services

23 FABEC Implementation Phase Terms of Reference Standing Committee Safety

24 SRAP Option 3 Terms of Reference version

25 Safety Performance Management Subgroup (SPM-SG) Terms of Reference

26 Safety Occurrence Management System Terms of Reference

27 International Audit Cooperation Team (IntACT) Manual version 3 dated January 2011.

28 FABEC Implementation Phase SCS Safety risk assessment and mitigation for FABEC changes

29 The FABEC Performance Plan RP1 - 2012 – 2014

30 FABEC Safety Occurrence Management Reference Document

31 FABEC Safety Performance Management Handbook

32 FABEC ANSP Strategic Board Safety Policy

FABEC Implementation Phase

FABEC Safety Risk Assessment and Mitigation for FABEC Changes

EC Information

Attachment L.5

Co-financed by the European Union
Trans-European Transport Network (TEN-T)

DOCUMENT SUMMARY

Objective : To guide the safety risk assessment and mitigation activities required to ensure FABEC wide changes are acceptably safe	
Origin : SC SAF	**Audience** : AFG, Task Force leaders, change leaders, safety practitioners

Title : Safety risk assessment and mitigation for FABEC changes (SRAP)
Reference : FABEC_SCS_SRAP_v2.9

Version : 2.9	**Date** : *11/04/2012*	**Status** : ☐ Draft ☑ Released	**Classification** : ☐ Public ☑ FABEC limited ☐ Addressees limited

DOCUMENT CHANGE RECORD

Version	Date	Reason for changes	Author of changes
0.1	17-19/03/2009	Document creation	SCS
0.9	23/03/2009	Consolidation of workshop results	R. Jansen
0.95	09/04/2009	Review comments from SCS members incorporated	R. Jansen
0.96	27/04/2009	Roles, responsibilities, tasks and functions added	R. Jansen, A. Du Bois, S. Ariën
0.99	18/05/2009	Review comments from SCS members incorporated	R. Jansen, A. Du Bois, K. Cartmale, C. Berthelé
1.0	29/05/2009	Approval SCS version 1.0	SCS
2.0		Incorporation of change notification process to the NSA	K Cartmale, A Du Bois
2.5 (draft)	26/10/2009	Update roles and responsibilities taking into account PMO (AFG) review Removal of change notification process to the NSA from this document	R. Jansen, S. Ariën
2.6	29/10/2009	Approval SCS version 2.6	SCS
2.7	25/11/2009	Put document on FABEC template	AFG
2.8	22/02/2012	Update references to changed numbers of EC regulations (EC 2096 to EC 1035 and EC 1315 to EC 1034)	R. Jansen
2.9	11/04/2012	Removed inconsistency with EC file deliverable by replacing diagram under Functions, tasks and timelines. Applied consistent font use.	J. Brüggen

APPROVAL

Author(s)			
Name	Function	Signature	Date
R. Jansen	Chairman SRAP		11/4/12

Review	
By	Function
All SRAP members	

Document Approval			
Name	Function	Signature	Date
J. Brüggen	Chairman SC SAF		11.04.12

Point of Contact			
Name	Telephone	Organisation	Email
R. Jansen	+31 20 406 3385	LVNL	r.jansen@lvnl.nl

This document is FABEC confidential

Distribution of this document is restricted to the following organizations:

- ANA – Administration de la Navigation Aérienne
- Belgocontrol
- DFS – Deutsche Flugsicherung GmbH
- DSNA – Direction des Services de la Navigation Aérienne
- LVNL – Luchtverkeersleiding Nederland/ Air Traffic Control the Netherlands
- MUAC – Eurocontrol Maastricht Upper Area Control Centre
- Skyguide – skyguide swiss air navigation services ltd

Management summary

This document is the most recent version of the FABEC SMS reference for the safety risk assessment and mitigation activities that have to be carried out for changes within FABEC Task Forces. This document describes the roles and responsibilities within the FABEC organisation w.r.t. safety assessment for changes. This document also provides three options for safety assessment and safety cases. Two options are based on existing methodologies from the FABEC ANSPs and can therefore be applied directly. The third option is a joint FABEC wide methodology for safety risk assessment and mitigation; this option needs to be developed.

This document will become part of the means of compliance for the safety regulatory requirements applicable to the FABEC.

TABLE OF CONTENTS

1 INTRODUCTION

1.1 Background

In the feasibility phase of FABEC, the safety risk assessment and mitigation processes and methodologies of the individual ANSP's have been compared extensively, see Ref. [Comparison FABEC Safety Methods]. The scope of this study was safety assessment and safety criteria. The main findings of this study can be summarised as:

- All individual FABEC ANSPs have NSA certified processes and methodologies;
- All individual FABEC ANSPs have similar processes and methodologies for safety assessment;
- There exist many differences in tools and techniques for safety assessment that are being used by the individual FABEC ANSPs; and
- For safety criteria, there exist more fundamental differences between the individual FABEC ANSP's.

All SCS members have approved this report and agree that, at the initial stage of FABEC implementation, one uniform and overall FABEC methodology for safety risk assessment and mitigation cannot yet be defined. Therefore, it was agreed at the first SCS meeting to define a pragmatic version of a handbook for safety risk assessment and mitigation for FABEC changes (see Ref. [Notes SCS KoM]).
The rationale of the approach was to define a solution for the short term (i.e., directly applicable), and to plan a strategy to come to one FABEC methodology for the longer term.

1.2 Purposes

This document is the FABEC SMS reference for the safety risk assessment and mitigation activities that have to be carried out for changes originating from FABEC Task Forces.

The document will become part of the means of compliance for the safety regulatory requirements applicable to the FABEC.

It is noted in this version that both the FABEC SMS and the safety regulatory framework for FABEC are not yet defined.

1.3 Scope

The scope of this document is safety risk assessment and mitigation for changes. For the sake of clarity, this implies that other SMS parts, like safety surveys, incident/ accident investigation et cetera, are not within the scope of this document.

Changes are defined as safety related FABEC changes according to the Common Requirements (Ref. [EC 2096/2005]).

1.4 Document structure

The structure of this document is as follows

Section 1 and section 2 give background, define purposes and scope, and explain the approach behind the creation of this document.

Sections 3, 4 and 5 provide the guidance material for the topics "Safety Assessment", "Safety Case" and "Safety Criteria".

The final parts of this document provide a "To do list" for this document, References, Acronyms and Definitions.

2 APPROACH

In the next sections, two solutions are provided that are based on existing ANSP risk assessment and mitigation methodologies. This implies that these solutions can be applied directly for safety risk assessment and mitigation for FABEC changes. These solutions are called “Option 1” and “Option 2”. The uniform and overall FABEC methodology for safety risk assessment and mitigation is referred to as “Option 3”. This option will be developed as the implementation phase progresses, and experience is gained through application of Options 1 and 2 within the task forces.

3 FABEC SAFETY ASSESSMENT PROCESS

This section describes the safety assessment process that, irrespective of the safety case options, always has to be followed. This process consists of the following four phases:

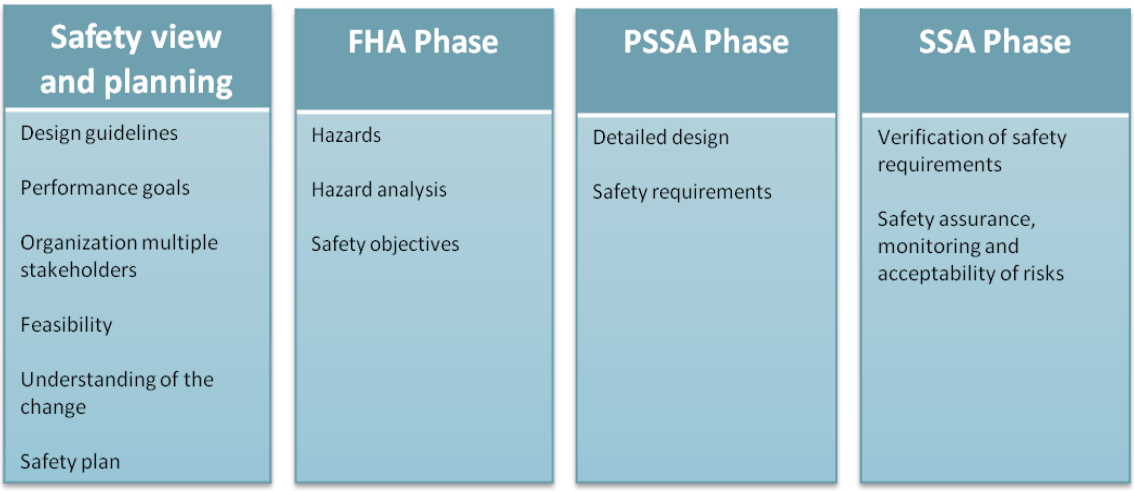


Figure 1 *Safety assessment process phases*

This process needs to be applied at the correct points through the project lifecycle, which usually consists of the following phases:

- Feasibility
- Design
- Development
- Testing and integration
- Implementation
- Transition
- Operation
- Decommissioning

[... TBD Coupling between lifecycle phases and safety assessment process ...]

3.1 General remarks

This section lists important remarks that are always relevant for the safety assessment process:

- Arrange involvement of (representatives of) relevant operational and/ or technical experts in the safety assessment process from the beginning onwards;
- The acceptance of the safety risk assessment and mitigation results by the impacted local management (e.g. OPS Management) is critical;
- Affected stakeholders outside FABEC ANSPs (e.g. adjacent ANSPs, military, meteo, airlines, ...) should be involved early in the process;
- All safety management processes need to be embedded in overall project management processes;
- Transparency of the working method to all participants of the sessions is crucial.

3.2 Safety view and planning

The following items need to be addressed in the safety view and planning step:

- Introduction of the change
    - Reason of the change, description of the change
    - Scope of the change: geographical boundaries, interfaces with other stakeholders, elements and/ or systems, et cetera
    - Interactions with other projects including interfaces with them
- The rationale of the selected safety case option
- Verification of adequate safety management plan
- Overview of safety management activities (e.g., hazard logs, audits, roles and responsibilities, participants in the project, et cetera)
- Overview of safety assessment activities
    - Log and identify assumptions, requirements, evidence et cetera explicitly
- Safety evidence approach
    - Define the safety target for the change (see section 5)
    - Quantitative and/ or qualitative approach
    - Absolute versus relative approach
    - Safety tools and techniques (like expert judgement, real time simulations, mathematical models, human factors, …)
- Safety organisation roles and responsibilities inside the change project
    - Which stakeholders are affected by the change (note that these can also be stakeholders outside FABEC ANSPs, like ANSPs from adjacent FABs, military, airlines, et cetera)
    - Which provisions of the safety management systems and, if necessary, which safety regulations are applicable to the change (like regulations from ICAO, EUROCAE, EC regulations, JAR, national safety regulations, …)
    - Define a strategy to get FABEC internal acceptance
        - Centralized: signatures from all related ANSP management
        - Decentralized: acceptance of safety risks at unit level
    - Start NSA notification process
        - Get clear who will be the NSA. Go for one NSA as PoC
        - One notification (thus not multiple from the different FABEC ANSPs)
        - AFG/Task Force Leader or Work Package Leader is the working level point of contact for the FABEC ANSPs
        - Establish the coordination and administration of safety information exchanges between the project and the NSA.

- When there is an external supplier, safety management arrangements have to be defined
- Make clear how the interactions will be set up and managed between the different units or ANSPs
- Establish how the AFG/Task Force Leader will interact with the SCS, e.g. through the local SCS representative
- Schedule and resource allocation, define the milestones and deliverables
- Use a glossary and definitions, references documents
- Communication plan
    - Who is communicating to whom, at what moment and about which subject

3.3 FHA phase

For safety case option 1 and option 2, either the selected FHA method (option 1) or the own FHA method has to be followed for the derivation of the safety objectives.

If safety objectives already exist for the change (like data link, ADS-B, RNAV et cetera), then these safety objectives need to be gathered together and assessed:

- Verify whether change related assumptions behind the safety objective are applicable;
- Verify whether new, additional hazards are applicable;
- Verify if existing hazards have same effects.

[... TBD The FABEC FHA method for safety case option 3 has to be defined ...]

3.4 PSSA phase

For safety case option 1 and option 2, the selected PSSA method (option 1) or the own PSSA method has to be followed respectively.

If safety requirements already exist for the change, then these safety requirements need to be assessed:

- Verify whether change related assumptions behind the safety requirements are applicable;
- Verify whether additional hazards or requirements are applicable;
- Verify if causes are still complete and correct;
- Verify that safety requirements are complete and correct, and will achieve the safety objectives.

[... TBD The FABEC PSSA method for safety case option 3 has to be defined ...]

3.5 SSA phase

For safety case option 1 and option 2, the selected SSA method (option 1) or the own SSA method has to be followed respectively.

If safety evidence and safety assurance already exist for the change, then the safety evidence and safety assurance needs to be assessed:

- Verify whether change related assumptions behind the safety evidence and safety assurance are applicable;
- Verify whether evidence is complete, correct and consistent;
- Verify if all safety requirements and safety objectives have been achieved.

- Verify that the residual risk is acceptable for Operations, or whether further safety assurance and monitoring is required.

[... TBD The FABEC SSA method for safety case option 3 has to be defined ...]

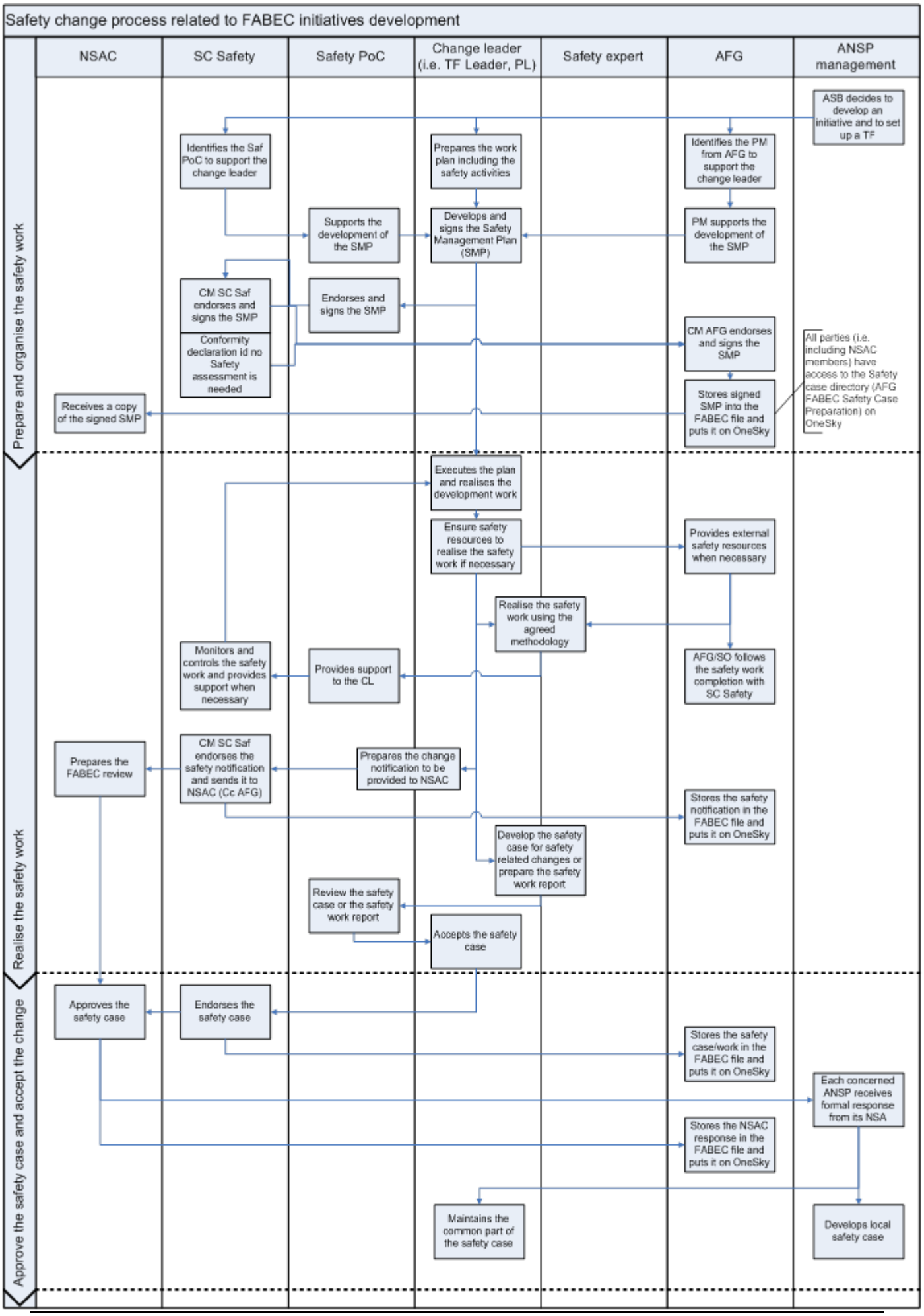
3.6 Functions, tasks and timelines

The following figure describes the logic to develop a FABEC Safety Case and the respective roles and responsibilities.

The drawing explains how the change is coordinated regarding:

- The preparation and the organisation of the safety work
- The realisation of the safety work
- The approval of the safety case and the acceptance of the change

It is clear that not all changes will lead to these three steps and will lead to the acceptance of the change by the NSAs.


Safety change process related to FABEC initiatives development
NSAC
SC Safety
Safety PoC
Change leader (i.e. TF Leader, PL)
Safety expert
AFG
ANSP management
Prepare and organise the safety work
Realise the safety work
Approve the safety case and accept the change
ASB decides to develop an initiative and to set up a TF
Identifies the Saf PoC to support the change leader
Prepares the work plan including the safety activities
Identifies the PM from AFG to support the change leader
Supports the development of the SMP
Develops and signs the Safety Management Plan (SMP)
PM supports the development of the SMP
CM SC Saf endorses and signs the SMP
Endorses and signs the SMP
Conformity declaration id no Safety assessment is needed
CM AFG endorses and signs the SMP
All parties (i.e. including NSAC members) have access to the Safety case directory (AFG FABEC Safety Case Preparation) on OneSky
Stores signed SMP into the FABEC file and puts it on OneSky
Receives a copy of the signed SMP
Executes the plan and realises the development work
Ensure safety resources to realise the safety work if necessary
Provides external safety resources when necessary
Realise the safety work using the agreed methodology
Monitors and controls the safety work and provides support when necessary
Provides support to the CL
AFG/SO follows the safety work completion with SC Safety
Prepares the FABEC review
CM SC Saf endorses the safety notification and sends it to NSAC (Cc AFG)
Prepares the change notification to be provided to NSAC
Stores the safety notification in the FABEC file and puts it on OneSky
Develop the safety case for safety related changes or prepare the safety work report
Review the safety case or the safety work report
Accepts the safety case
Approves the safety case
Endorses the safety case
Stores the safety case/work in the FABEC file and puts it on OneSky
Each concerned ANSP receives formal response from its NSA
Stores the NSAC response in the FABEC file and puts it on OneSky
Maintains the common part of the safety case
Develops local safety case

4 FABEC SAFETY CASES

This section describes the three options for the structuring of FABEC Safety Cases. For each FABEC change that is subject to a safety assessment, one of the options can be selected.

The safety case options prescribe the methods to be used within the four safety assessment phases.

Note that for all three options, the safety case structure consists of a common part and of local parts. The common part is applicable for every participating ANSP, and can, for example, consist of common hazards, common safety objectives, and common safety requirements. The local parts ensure that local characteristics relevant for safety are considered in addition to the common part of the safety case, such as local specific issues and local safety requirements associated with installation and transition, training, maintenance et cetera. This is the same for all three options.

4.1 Safety case option 1: One selected existing method

Key for safety case option 1 is that all ANSPs that are planning to implement the change use the same method for safety risk assessment and mitigation. The selected method is one of the existing methods of the affected ANSPs (most likely the method of the ANSP that is leading the change).

In *Figure 2*, safety case option 1 is illustrated.

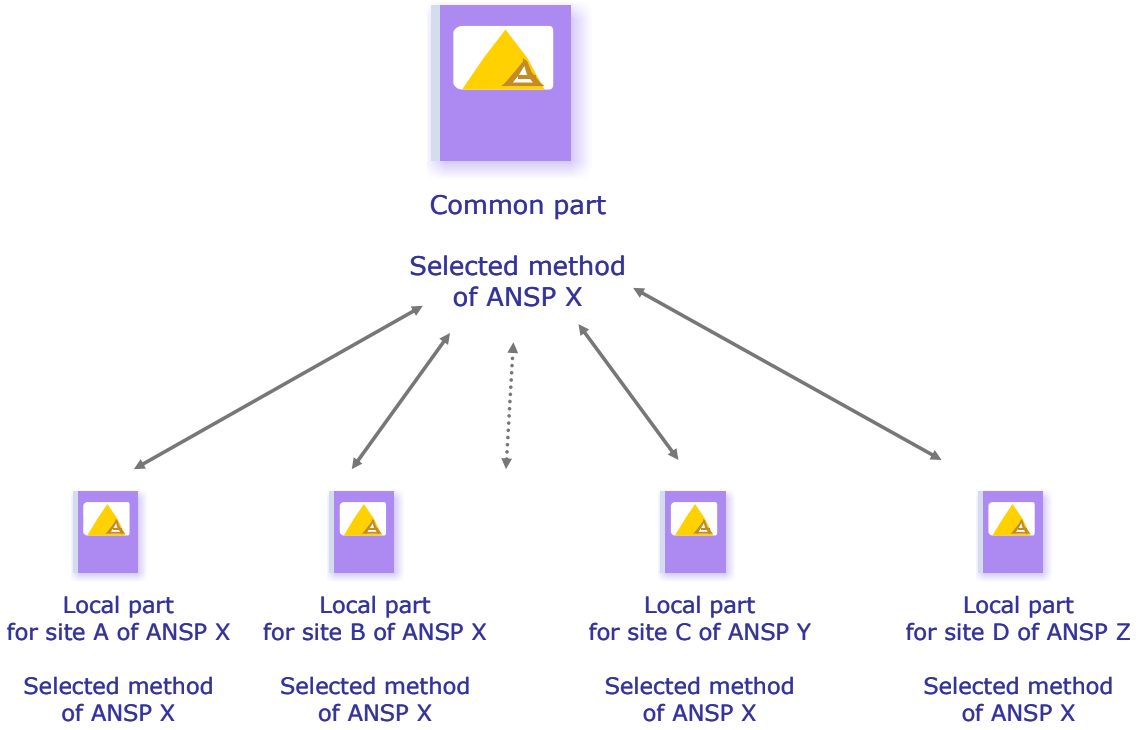


***Figure 2** Illustration of the working of safety case option 1: Three FABEC ANSPs that are planning to introduce the change use the same selected method from one of the FABEC ANSPs.*

In addition to direct applicability, a main foreseen advantage of this option is that FABEC ANSPs get familiar with, and learn from other existing methods that are used by colleague FABEC ANSPs.

4.2 Safety case option 2: Mix of joint method and individual existing methods

Key for option 2 is that, to a large extent, ANSPs stay with their own existing methods. The only exception is the usage of a joint method for the common part. At this moment, this can for example be the way how hazards are identified. For all other steps, the FABEC ANSPs stay with their own existing methods for safety risk assessment and mitigation. This option is illustrated in *Figure 3*.

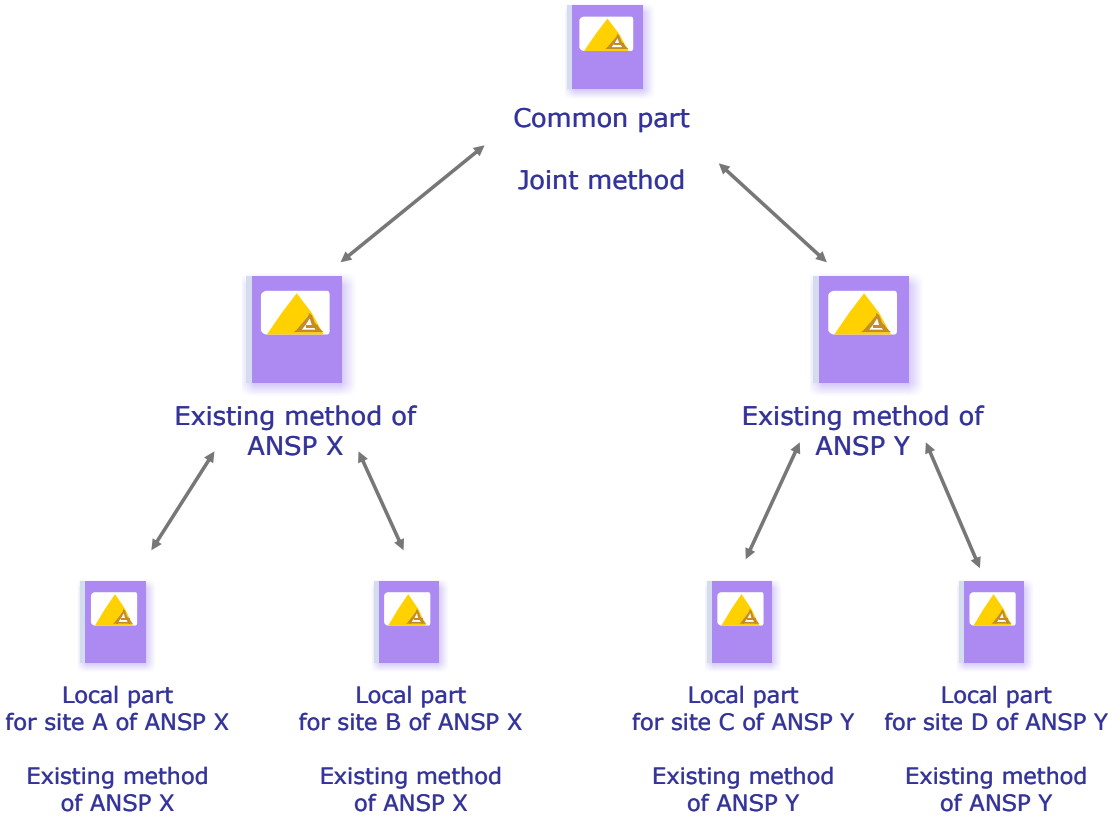


Figure 3 *Illustration of the working of safety case option 2: Two FABEC ANSPs that are planning to introduce the change use their own method in addition to a common part for which a joint method is used.*

In addition to direct applicability, main foreseen advantages of this option are that FABEC ANSPs stay close to internal (decision making) processes and NSA familiarity.

4.3 Safety case option 3: One FABEC method for all

Key for option 3 is that all FABEC ANSPs use a joint FABEC wide method for safety risk assessment and mitigation. This will apply to the common and local parts.

Figure 4 *Illustration of the working of safety case option 3: One joint FABEC method used by all FABEC ANSPs.*

This option is planned to become the solution for FABEC in the future. Currently it cannot be applied as the joint method needs to be developed.

4.4 Selection of safety option per FABEC change

For every FABEC change that needs a safety case, one of the three safety case options has to be selected. Currently, only option 1 or option 2 can be selected.

Below, a matrix is presented that is designed to enable a particular option to be selected per task force. This matrix contains objective indicators that have to be scored for the different safety case options. The main rationale is that the options are scored on efficiency regarding the process and effectiveness regarding the result.

[… TBD matrix to score the options, both the indicators and the scoring mechanism …]

	Option 1	**Option 2**	**Option 3**
Indicator 1 **(e.g. effort)**			
Indicator 2 **(e.g. coordination)**			
Indicator 3 **(e.g. acceptance)**			
Indicator 4 **(e.g. consistency)**			

5 FABEC SAFETY CRITERIA

This section describes for all three safety case options the safety criteria approach to be used.

5.1 Safety criteria for safety case option 1 and option 2

If safety case option 1 is selected for the change, then the existing safety criteria that are part of the selected method have to be used. It might be necessary to adjust these safety criteria when the method is applied to other FABEC ANSPs ("fit for purpose"). This has to be done in consultation with the SCS PoC.

If safety case option 2 is selected for the change, then the existing safety criteria of the own method have to be used, except for the common part.

5.2 Safety criteria for safety case option 3

[… TBD …]

At this moment, there is no process available for the derivation of safety criteria for FABEC.

The SCS has identified two candidate approaches to fill in this missing link. These two approaches are sketched below. It is stressed that these approaches are for illustrations purposes only. They need further research and discussion with SCS and, as such, should not be considered as guidance material at this moment.

Approach 1: Risk Classification Scheme

The starting point of approach 1 is a Risk Classification Scheme at a European level (for example from EUROCAE in case ED 125 is considered). This RCS breaks down to a FABEC RCS via a regulatory level. At these two stages, so called ambition factors can be applied. A FABEC RCS can then be used to define FABEC 'Pe RCS' or FABEC 'SOCS' that can both be applied within the safety assessment of the change. This process is illustrated in Figure 5.

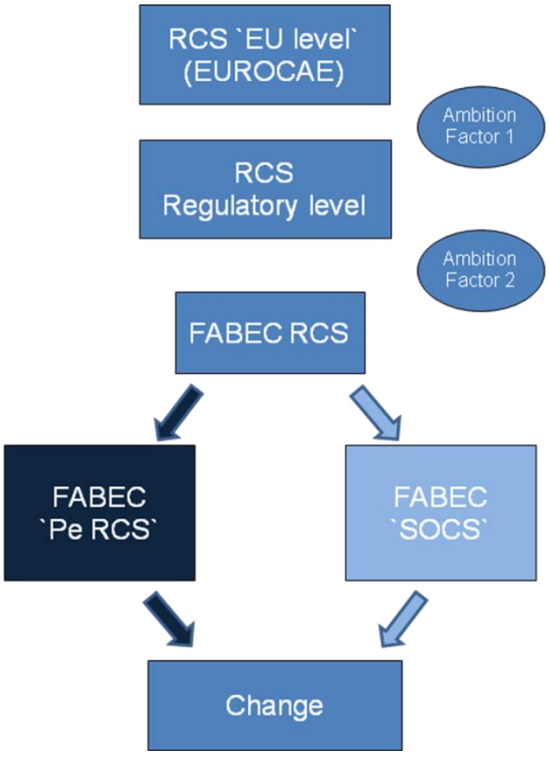


Figure 5 Illustration of safety criteria approach 1 (Risk Classification Scheme)

Within this process the apportionment of the risk will be done based on the following assumptions:

- The number of hazards for airport, approach, area control, en route, …;

- The underlying statistics (e.g., accident and flight hour statistics);
- Relationship between severity levels;
- Apportionment (or not).

Approach 2: Overall FABEC safety objective

The starting point of approach 2 is the FABEC safety objective as presented in Ref. [ASB 1 – preparation]. An ATM strategy for FABEC (that needs then to be developed) specifies more concretely how it is planned to meet this overall safety objective, e.g., via safety benefits in ATFCM, ASM, ATS, et cetera. Based on these safety targets, a safety target for the specific change is derived. The underlying safety assessment process collects the safety evidence that the safety target is met. This approach is illustrated in Figure 6.

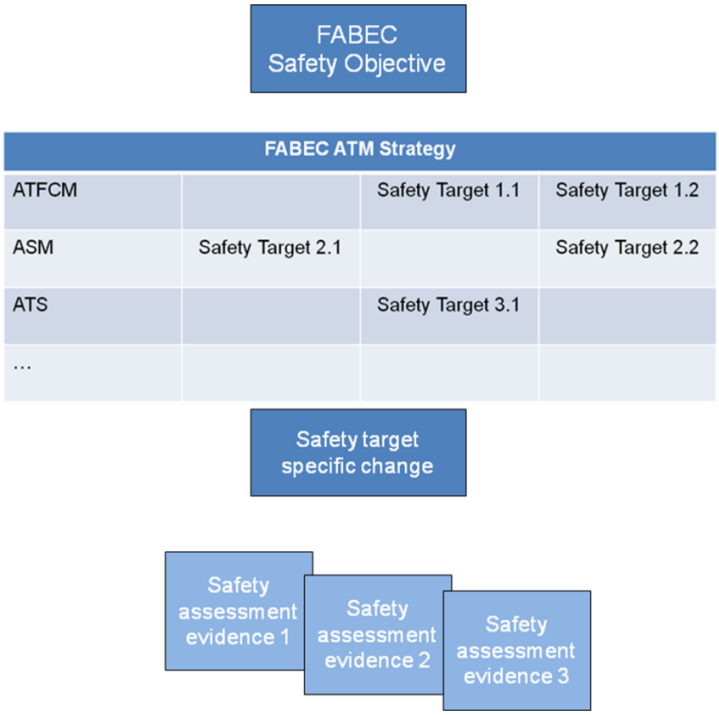


Figure 6 Illustration of safety criteria approach 2 (Overall FABEC Safety Objective)

This approach brings along the following questions and issues:

- The need for a FABEC ATM strategy;
- The allocation of safety targets on the different elements on the FABEC ATM strategy, and who will decide on these?
- How to deal with common causes, interrelationships and dependency between the different elements on the FABEC ATM Strategy like ATFCM, ASM, ATS, et cetera?
- How does this FABEC ATM strategy meet the existing individual ATM strategies?

References

Ref.	Full description
[EC 1035/2011]	Commission Implementing Regulation (EC) No 1035/2011 of 17 October 2011 laying down common requirements for the provision of air navigation services
[EC 1034/2011]	Commission Implementing Regulation (EC) No 1034/2011 of 17 October 2011 on safety oversight in air traffic management and air navigation services
[Comparison FABEC Safety Methods]	J.J. Scholte, B.A. van Doorn, C. Montijn, "Analysis of safety assessment methodologies and criteria", FABEC-SAF-WP7.2-extra-v1.0, October 2008
[Notes SCS KoM]	Conclusions from 1st FABEC Standing Committee Safety, Powerpoint sheets, 13 February 2008
[Minutes SCS Workshop]	C. Berthelé, FABEC Safety Assessment Process, Meeting Minutes, 17-19 March 2009.
[ASB 1 – preparation]	Safety meeting Safety Champion and SCS chair, Zürich, 28 January 2009
[Change Notification Process]	To Be Completed

A To do list

Item	Section	Description
1.	-	Document configuration process: review and approval
2.	3	Coupling between lifecycle phases and safety assessment process
3.	3.2	A FABEC FHA
4.	3.3	A FABEC PSSA
5.	3.4	A FABEC SSA
~~6.~~	~~3.5 and 3.6~~	~~Review sections 3.5 and 3.6~~
7.	4.4	Selection method for safety case options
8.	5.2	Safety criteria for safety case option 3
9.	-	Define interrelationships with stakeholders outside FABEC (other ANSPs, other FABs, airlines, military, …)
10.	Appendix C	Complete definitions

B Acronyms

Acronym	Full description
ADS-B	Automatic Dependent Surveillance – Broadcast
AFG	ANSP FABEC Group
ANSP	Air Navigation Service Provider
ASB	ANSP Strategy Board
ASM	Airspace Management
ATFCM	Air Traffic Flow and Capacity Management
ATM	Air Traffic Management
ATS	Air Traffic Services
CL	Change Leader
CST	Common Supervisory Team
EC	European Commission
FABEC	Functional Airspace Block Europe Central
FHA	Functional Hazard Assessment
ICAO	International Civil Aviation Organisation
JAR	Joint Aviation Regulation
NSA	National Supervisory Authority
PoC	Point of Contact
PSSA	Preliminary System Safety Assessment
RCS	Risk Classification Scheme
RNAV	Area Navigation
SMS	Safety Management System
SOCS	Safety Objectives Classification Scheme
SRAM	Safety Risk Assessment and Mitigation
SSA	System Safety Assessment
SCS	Standing Committee Safety
TBD	To Be Done
TFL	Task Force Leader

C Definitions

Terminology	Definition
Safety case	The safety case provides a constructed and logical argument as to why the system/change is acceptably safe, and refers to/contains the appropriate evidence
Safety assessment	In summary, safety assessment is the process of providing and gathering safety evidence and generating the safety case
Safety acceptance criteria	Safety acceptance criteria distinct assessed safety risks into acceptability classes
FABEC Safety Related Change	Any change which is subject to a safety assessment, and impacts more than one of the ANSP partners. (Any change which affects only one of the FABEC partners shall be notified through the existing NSA change notification mechanisms of that ANSP).
[…To be completed…]	

D Safety Management Plan Summary

This appendix presents the Safety Management Plan summary template.

Core part of SMP This will be part of the notification of the change to the NSA committee	
FABEC Project Entity **Name, ID**	The name of the Task Force (TF), Working Group (WG), sub-Working Group (sWG) or Early Implementation Package (EIP) Name, change_ID
Change Description	Describe in short the anticipated change that is within the scope.
Scope of the change	Includes: • Describe the scope, e.g. airspace boundaries, technical system limits, operational concept(s) associated with the change Excludes: • Describe what explicitly will NOT be covered by the change.
Safety organisation, roles & responsibilities	Project Manager: Task Force Leader: WG/sWG/EIP Leader: Overview of points of contact per stakeholder for the change: • DFS: • LVNL: • DSNA: • MUAC: • Skyguide: • Belgocontrol: • ANA Luxemburg: • RNLAF: • BE DEF: • FAF: • Point(s) of Contact Standing Committee Safety (SCS PoC): TF Leader is responsible for the development of Safety Case (including definition of necessary resources) and can consult the SCS PoC for this. This is described in detail in section 3.5 of the FABEC SRAP handbook. If the necessary resources are not available, then the TF Leader will raise the issue to the Project Manager for resolution with the SCS. A description of the entities which perform the safety activities, including: • types of responsibilities - co-ordinate, perform, review, sign-off, etc

	• applicability of responsibility types to each safety activity • organization, department, job title, and individual name of person/body with each responsibility • organization charts to show levels of organization, reporting line, and interrelationships Within this description, the following aspects of project safety organization, inter alia, shall be addressed: • the name of the Safety Assessment Expert, his/her activities, responsibilities, and degree of project involvement • the responsibilities for detecting, recording, and resolving unexpected safety issues arising during the project • the responsibilities for maintenance of the Safety Management Plan and Hazard Log • the responsibilities for ANSPs' handovers of the Safety Case The responsibility for accepting the change, including the interface with the safety management authority and the safety regulatory authority
Stakeholders	Involved ANSP stakeholders: Other affected stakeholders:
Milestones	Deadlines related to implementation
Option and methodology selected to build the Safety Case	Give the option chosen for the assessment of the change, based on the three options available in the Safety Risk Assessment and Mitigation document. The rationale for the choice has to be briefly described as well as the ANSP safety assessment methodology which will be applied to assess the change. Provide the formal reference of the Safety Management System used.
Signatures	Head AFG Chair SCS TF leader SCS PoC

Appendix of SMP This will **not** be part of the notification of the change to the NSA committee	
Safety significance result	Describe here the safety significance of the change. Possible answers are: safety significant, not safety significant, safety significance not known yet
Interface with other TF and/or WG or sWG, EIP, Panel, SC,	Describe management interfaces with other organizational entities or changes, if applicable.
Safety Case Deliverables	Describe what will be delivered as a result of the safety management activities. E.g. • **a coordinated safety case at FABEC level**, providing the arguments and the evidence that the change will reach the safety target or meet the safety criteria. • Additional **specific safety cases for each individual ANSP** that implements the change. • Summary of **safety assessment results related to interactions** between stakeholders • Overview of joint **Safety Case activities** • Summary of **individual Safety Case results** • **Safety assessment reports** per stakeholder Documentation for deliverables is in line with SMS's of individual FABEC stakeholders A diagram / overview will help in displaying the relationships between the documents.
Assumptions	Define assumptions used during the development of the SMP. Precisely word the assumptions as they need to be validated during the execution of the project.
Safety activities: joint and individual activities	A description of the time ordering of the safety activities and their scheduling, dependencies and constraints, including: • estimated allocation/loading of personnel identified to safety activities • scheduling and allocation of facilities, services, information, tools, and other supplies to support the safety activities • the location of the safety activities The resources required to do safety work should make a distinction on the skills which are required: • project management expert • safety management system expert • safety assessment expert • domain experts (for example OPS expert, TECH expert) A clear indication will be given of which are 'joint' activities (e.g. at FABEC level) and which are 'individual' activities (e.g. per ANSP). Describe the activities that will be undertaken to produce the deliverables. An example could be: Joint activities:

	• Kick off session: agreement on approach, scheduling of joint sessions and harmonisation of time planning. • Joint session(s) to share identified hazards and potential safety issues focusing on interactions between stakeholders. • Joint session(s) to share of (intermediate) safety assessment results. • One joint notification of the change to NSAc (instead of individual notifications) • One joint review and approval process for the change by NSAc (instead of individual reviews and approvals) Individual activities: • Safety activities in line with SMS's of individual FABEC stakeholders
Relevant info for resources and time planning	Give the estimates for the resources that will be used for the safety management activities of the change. These are essential for determining whether enough safety resources can be made available. As an example the following table will illustrate this:

	May	June	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb	March
Planning of **JOINT** safety case activities and resources (mandays)											
KOM	SMS: 2 SA: 2										
(Prepare) Notify NSA			SMS: 1								
Sharing hazards		SA: 4 DOM: 4									
Sharing interm results				SA: 4 DOM: 4							
Coord Safety Case						SMS: 1 SA: 5					
Review & Approval NSA											
Ad hoc coord and sharing		SMS: 2 SA: 4 DOM: 4									
Planning of **INDIVIDUAL** safety case activities and resources (mandays) LVNL resources estimated below											
Safety View and planning	SMS: 2 SA: 2 DOM: 2										
FHA phase		SA: 10 DOM: 5									
PSSA phase			SA: 20 DOM: 5								
SSA phase								SA: 10 DOM: 10			

	SMS: safety management system expert (methodology and system expert) SA: safety assessment expert DOM: domain expert (for example OPS expert, TECH expert)

Page intentionally left blank

FABEC Implementation Phase

FABEC Initial Safety Impact Assessment (ISIA)

EC Information

Attachment L.6

Co-financed by the European Union
Trans-European Transport Network (TEN-T)

DOCUMENT SUMMARY

Objective : To guide the definition of the safety assessment process by means of an initial safety impact assessment	
Origin : *Standing Committee on Safety, WG ISIA*	**Audience** : AFG, FABEC Programme and project leaders, change leaders, safety practitioners

Title : Initial Safety Impact Assessment
Reference : FABEC_SCS_ISIA_v1.1

Version : 1.1	**Date** : *22/02/2012*	**Status** : ☐ Draft ☑ Released	**Classification** : ☐ Public ☑ FABEC limited ☐ Addressees limited

DOCUMENT CHANGE RECORD

Version	Date	Reason for changes	Author of changes
0.1	01/03/2011	Document creation	FABEC ANSPs: R. Jansen,S. Ariën, K. Cartmale, F. Kern, M. Vettovaglia, C. Berthelé FABEC NSA TF: F. Demeyere, L. Chapeau
1.0	24/03/2011	Review comments	FABEC ANSPs: R. Jansen, S. Ariën, K. Cartmale, F. Kern, M. Vettovaglia, C. Berthelé FABEC NSA TF: F. Demeyere, L. Chapeau
1.1	22/02/2012	Update references to changed numbers of EC regulations (EC 2096 to EC 1035 and EC 1315 to EC 1034)	R. Jansen

Document configuration

Author(s)			
Name	Function	Signature	Date
R. Jansen	Chairman ISIA		23-2-2012

Review	
By	Function
All ISIA members	

Document Approval			
Name	Function	Signature	Date
J. Brüggen	Chairman SC SAF		23-2-12

Point of Contact			
Name	Telephone	Organisation	Email
R. Jansen	+31 20 406 3385	LVNL	r.jansen@lvnl.nl

This document is FABEC confidential

Distribution of this document is restricted to the following organizations:

- ANA – Administration de la Navigation Aérienne
- Belgocontrol
- DFS – Deutsche Flugsicherung GmbH
- DSNA – Direction des Services de la Navigation Aérienne
- LVNL – Luchtverkeersleiding Nederland/ Air Traffic Control the Netherlands
- MUAC – Eurocontrol Maastricht Upper Area Control Centre
- Skyguide – skyguide swiss air navigation services ltd

Management summary

This document is the most recent version of the FABEC SMS reference for the process initial safety impact assessment (ISIA). Such an initial assessment is applicable to FABEC ATM functional changes and is carried out before the safety risk assessment and mitigation process starts. ISIA answers the question whether full safety assessment process has to be carried or whether a light version is sufficient for safety assessment. ISIA consists a flow diagram and criteria for its assessment.

ISIA has been developed by safety assessment method experts from FABEC ANSPs and FABEC NSAs.

This document will become part of the means of compliance for the safety regulatory requirements applicable to FABEC.

TABLE OF CONTENTS

1 INTRODUCTION

1.1 Background

All (FABEC) organisations providing air traffic services have safety assessment processes in place to assess the safety risks of planned changes to the ATM functional systems. Within these processes, some make use of an initial safety impact assessment. The purpose is to decide on the application of the safety assessment method: a “full” or a “light” safety assessment method. This decision is then used by change leaders to plan their project with respect to resources, time planning and safety assessment related deliverables. The different types of methods for such initial assessment can be found in the following references: [Belgocontrol method], [DFS method], [DSNA method], [LVNL method], [MUAC method] and [skyguide method].

Within the context of the FABEC motto: “Act as one”, the Standing Committee of Safety has initiated a working group of experts to investigate whether a harmonized FABEC method can be developed. This group is called WG ISIA and this document reflects the result of these developments.

1.2 Approach

The following approach is followed to develop ISIA:

1. Exchange and review existing initial safety impact assessment methods from FABEC ANSPs and from other industries like [Railway regulation] and [Railway guidance];
2. Agreement about necessity and feasibility for ISIA development and application;
3. Development of ISIA concept, flow diagram and criteria.

A number of workshops have been organized to follow these approach steps.

The group of experts participating in the workshops also included representatives from the NSA Task Force. The current regulatory framework requires NSAs to decide whether a safety assessment has to be reviewed or not (see [EC 1034/2011]) before the change can be implemented into operation. At this moment, the NSA representatives are investigating how results from this ISIA process can be implemented into the NSA decision making process (review or not by NSA).

1.3 Document structure

The structure of this document is as follows

Section 1 gives background and explains the ISIA approach followed behind the result presented in this document.

Section 2 presents the ISIA flow diagram and the process.

The final part of this document provides References and Acronyms used.

2 ISIA PROCESS

The ISIA process is presented in the figure below.

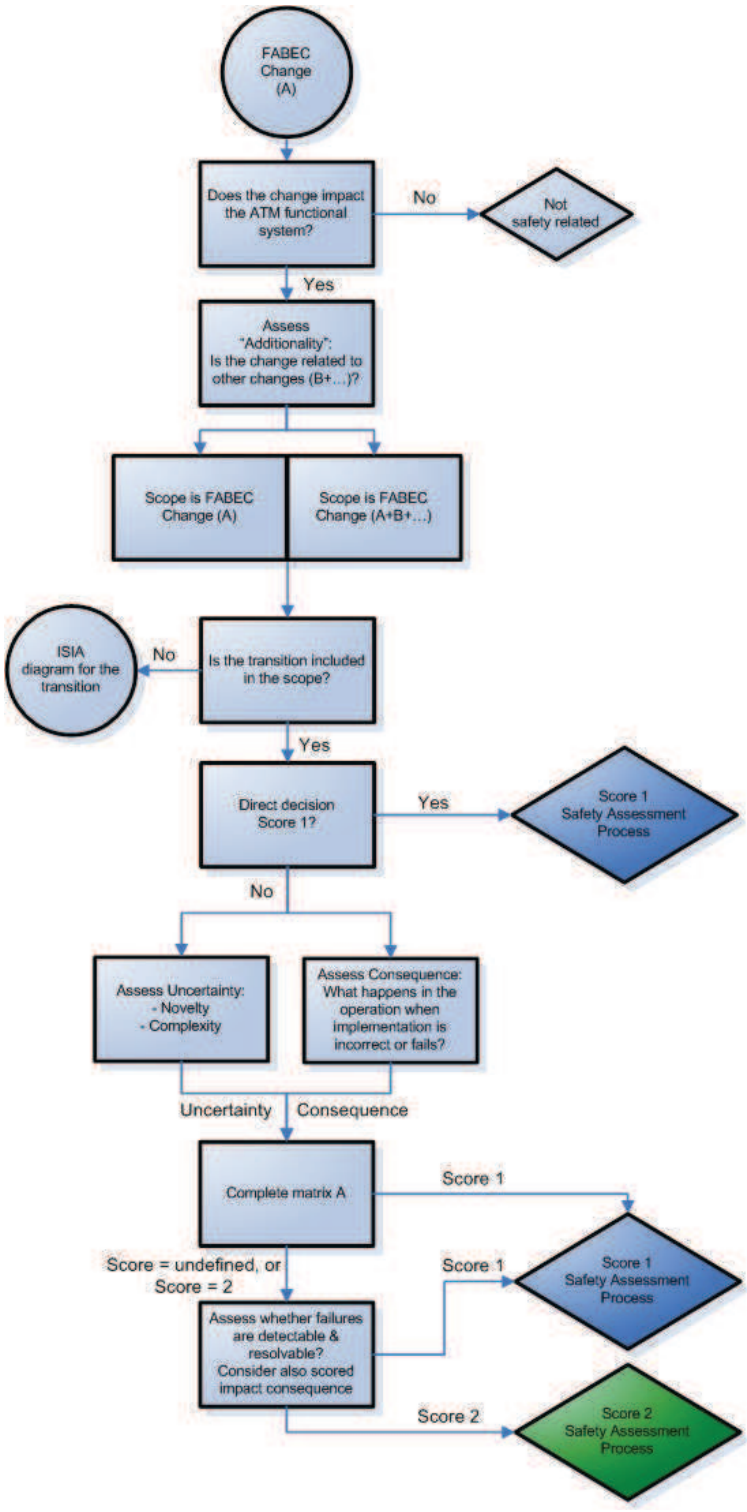


Figure 1 ISIA process in a flow diagram

The ISIA process is initiated by a FABEC change (top) and results in a Score: Score 1 or Score 2 (bottom part). The Score 1 represents a full safety assessment method and Score 2 a light version of a safety assessment method.

Hereunder, all steps in between are explained in more detail.

Does the change impact the ATM functional system? (safety related yes or no)

In the first step, it is assessed whether the change does impact on the ATM functional system. In [EC 1035/2011], functional system is defined as

'functional system' shall mean a combination of systems, procedures and human resources organised to perform a function within the context of ATM.

When a change adds new functions, removes functions, or changes the way functions are performed, then the change is safety related. Moreover, if the environment in which the functional system operates changes, then the functional system can be influenced. Such situations can also be safety related.

If the change does not impact the functional system (e.g. a piece of hardware is replaced) or when it is part of the daily operation (like a switch in the way the runways are used), then it is called not safety related. The flow diagrams stops here.

Assess Additionality

This step assesses whether the change under consideration is treated as an individual change or not. Within the railway safety regulatory framework, see [Railway guidance], additionality is formulated as follows:

"additionality: assessment of the significance of the change taking into account all recent safety-related modifications to the system under assessment and which were not judged as significant."

Additionality aims to ensure that a series of changes which, although individually not significant, are examined as a whole for the purpose of deciding whether or not to apply a full safety assessment.

Example: When a change 'A' is proposed, other recent changes (B, C, …) should be considered and, if necessary, included within the scope of the change subject to the test of significance (that is, if necessary, the change whose significance is to be decided is A + B + C …).

The output of the additionality assessment is the **scope** of the change.

Is the transition included in the scope?

In general, a transition phase represents the phase between the old system and the changed system. For some changes it can be necessary to treat the transition phase as a change in itself as safety risks of such transition phase can have specific and/ or different characteristics from the safety risks of the changed system. If this is the case, a separate safety assessment for the transition phase needs to be developed, and consequently, ISIA is also applicable to the transition phase.

There are different types of transition phases, like:

- the transition between the situation before the change and after the change consists of a period that a back up mode of operation is necessary to upload and implement the change. This is illustrated in figure 2;

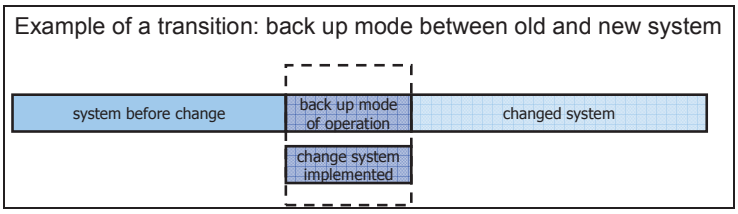


Figure 2 The transition phase includes a back up mode between the system before and after the change

- the elements of the changed system are implemented gradually. In such situation, the old system and the changed system run in parallel. The implementation of each element can then be seen as a change in itself. This is illustrated in figure 3.

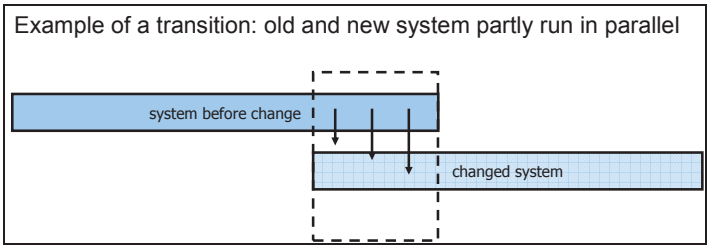


Figure 3 The transition phase exists of piecewise implementation of the changed system

The output of this step is the determination whether the transition phase is included in the scope or whether the transition is treated as a separate change, and as such will also be assessed following the ISIA flow diagram.

Direct decision score 1?

For various reasons, it can be obvious that the change needs a full safety assessment. It is then not necessary to proceed with the flow diagram.

Example score 1 changes are the implementation of a new Voice Communication System, reorganization of airspace and routes when multiple (civil and military) ANSPs are affected and involved, and the implementation of a new radar tracking system.

The flow diagrams stops here.

Assess Uncertainty

The behaviour of the changed system always contains uncertainties. Novelty and complexity can be thought of as measures of the 'uncertainty of outcome' the likelihood that the proposed change, once implemented, will or will not behave as predicted. Clearly, the more novel and the more complex a change is, the higher the likelihood that it may behave in an unpredicted, and possibly undesirable, way.

The output of the uncertainty assessment could be a score between, for example, 1 and 5. A scoring range including definitions of the scores has not yet been developed.

Assess Consequence: What happens in the operation when implementation is incorrect or fails?

The consequence assessment seeks answers to the question "what happens in the operation when the changed system fails or functions incorrectly?". This is a high level assessment to get initial insight in the consequences of failures and expert judgement from operational experts is considered useful and practicable for this step.

The output of the consequence assessment could be a score between, for example, 1 and 5. A scoring range including definitions of the scores has not yet been developed.

Complete matrix A

Risk is a function of likelihood and consequence. Similarly, the potential scale of a change with respect to safety can be thought of as a function of 'uncertainty of outcome' and 'consequence of failure'. In this process, the 'uncertainty of outcome' is judged by reference to novelty and complexity.

The matrix below gives an illustration how the relationship between 'uncertainty of outcome' and 'consequence of failure' can be defined. This looks similar to the well known risk matrices.

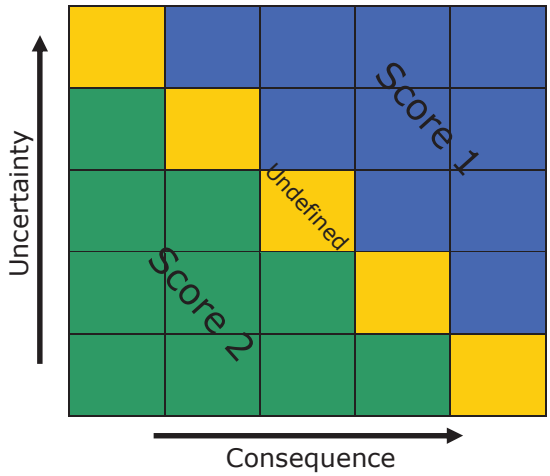


Figure 4 Matrix A

The score for 'uncertainty of outcome' is placed on the vertical axis and the score for 'consequence of outcome' on the horizontal axis. The result is this step is a score:

- Score = 1 (blue area in the matrix) implies a large potential scale of a change with respect to safety;
- Score = 2 (green area in the matrix) implies a small potential scale of a change with respect to safety;
- Score is undefined implies a potential scale of a change with respect to safety that is in between large and small.

If the score = 1, then the change needs a full safety assessment. The flow diagrams stops here.

If the score = 2 or undefined, the next step has to be carried out.

Assess whether failures are detectable & resolvable?

This step assesses whether failures due to the changed system are detectable and resolvable. To a certain extent, it details the Consequence score that has been determined earlier in the flow diagram. The detectability and resolvability includes for example the possibility to return to the original system (as it was before the change) as a recovery means in case the changed system fails. This is called 'reversibility'.

This steps results into a definite score: score = 1, or score = 2.

Score = 2 can only be reached at this stage and the process results are to be used in the argumentation or rationale behind choosing a light safety assessment approach.

References

Ref.	Full description
[EC 1035/2011]	Commission Implementing Regulation (EC) No 1035/2011 of 17 October 2011 laying down common requirements for the provision of air navigation services
[EC 1034/2011]	Commission Implementing Regulation (EC) No 1034/2011 of 17 October 2011 on safety oversight in air traffic management and air navigation services
[DSNA method]	EPIS, Preliminary safety impact assessment and risk mitigation, EPIS-CA V4
[skyguide method]	Initial Safety Analysis of ATM system changes, skyguide internal version
[DFS method]	Safety assessment handbook, Version 2.02, DFS, November 9th, 2005
[Belgocontrol method]	Safety assessment manual for safety practitioner, A.06, March 7th, 2007
[MUAC method]	ABC Procedure, Maastricht UAC Safety Management System, version 02, released issue, June 27th, 2008
[LVNL method]	Determination minor or major change to the ATM system, version 1.1, December 14th, 2010
[Railway regulation]	Commission Regulation (EC) No 352/2009 on the adoption of a common safety method on risk evaluation and assessment, April 24th, 2009
[Railway guidance]	Office of Rail Regulation (ORR) guidance on the application of the common safety method (CSM) on risk assessment and evaluation, September, 2010

A Acronyms

Acronym	Full description
AFG	ANSP FABEC Group
ANA	Administration de la Navigation Aérienne
ANSP	Air Navigation Service Provider
DFS	Deutsche Flugsicherung GmbH
DSNA	Direction des Services de la Navigation Aérienne
EC	European Commission
FABEC	Functional Airspace Block Europe Central
ISIA	Initial Safety Impact Assessment
LVNL	Luchtverkeersleiding Nederland/ Air Traffic Control the Netherlands
MUAC	Eurocontrol Maastricht Upper Area Control Centre
NSA	National Supervisory Authority
SCS	Standing Committee on Safety
SMS	Safety Management System
TF	Task Force
WG	Working Group

Page intentionally left blank

FABEC Implementation Phase

Status of Safety Assessments FABEC Changes

EC Information

Attachment L.7

Co-financed by the European Union
Trans-European Transport Network (TEN-T)

DOCUMENT SUMMARY

Objective : *This document describes the process used to manage the safety work of the FABEC initiatives. It also gives the status of the work so far considering that some of the initiatives are not yet implemented, for others, the safety work has been realised at FABEC and at local levels. Finally, others were considered as study and did not lead to an implementation.*	
Origin : *AFG/SO*	**Audience** : *FABEC*

Title : *Status of Safety Assessments FABEC changes*
Reference : *FABEC_AFG_Status_Safety_Assessement_FABEC_Changes_Version0 1*

Version : 1.0	**Date** : *21.03.2012*	**Status** : ☐Draft ☑ Released	**Classification** : ☐ Public ☑ FABEC limited ☐ Addressees limited

DOCUMENT CHANGE RECORD

Version	Date	Reason for changes	Author of changes
0.1	9.03.2012	Initial draft	Mathieu Pleyers
1.0	21.03.2012	Approved version CM SC Safety	Mathieu Pleyers

1 INTRODUCTION

Regulation (EU) No 176/2011 Annex Part II Art 1 (e) indicates that “statements that safety assessment – including hazard identification, risk assessment and mitigation – has been conducted before introducing operational changes resulting from the establishment of FABEC”.

This document fulfils the objective to:

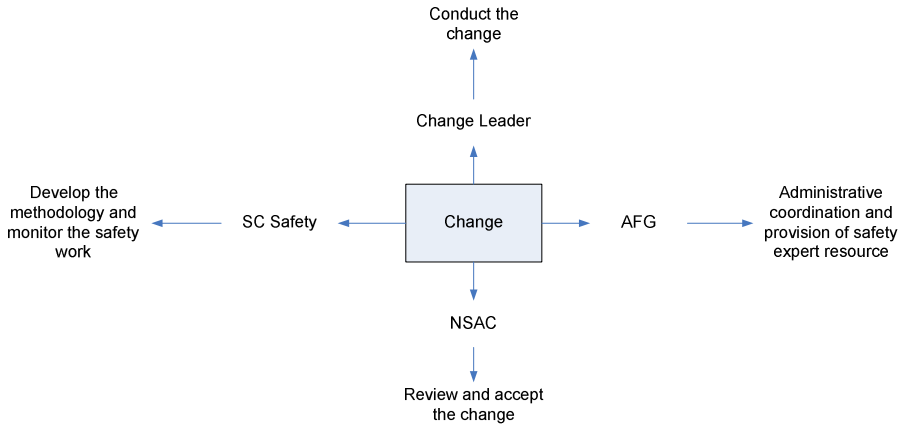
- explain the process used to manage the safety assessment of the safety related FABEC changes,
- give a status of the safety work

The complexity of a program like FABEC is that each of the ANSPs involved in the program has its own certified methodology. Therefore, none of the methodology supersedes the others.

Four key different actors have been identified considering a safety related change:

- The project leader: he is in charge to conduct the change and is responsible of the safety work,
- The Standing Committee Safety: it provides the methodology to conduct the change and monitors the safety work,
- The NSA Committee: it has to review the change and to accept that it is put into operation,
- The AFG: it ensures the coordination of the safety work between the three other actors by making sure that all of them have the information and provide the safety expert resource when necessary.

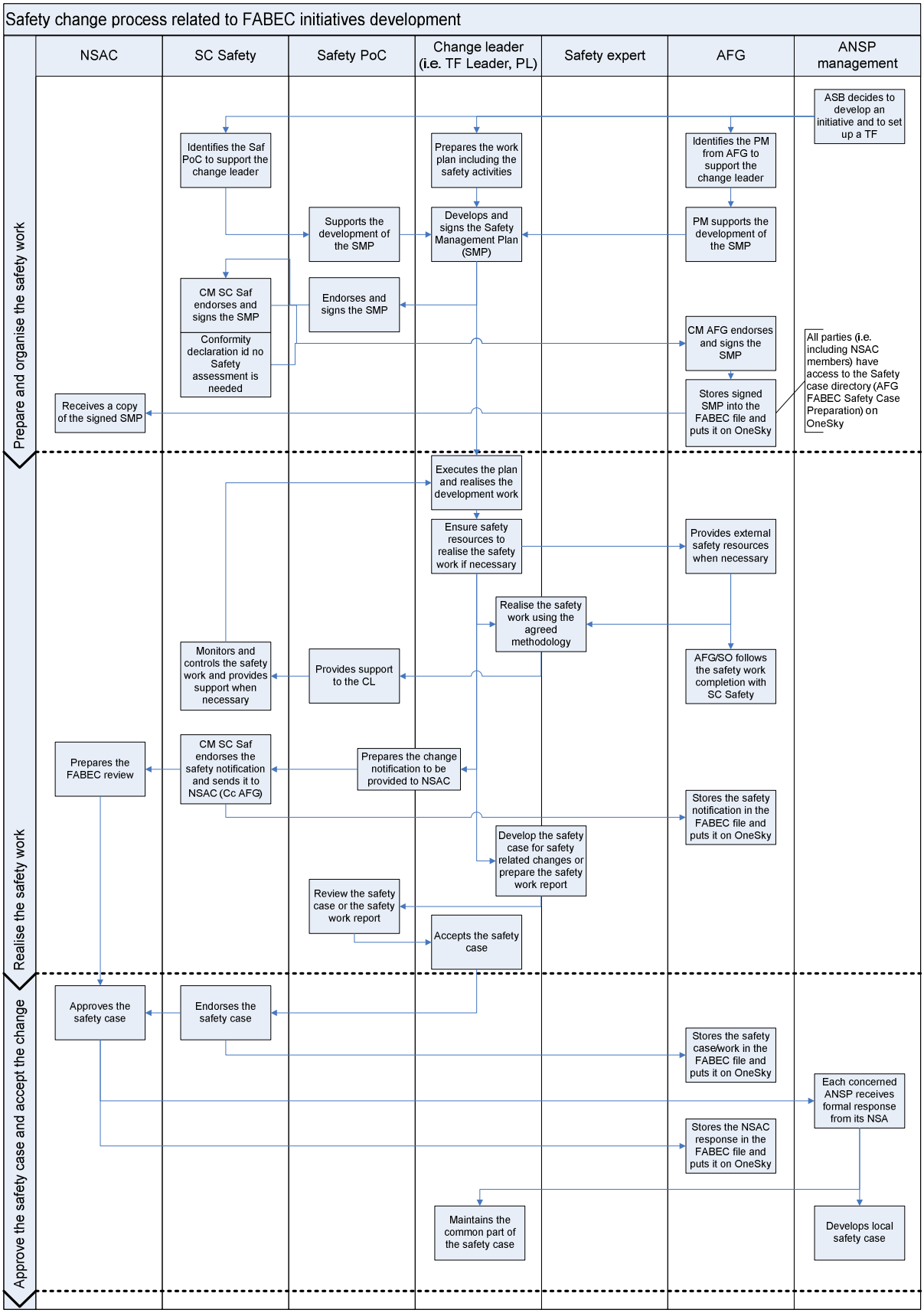
The actors and their role are summarized as follows:



2 PROCESS TO MANAGE THE SAFETY ASSESSMENT

In order to manage the safety assessment, specific processes have been developed. One is related to the coordination between the different actors. A second one describes the methodology to be used to proceed when a change needs to be assessed. A third one expresses the way NSAC is organised to review the change. The fourth process is related to the administrative support.

2.1 Coordination between the different actors



The drawing explains how the change is coordinated regarding:

- The preparation and the organisation of the safety work
- The realisation of the safety work

- The approval of the safety case and the acceptance of the change

It is clear that not all changes will lead to these three steps and will lead to the acceptance of the change by the NSAs.

2.2 Methodology to support the safety change

At the start of the implementation phase of the program, the SC Safety has developed a methodology to support the safety work. This methodology, called "Safety risk assessment and mitigation for FABEC changes", has for objective to guide the safety risk assessment and mitigation activities required to ensure FABEC wide changes are acceptably safe.

When starting an initiative, the project leader will define how he intends to realise the safety work, choosing between several options. His approach will be described in the project's Safety Management Plan (SMP). This key document to realise the safety work is reviewed and approved by the SC Safety and the AFG before being sent to the NSAC and stored in a central database.

The "Safety risk assessment and mitigation for FABEC changes" is part of the FABEC Safety Management System.

2.3 Change review by NSAC

The FABEC NSA Committee (NSAC) has developed its own methodology to review a change. The methodology has been used for several changes. The objective of such process is to ensure that the common part of the change will be assessed on the same way by all NSAs involved by the change and will lead to one single position of the NSAs provided to the concerned ANSPs.

The NSAC methodology used to review a change is part of the FABEC NSA Manual.

2.4 The administrative support

AFG is ensuring the administrative support and the coordination between the change leader, the SC Safety and the NSAC. This support is provided as such:

- Collection of the SMP,
- Review and submission to the SC Safety for approval
- Provision of a copy to the NSAC
- Management of the central database between the SC Safety and the NSAC
- Monitoring of the safety work during the project
- Provision of the safety expert resources when necessary

The administrative support is fully embedded into the coordination process between actors as described at point 2.1.

3 STATUS OF THE SAFETY WORK

The table below shows the status of the safety work realised and in progress so far in the program.

Initiative	Safety work needed ?	Notification		Safety work								NSA Com	Implementation	
		Needed ?	When will it be ready?	Option used	From	To	FHA	PSSA	SSA	External resource needed?	Work completed?	Decision	Imple. fore-seen?	Imple. date
West Project IP Phase I (a)	Y	Y	avr-11	2	1/04/2011	30/11/2011	30/06/2011	31/08/2011	30/11/2011	N	Y	Local	Y	17/11/2011
IP Phase II (a)	Y	Y	juil-11	2	1/05/2011	31/03/2012 TBC	31/07/2011 TBC	30/11/2011 TBC	31/05/2012 TBC	Y	N	Local	Y	31/12/2012
South-East Project IP SWAP	Y	Y	TBD	2	TBD	TBD	TBD	TBD	TBD	Y	N	Local	Y	31/08/2012
IP CBA 22	Y	Y	TBD	2	TBD	TBD	TBD	TBD	TBD	Y	N	Local	Y	30/06/2013
EIP Night Network	Y	Y	TBD	2	1/03/2009	31/12/2010	Local	Local	Local	N	N	Local	Y	TBD
EIP City pairs	Y	Y	TBD	2	1/03/2009	31/12/2011	Local	Local	Local	N	N	Local	Y	TBD
HSAD-AMRUFRA	Y	Y	Sent	2	5/09/2010	30/11/2009	Done	Done	Done	N	Y	Approved	Y	1/303/2010
ATFCM/ASM	N(*)	Y	avr-11	1	1/01/2011	1/06/2011	N/A	N/A	N/A	N	N	Study	N	N/A
CDS	Y	N	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Study	N	N/A
VCS	Y	N	N/A	1	1/06/2009	31/12/2009	N/A	N/A	N/A	N	N	Study	N	N/A
OLDI	N	N	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Study	N	N/A
CATS	N(*)	N	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Study	N	N/A
AGDL Services	N	N	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Study	N	N/A
SUR Optimization	N	N	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Study	N	N/A
FINE	Y	Y	TBD	2	1/01/2012	31/12/2012	31/03/2012	30/06/2012	31/12/2012	TBD	N	Local	Y	31/12/2018
Training	N	N	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Release date: 9/03/2012

Color code :

Green: work completed

Yellow: work in progress

Red: work planned to be started but not started