Nationaal Lucht- en Ruimtevaartlaboratorium
National Aerospace Laboratory NLR

NLR-CR-2006-536

Post implementation audit of aviation safety management in Switzerland

On the way from the myth of perfection towards excellence

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Executive summary

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Problem area
In 2002, the Head of DETEC commissioned the National Aerospace Laboratory NLR to conduct an extensive evaluation of the safety of air transport in Switzerland.
The final report, published in 2003 under the title “Aviation safety management in Switzerland, recovering from the myth of perfection” provided an in-depth assessment of aviation safety management in Switzerland.
Based on the findings, a substantial number of recommendations were given.
In order to receive outside feedback on the status and quality of the implemented recommendations, three years after publication, the Head of DETEC commissioned NLR to conduct a “Post Implementation Audit”.

Description of work
All parties involved in the original NLR study have been revisited. The information gathered during the assessment is used to draw conclusions concerning the present status of aviation safety management in Switzerland. This has been done against the background of the public policy process described in the original report.

Results and conclusions
Overall it is concluded that significant improvements have been made to the way aviation safety is managed in Switzerland. Switzerland is indeed recovering from the myth of perfection. While, this does not mean that all problems are solved, and while it is too soon to demonstrate the actual impact of the improvements on safety performance, the progress achieved so far is bound to have a favorable impact on safety.

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Summary

Between 1998 and 2002 Switzerland was struck by a series of severe and tragic aviation accidents. A SwissAir MD-11 crashed near Halifax, in 1998. This was followed by a fatal accident with a Crossair Saab 340 near Nassenwil in January of 2000, and a Crossair Avro 146 RJ 100 near Bassersdorf in November of 2001. Finally, on July 1, 2002, two large civil aircraft crashed near Überlingen (Germany) after a mid-air collision in airspace controlled by Skyguide. In the same timeframe, the Swiss National Bureau of Accident Investigation (AAIB) reported various cases of near accidents and the identification of shortcomings in Air Traffic Control equipment. All of this led to the general perception that structural causes for an overall adverse safety trend might be present in the Swiss air transportation system.

For this reason the Swiss Confederation, represented by the "Department of the Environment, Traffic, Energy and Communications" (DETEC), asked NLR in autumn 2002 to conduct an extensive evaluation of the safety of air transport in Switzerland. In response to this request, NLR performed an in-depth assessment of aviation safety management in Switzerland. The NLR study approached the safety level and safety trends in Switzerland as being the results of the collective safety management efforts within the Swiss aviation sector. The study comprised DETEC, the Federal Office of Civil Aviation (FOCA), the Aviation Accident Investigation Bureau (AAIB), the air navigation service provider Skyguide, selected airlines (SWISS and EasyJet) and major airports (Zurich and Geneva). The role of each of the parties involved was defined in the context of a so-called “public policy process”, providing a clear structure for the assessment.
The resulting NLR report *(NLR-CR-2003-316, Aviation Safety Management in Switzerland – recovering from the myth of perfection)* was published in July 2003.

The main finding of the report was that in Switzerland a number of essential safety management processes and associated responsibilities had been institutionalized in such a way that effective safety management was not being achieved. The study also established that the, once exemplary, safety level of Swiss civil aviation had undergone an adverse trend, requiring focused measures to reverse this trend. These measures concerned the removal of institutional barriers, and the implementation of a number of organizational changes at the level of DETEC, FOCA and the AAIB. Moreover it was found to be necessary to take a number of national and sector-wide safety initiatives to introduce and/or improve safety management processes.

The NLR report finally contained 28 recommendations, directed to the various parties involved, in order to address and resolve the problems identified. The NLR report was fully accepted by the Head of DETEC as the basis for a national aviation safety action plan to reverse the negative

safety trend and restore the Swiss exemplary reputation in the area of aviation safety. A special safety delegate was assigned to develop this plan. The national aviation safety action plan was started off energetically, shortly after the publication of the NLR report.

In 2006, three years after the initiation of the plan the Head of DETEC has asked NLR to review the progress made, and in particular to assess the status and the quality of the implementation of the NLR recommendations.

In response to this request, NLR has carried out a so-called “post implementation audit”.
It is emphasized here that this investigation is not a repetition of the original study three years later. The original study assessed all elements of the safety management processes in Switzerland, either good or bad. The present study focuses mainly on those elements that in some way showed a deficiency or needed to be strengthened. These elements are addressed by the recommendations of the original study. The present study focuses therefore on these recommendations. The particular questions addressed are:

- What is the status of the implementation?
- In case of non-implementation, what are the reasons and potential adverse consequences?
- How adequate are the measures taken and what are the possible shortcomings found?
- How do the measures fit into the entire set of actions?
- What are the life cycle expectations for a given measure?

Furthermore it is evaluated whether particular recommendations need to be corrected or amended in the light of observations made.

All parties involved in the original NLR study have been revisited in order to find answers to the questions mentioned above and to evaluate the effectiveness of the associated safety initiatives. Also a substantial amount of information has been gathered in the form of reports, memo’s, presentations, manuals, internal notes, etcetera. This information has been used as underlying evidence and substantiation of the progress and effectiveness of safety management processes and/or particular safety initiatives. The current document presents the results of this assessment and summarizes the implementation status of all recommendations.

For reasons of consistency and efficiency the report uses a similar approach as the original study. This means that it follows the structure of the public policy process, as described in the original NLR report, as a basis for the assessment.

An important observation of the present assessment is that the Swiss federal government has taken direct and concrete action to reverse the adverse safety trend in Swiss aviation.

The national aviation safety policy has been completely rewritten and now demonstrates a clear commitment to improve safety. It provides strong guidance, amongst others by explicitly stating that possible costs associated with the targeted increase in aviation safety should be accepted.
A national aviation safety action plan has been developed under the direction of DETEC to determine the safety initiatives required and to implement the NLR safety recommendations. These actions have paved the way for additional investments, specifically aimed to reach the stated safety objectives. And indeed, extensive and sector-wide investments have been made to improve safety management processes and to realize the necessary organizational changes.
The general conclusion is that in the past three years the Swiss aviation sector (including DETEC and FOCA) has put substantial efforts into the realization of the national safety action plan and that significant progress has been achieved.

The role of DETEC has been significantly strengthened by the assignment of a dedicated Civil Aviation Safety Officer. FOCA has been completely reorganized to better reflect the dual role of FOCA for safety regulation & oversight and policy making. Not everything is functioning perfectly yet, but the steps forward are considerable.
Safety awareness within the aviation sector has noticeably increased in the past three years. Safety and risk management systems are now inherent organizational parts of both sector parties and the national aviation authority. Both reporting of safety information and feedback of this information into the safety management process have notably improved. Basically, the safety management processes appear to work, although still at varying levels of quality.

The generally positive evaluation above should however not be conceived as a statement that all important problems are solved. As a matter of fact, better functioning safety management processes may even lead to exposure of additional problems that otherwise would have remained unnoticed. Within the present study this effect has also been noted. In some areas it is perceived that the number of problems have increased, while in fact this is a result of better safety awareness, resulting from improved safety management or supervision. For instance, the failure of Skyguide to achieve the merger of the Zürich and Geneva Upper Airspace Control Centers can be perceived as a quality assurance problem within Skyguide. However, it can also be considered as positive evidence that the safety policy process has gained in effectiveness, by better supervision of FOCA.

As a general observation it has been noted that many of the safety initiatives are largely driven in a top-down fashion and that the bottom-up complement is still underdeveloped. In the organizations where the biggest changes have been introduced there is the perception that the safety initiatives are not yet fully lived throughout the whole organizations and that safety cultures need to be strengthened further. Further incorporation of feedback from operational and

technical personnel appears to be required in order to ensure that safety management processes are sufficiently connected with the operational practice.

Overall it is concluded that significant improvements have been made to the way aviation safety is managed in Switzerland. Switzerland is indeed recovering from the myth of perfection. While, this does not mean that all problems are solved, and while it is too soon to demonstrate the actual impact of the improvements on safety performance, the progress achieved so far is bound to have a considerable impact on safety. Provided that the safety efforts are sustained and that the remaining concerns are being addressed, Swiss aviation is indeed on its way to actual excellence in safety. Moreover, due to the strengthened safety management processes at large it is not likely that negative safety trends and safety threats remain unnoticed and/or that new developments (i.e. systems, procedures and/or technologies) are introduced without proper analysis of the safety impacts.

On a more detailed level the main conclusions are:

With respect to Swiss Federal Government:

- *An adequate National Aviation Safety Policy has been formulated.*
  The NLR recommendation has been fulfilled.

With respect to DETEC:

- *A Civil Aviation Safety Office has been established and functions well. The legislation process to introduce non-punitive reporting schemes, conducted by FOCA, is almost completed.*
  The NLR recommendations have been largely fulfilled.

With respect to FOCA:

- *FOCA has been adequately reorganized. Oversight over airlines and Skyguide has been sufficiently strengthened, although staffing level in this area is still relatively thin. Safety management processes are explicitly introduced, but still mechanized in a predominantly top-down fashion. Direct involvement of the employees on the working floor should be improved.*
  The NLR recommendations are largely fulfilled.

With respect to accident investigation:

- *Not much has changed. Legislation is in early preparation, enabling changes in organization that are presumably in line with NLR recommendations.*
  The present status is that NLR Recommendations are mostly not implemented yet.

With respect to Skyguide:

- *Risk and safety management, and incident reporting and investigation have been strongly improved both in terms of process and in terms of staffing and expertise. Some of these processes suffer from a less than optimal acceptance and actual practice on the work floor. Quality control is a point of attention regarding risk assessment and mitigation. The concept of risk portfolio has not been sufficiently introduced. Shortage of Air Traffic Controllers has not been reduced. Instead of a licensing scheme for Air Traffic Control technical personnel, Skyguide has proposed a qualification scheme to demonstrate proper qualification of technical personnel, and this is currently checked by FOCA as means of compliance with ESARR 5.*
  The status of implementation of NLR recommendations varies.

With respect to airlines:

- *Safety policies are reasonable and Flight Data Monitoring has been widely introduced. The NLR recommendations are largely implemented.*

With respect to airports:

- *Safety policies are reasonable and Safety Management Systems are being introduced. NLR Recommendations are partially implemented.*

Contents

List of Acronyms and Abbreviations

AAIB	Aircraft Accident Investigation Bureau (Switzerland)
ACAS	Airborne Collision Avoidance System
ACC	Area Control Center
AIB	Accident Investigation Buro (UK)
AIG	Geneva International Airport
airprox	Air proximity
ANC	Air Navigation Committee
ANS	Air Navigation Services
ANSP	Air Navigation Service Provider
AOC	Air Operator Certificate
APP	Approach control
ASR	Air Safety Report
ATC	Air Traffic Control
ATCo	Air Traffic Controller
ATIR	Air Traffic Incident Report
ATM	Air Traffic Management
BAZL	Bundesamt für Zivilluftfahrt (= FOCA)
BFU	Büro für Flugunfalluntersuchungen (Switzerland)
CAA	Civil Aviation Authority
CASO	Civil Aviation Safety Officer
CEO	Chief Executive Officer
CH	Confoederatio Helvetica
COO	Chief Operations Officers
COSAR	Consultation of Safety Recommendations
CRM	Crew Resource Management
CVR	Cockpit Voice Recorder
DDPS	Department of Defense, Civil Protection and Sports
DETEC	Department of Environment, Traffic, Energy and Communication (= UVEK)
DFS	Deutsche Flugsicherung (Germany)
EC	European Commission
ECAC	European Civil Aviation Conference
EFUK	Eidgenössische Flugunfallkommission
ESARR	Eurocontrol Safety Regulatory Requirements
EU	Eurpean Union
FCL	Flight Crew Licensing
FDM	Flight Data Monitoring
FDR	Flight Data Recorder
FOCA	Federal Office for Civil Aviation (= BAZL)
FTE	Full Time Equivalent
GS	Secretary General
ICAO	International Civil Aviation Organisation
IFR	Instrument Flight Rules
JAA	Joint Aviation Authority
JAR	Joint Aviation Requirement
LFG	Luftfahrt Gesetz
LFV	Luftfahrtverordnung

OIR	Operational Internal Report (Skyguide)
OM	Operations Manual
OPS	Operations
OSG	Operational Safety Group (Skyguide)
PANS	Procedures for Air Navigation Services
QA	Quality Assurance
REACH	Review and Evaluation of Safety management in CH
RIT	Regional Investigation Team (Skyguide)
SAFA	Safety Assessment of Foreign Aircraft
SAFIR	Project “Safety First”
SE	SWISS Europe
SI	SWISS International
SIR	Safety Improvement Report (Skyguide)
SMS	Safety Management System
SOA	Safety Oversight Assessment
SOPs	Standard Operating Procedures
SPD	Safety Project Directive
SR	Safety Recommendation
SSAB	SWISS Safety Advisory Board
SSB	SWISS Safety Board
SSG	Safety Steering Group (Skyguide)
STC	Supplemental Type Certificate
STCA	Short Term Conflict Alert
TCAS	Traffic Alert and Collision Avoidance System
TOKAI	Toolkit for ATM Investigation
TWR	Tower
UAC	Upper Area Control
UVEK	Eidgenossenschaft für Umwelt, Verkehr, Energie und Kommunikation (=DETEC)
VFR	Visual Flight Rules
VFU	Verordnung über die Untersuchung von Flugunfällen und schweren Vorfällen
VP	Vice-President

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1 Introduction

1.1 Study background

In 2002, the Swiss Confederation, represented by the "Federal Department of the Environment, Traffic, Energy and Communication" (DETEC), commissioned the National Aerospace Laboratory NLR to conduct an extensive evaluation of the safety of air transport in Switzerland. The main objective of this investigation was to show, in particular, whether the structures for ensuring aviation safety within Switzerland were appropriate (i.e. effective and efficient) at that time.

The final report, published in 2003 under the title "Aviation safety management in Switzerland, recovering from the myth of perfection" (NLR-CR-2003-316, ref. [1]), provided an in-depth assessment of aviation safety management in Switzerland. Based on the findings, a substantial number of recommendations were given. After publication of the report Mr. Leuenberger, the Swiss Federal Counsellor and Minister of Energy, Transport, Environment and Communication[1], decided that the recommendations were to be implemented.

In order to receive outside feedback on the status and quality of the implemented recommendations, three years after publication of the original report, the Head of DETEC commissioned NLR to conduct a "Post Implementation Audit".

1.2 Objectives

The objectives of the "Post Implementation Audit" have been defined in the study assignment as drawn up by DETEC. According to this assignment, the main objective of the "Post Implementation Audit" is to assess the status and quality of the implemented recommendations of the original study as well as the coherence and sustainability of the overall efforts. The following aspects will be assessed:

1. Implementation of recommendations
    - Status of the implementation for each recommendation of the original NLR-report;
    - Reasons in case a recommendation is not implemented. Evaluation of potentially adverse side-effects;

[1] In the remainder of this report the Minister of Energy, Transport, Environment and Communication will be further referred to as the Head of DETEC.

- Adequacy of the measures taken, shortcomings found;
- How do the measures fit into the entire set of actions;
- Which are the life cycle expectations for a given measure, i.e. what is the resilience of the measures taken when it comes to cope with future changes in the industry;
- Further observations.

2. Lessons learned in the course of this evaluation
    - Does the audit team make observations that require correcting or amending original recommendations?

In the assignment it is explicitly mentioned that the accident investigation capability of AAIB and the benchmark performed in the original study will not be part of the “Post Implementation Audit”. This does not impede the audit because neither subject had resulted in specific recommendations in the original study.

1.3 Project scope

The scope of the “Post Implementation Audit” is limited to the objectives stated in the previous paragraph. In appendix A the list of recommendations of the original report is repeated, as the implementation of the recommendations is the primary focus of the “Post Implementation Audit”.

The information gathered during the assessment is used to draw conclusions concerning the present status of aviation safety management in Switzerland. This has been done against the background of the public policy process described in the original report. Relevant developments affecting the safety management elements targeted by the original recommendations are taken into consideration.

Like the original assessment, the audit is limited to Swiss organisations involved in commercial aviation. Commercial aviation is assumed to be limited to, national and international, scheduled flight operations. General, recreational, military and search & rescue flight operations are excluded. The organisations included in the audit are DETEC, FOCA, Skyguide, AAIB, the airlines Swiss International Airlines and EasyJet and the airports Zürich and Geneva. Information has also been gathered from Swiss airline pilot & air traffic controller

organisations. In appendix B the list of interviews conducted for the “Post Implementation Audit” is given.

Despite the fact that military aviation is excluded, an exception is made for the responsibility of Skyguide for military air traffic control in Switzerland. Aircraft manufacturers and maintenance organisations are still excluded.

1.4 Limitations of the report

Given the scope of the “Post Implementation Audit”, as addressed in the previous paragraph, the mandate of the current investigation is limited. Therefore, the audit should not be considered as the original investigation, performed for a second time. Further, as the original study was, at the national level, primarily paying attention to necessary improvements in the safety management *process* in Switzerland, the audit is also primarily paying attention to this *process*, and in particular to those elements of this process that have been addressed by the recommendations of the original study. Attention for cultural aspects, important for further (and continuous) improvements, at the national level as well as on the corporate level, is therefore limited.

There is another reason for limiting the investigation of cultural aspects as well. After dramatic improvements in technical aspects for many decades, development of standardized regulation and supervision, and the introduction of safety management, safety culture is a presently considered as a key aspect for improving safety. The concept of safety culture is therefore receiving much interest as a research topic in aviation and other safety critical industries. Nevertheless, research is still in an early stage. Many different definitions of safety culture are used, and although important aspects of safety culture have been determined, their relative importance and effect on safety culture, and indeed the influence of safety culture on safety are still far from crystallized out. Tools for measuring safety culture are for instance being developed, but often for different kinds of organisations or groups of people within these and validation of these tools is needed. In this context, safety culture is not an aspect that is easily determined in a scientifically sound and systematic way, and this makes application in the setting of a post implementation audit performed in this report impossible.

Nevertheless, the importance of safety culture as a next step in improving safety is – as already mentioned – fully recognized, and where the authors feel the necessity and the confidence to make observations regarding safety culture aspects without in depth considerations, they will do so. Example aspects, where such observations can be feasible are the observed priorities and attitudes regarding safety and the extent to which (good) intentions are actually implemented

and practised. However, by the aforementioned scientific and project context, these observations cannot be made in a systematic way.

Finally, given the limited mandate, the limited amount of time available and the large amount of parties involved, it is also important to stress that the possibilities for detailed verification were limited. Hence, the conclusions drawn in this report are for a large part based on information presented on a top management level.

1.5 Set-up of the report

The set-up of the report follows the set-up of the original report. As the information gathered during the “Post Implementation Audit” is used to draw conclusions concerning the present status of aviation safety management in Switzerland, the two levels of safety management considered in the original study (at the national level *the public policy process* and at the corporate level *the safety management model*) are summarized in chapter 2 and 3. Each of the chapters 4 through 11 is then – again – about one element of the public policy process. Each chapter starts with a brief summary of the situation found in 2003, including the recommendations given. The status and quality of the implemented recommendations as well as the coherence and sustainability of the overall efforts is given thereafter. Chapter 12 is dealing with the final recommendations given in 2003: the Development of a National Aviation Safety Action Plan and the assurance of commitment for it. A complete overview of the implementation status of all the recommendations is given in chapter 13.

2 The process of achieving aviation safety – a summary

2.1 Introduction

In this chapter, a summary is given of the first level of safety management considered in the original study. At this first level, the national level, high levels of air transport safety must be achieved through an effective and efficient *public policy process*. Details of this public policy process will be given in paragraph 2.2. As will be discussed, a few adjustments are made in this process.

2.2 Aviation Safety as a National Public Policy Objective

As stated in the original study, the basic elements of a *generic* public policy process are the following:

1. Setting the public policy;
2. The implementation of the public policy;
3. The outputs of the public policy;
4. The impact of these outputs on the relevant operators;
5. The policy outcomes;
6. Feedback of the outcomes to the policy.

The subject of the public policy may differ widely. In case aviation safety (*safe air transport*) is the subject (the public policy objective), these generic public policy elements can be attributed to the different actors involved in achieving safe air transport in Switzerland. As there is a new actor involved in achieving safe air transport in Switzerland, the Civil Aviation Safety Officer (CASO), a small but important adjustment is made compared to the attribution in 2003 (figure 2-1):

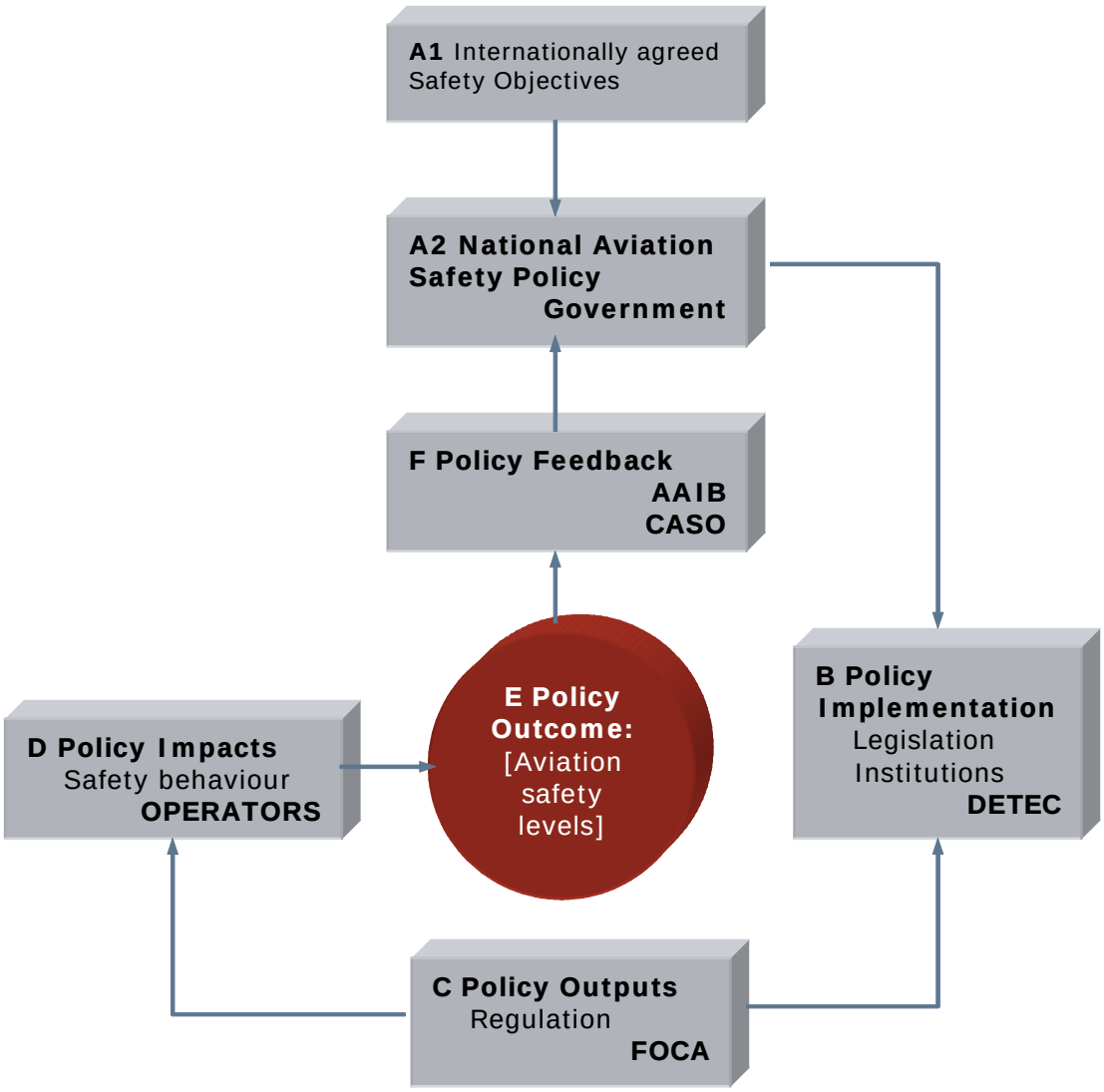


Figure 2-1 The National Aviation Safety Policy Process Model

Policy Setting (box A2)

The public policy process starts with setting the national aviation safety policy. In setting this policy the government expresses its ambition with regard to the safety of Swiss aviation and may indicate specific lines of actions that must be developed to achieve that ambition. The objectives could be set in an absolute manner (e.g. the number of accidents not to be exceeded) as well as in a relative manner (e.g. better than last year or not worse than other states). In aviation, which is strongly governed by international rules, any policy must fit within those rules (**box A1**). As a consequence, the policy is likely to refer to the international framework and express the national ambition relative to that. The policy serves as guidance to the departments and services on what to achieve.

Policy implementation (*legislation, institutions,* box B)

In order to carry out the policy, appropriate legal and institutional arrangements must thus be put in place as the means to implement the policy. The translation of the national policy in guidance and control of the department (DETEC) towards the regulator is also part of this element of the public policy process.

Policy outputs (*regulation,* box C)

Armed with the necessary resources and powers, the civil aviation authority FOCA uses the legal framework (and accessory the guidance from the department) to *regulate* the industry in order to ensure that the operators behave in accordance such that the desired safety performance is achieved. The actual outputs are standards, guidance, surveillance (inspections and audits) and enforcement (warnings, fines, etc.) as well as information and education.

Policy impact (*safety behaviour,* box D)

The impact of the policy is how the different industry actors conduct their operations. This element basically consists of the safety management of the airlines, the airports, and Skyguide. This is the element of the policy where (un)safety is actually being produced. As the safety conduct of the industry actors is governed by more than just regulatory compliance, their broader safety management process constitutes this element of the public policy. Therefore, this part of the evaluation will be structured along the lines of the safety management framework developed in paragraph 3.2.

Policy outcomes (*aviation safety levels,* box E)

The policy outcome is the safety performance of Swiss aviation. If the public policy is conducted successfully, the safety outcome is in accordance with the policy objective. It is important to stress that policy outcomes are not limited to accident and incident data, being a *reactive* indicator of the safety performance, but also includes safety performance indicators that, being *pro-active* indicators of safety performance, help to spot pre-cursors to accidents and incidents.

Policy Feedback (box F)

Confronting the safety performance of Swiss aviation (the policy outcome) with the policy objectives closes the public policy loop. This feedback is necessary to ensure that the government and all other actors in the policy cycle are aware of whether their policy has been

successful. If this is not the case, it may require changes to the policy such that the safety objectives are being achieved or guidance to the department and services to improve upon the other elements of the public policy process. This element of the public policy process is provided by both the accident investigation bureau AAIB and EFUK (still, see Chapter 11) in a reactive way and by CASO in a pro-active way.

When reading the public policy model as described above, one should keep in mind that it is a *generic* model, only used to attribute the generic public policy elements to the different actors involved in achieving safe air transport, when the latter is the public policy objective. Hence, it is a *strong* simplification of reality.

3 Aviation safety management within organisations

Besides their shared responsibility for air transport safety through their involvement in the public policy process, a number of individual actors are also solely responsible for their own specific safety relevant activities. At this second level, the level of individual organisations, a dedicated *safety management model* was defined in the original study, specifying all the key-elements of modern safety management. The model was derived from the best practices in safety critical industries, and was used to structure the investigation of the airlines Swiss and EasyJet, the airports Unique Zurich and Geneva, Skyguide, and FOCA. The following paragraphs summarize this model.

3.1 What is safety management

In the original study, safety management was defined as follows:

> *Safety management is the systematic management of all activities to secure an acceptable level of safety*.

The acceptable level of safety needs to be defined by a statement, provided and endorsed by the highest management level, explicitly specifying the safety objectives of the involved organisation, meeting as a minimum the provisions of the applicable regulatory requirements.

Safety management defined in this way has two, equally important dimensions:

1. the safety management **process**: addressing the various processes that have to be carried out to control the level of safety;
2. the safety management **organisation**: defining responsibilities, competence, commitment and communication of the involved organisations or persons.

3.2 The safety management process

The (generic) safety management process is given in figure 3-1:

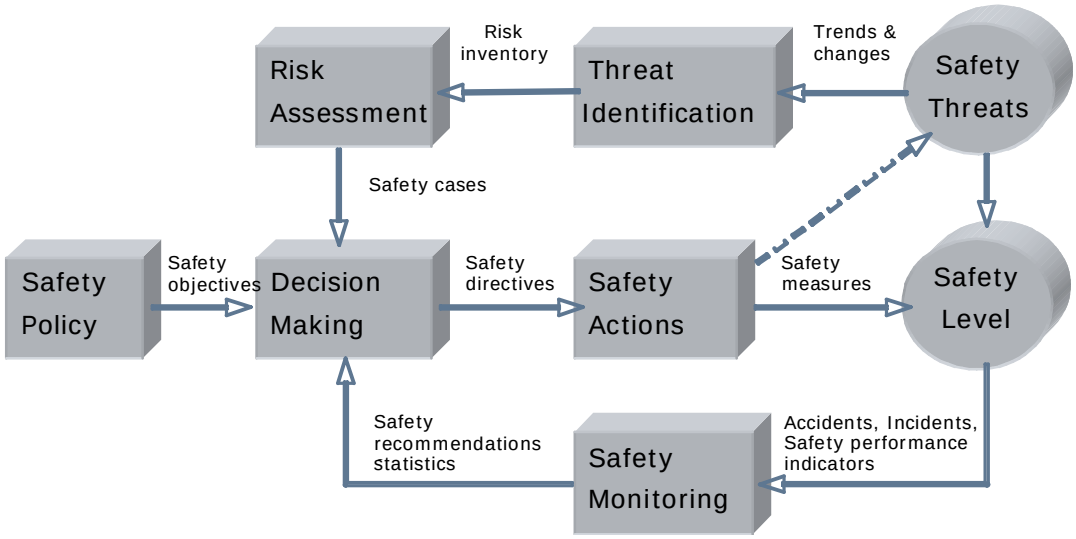


Figure 3-1 The safety management process

It shows how a desired level of safety is achieved by a structured process of setting safety objectives in a safety policy, monitoring actual safety performance and taking safety actions if needed. Because a good safety management process cannot purely rely on a re-active approach, it has been recognised that potential safety threats, as much as possible, need to be identified before they are affecting the accomplished level of safety, and to be dealt with by appropriate pro-active and risk mitigating actions.

The key-elements of the process can be described as follows:

- *The safety policy*: a safety goal-setting statement by highest management responsibles. It can be part of a wider policy, integrating capacity, economic, environmental and social aspects.
- *Decision making*: the decision making process, based on the adopted safety policy, of defining safety directives in response to results from either:
  - the safety monitoring process, in case the current level of safety is perceived not to be in conformance with the desired standard and therefore require corrective actions, or
  - the risk assessment process, in case risks associated with potential threats to aviation safety are considered unacceptable and therefore require risk mitigating actions.
- *Safety monitoring:* the process of assessing the current level of safety of the aviation system. This process may involve monitoring incidents, safety occurrences or other safety performance indicators. It certainly incorporates the investigation of accidents and major incidents as most evident symptoms of safety deficiencies in the current system.
- *Threat identification*: the process of identifying emerging conditions or developments that may seriously affect the current level of safety. These potential safety threats can be of

varying nature, such as technical developments, economic conditions, environmental pressures and operational or procedural changes.

- *Risk assessment*: the process of assessing the risk (i.e. the combination of probability and severity of consequences) associated with potential safety threats and, if required, definition of proposed risk mitigating measures to be taken.
- *Safety actions*: activities to be undertaken in order to either correct safety deficiencies, or mitigate risks. As shown in figure 2-2 it should be recognised that results of safety actions may have unwanted side-effects, and therefore always have to be assessed to which extent they could invoke a new safety threat.

3.3 The safety management organisation

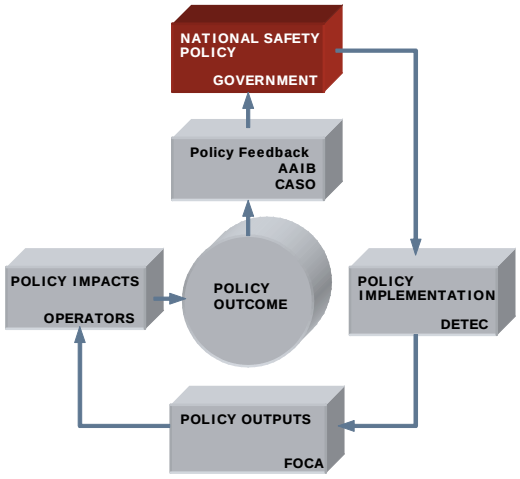
As stated in the original report, no process can function properly if the organisation that carries out that process does not meet a number of basic qualities. These specific qualities are:

- *Competence:* an organisation must have sufficient competence to perform the assigned functions and the underlying tasks. This means that staff is suitably trained and motivated.
- *Commitment and Priority:* within the organisations sufficient commitment and priority to perform the safety management tasks shall be available. This means that at highest management level required safety activities are endorsed, supported and provided with sufficient priority.
- *Communication and Dissemination:* communication and dissemination of safety relevant information shall be clear and un-ambiguous.
- *Documentation:* it is essential that safety management processes, and the associated safety organisational aspects (roles & responsibilities), are well documented.

4 Setting the aviation safety policy – the role of the government

4.1 Introduction

In correspondence with the original REACH study in 2003, each of the chapters 4 through 11 is about a single element of the public policy process as introduced in Chapter 2. To assist the reader in maintaining awareness of which part of the public policy process is addressed in the current chapter, the diagram shown to the right hand side of this text is provided. The dark red box indicates which element is being addressed.



This Chapter 4 is about Policy Setting.
It summarizes the findings and associated recommendation as reflected in the original REACH study. Next, an assessment is made of the current status of the implementation of the recommendation and the activities initiated by the government in this context.

4.2 Observations concerning the aviation safety policy in 2003

The original study in 2003 found that in Switzerland at governmental level no explicit aviation safety policy or specific safety objectives had been defined with regard to aviation safety. Only few and scattered evidences could be found that aviation safety was addressed at governmental level. It was mentioned in the organizational ordinance for DETEC (OV-UVEK, 172.217.1), stating that one of the objectives for FOCA was to guarantee a high safety standard in Swiss civil aviation. Furthermore the DETEC Departmental Strategy document stated: "*DETEC strives to ensure a high degree of safety in air*".
It was concluded that these messages were largely insufficient to express the government's commitment to achieve the highest possible level of aviation safety in Switzerland and serve as a clear indication to the aviation stakeholders to consider aviation safety as a national priority. As described by the aviation safety policy model, the national aviation safety policy is the starting point of the policy cycle. For that reason it is imperative that the national safety policy is a clear statement of the national government that can serve as guideline to all aviation stakeholders.

This has led to formulating the following recommendation:

Recommendation 4-1: Development of a national aviation safety policy
It is recommended to the Swiss government to develop a national aviation safety policy, and to ensure that this policy is adopted for implementation under the responsibility of the Minister of Transport.

4.3 Development of the national aviation safety policy

The main activity, undertaken by the Swiss Federal Government in the context of the development of a national aviation safety policy, concerns the complete reformulation of the Swiss aviation policy in 2004. This new policy has been established in a so-called Swiss aviation policy document (2004)[2], Ref. [2], and has been signed by both the Bundespräsident and the Bundeskanzlerin. This policy document has been approved by the Federal Council on December 10, 2004 and passed the Parliament in May 2005.
The Swiss aviation safety policy is a foremost and integral part of this policy document. After an introductory chapter, aviation safety is presented as the primary requirement within the aviation sector.
The objective of the aviation safety policy has been formulated (Chapter 2.1.1 of Ref. 2), as follows:

"The expectations of users and parties concerned in aviation require that, despite increasing traffic volumes the absolute number of accidents and serious incidents does not increase. […] Within Europe Switzerland strives for a relatively high standard of safety"

The actual formulation of the safety objectives is considered somewhat remarkable because it has been based on the expectations of users and parties concerned. First of all it is not clear how it has been established what the exact expectations of users and parties in aviation in fact are. Moreover these expectations should not be the only driver of the safety policy. The objectives of the national policy should be based on a strategic assessment, and vision with respect to the future of aviation, of the government itself.
Nevertheless the stated objectives of the aviation policy express a clear ambition of the Swiss Federal Government to ascertain that increased traffic volumes will be matched with a corresponding increase in safety, and that aviation safety within Switzerland is aimed to be above average as compared with other European countries.
A good property of the formulated aviation safety policy is that it is not limited to purely formulating the objectives of the policy, but that it further elaborates the consequences of adopting the policy.

[2] Bericht über die Luftfahrtpolitik der Schweiz 2004

So, it has been formulated that in order to achieve mentioned goals it will be necessary to adopt standards that go beyond the (minimum) recognized international standards and that reflect the best practices available. An important observation made is that the targeted increase in aviation safety could incur additional costs and therefore could lead in some cases to a competitive disadvantage. It has been clearly stated that this is the price that has to be paid.
Also it has been well recognized that aviation safety is in particular a matter of values, attitude and qualifications of the actors in the aviation sector. The role of the government is to create the conditions under which these issues can prosper. In this context a number of government initiatives have been explicitly mentioned, such as the introduction of a sector-wide licensing system for all safety relevant work and the introduction of non-punitive occurrence reporting system.

In addition the policy document provides a further problem analysis of the aviation safety situation in Switzerland (see Chapter 3.1.2 of Ref. 2) as well as the approach of the federal council to solve these problems.
This approach is characterized by a comprehensive system to ensure aviation safety. This system is described as a safety control system consisting of three layers (control loops).
The first layer of safety control occurs at the level of the aviation sector participants. It describes in fact the integral safety management activities of the sector parties and mentions the introduction of a non-punitive reporting system to further support these activities.
The second layer of the system is formed by the FOCA, by providing the regulatory framework and surveillance of the application of associated rules and regulations within the aviation sector.
The third layer is formed by the Federal Council (Bundesrat), that defines the primary characteristics of national aviation safety policy. Within this third layer the responsibility for monitoring that the safety policy is effectuated in practice has been delegated to the DETEC.

Furthermore the central role of the FOCA has been underlined not only as the direct responsible authority for supervision over the aviation sector on Switzerland, but also for the preparation and implementation of matters of aviation political character.

4.4 Acceptance of the national aviation safety policy

During the interviews conducted by NLR the level of awareness of the national safety policy and the acceptance within the aviation sector has been assessed.
It is concluded that in general that within the aviation sector, at least at management level, there is a sufficient awareness of the existence and content of the national safety policy.
As an example, one safety manager expressed his opinion as follows: "*… for the national level it is an adequate paper. It does not only cover safety, but also addresses development. It clearly says in terms of safety to become leading in Europe. It is a good basis to formulate our policy.*

LuPo [ed. The Swiss Aviation Policy] reflects all of our recommendations. Actually, we were desperately waiting for something like LuPo."
As can inferred from this statement, and other similar ones, the intention of the Swiss aviation safety policy is well understood and accepted within the aviation sector, and may serve as a basis for local safety policies.

4.5 Conclusion concerning the national aviation safety policy

Based on the analysis of the new Swiss national aviation safety policy document and the encountered general awareness and acceptance of this policy within the Swiss aviation sector it is concluded, that formulation of the Swiss national aviation safety policy, as laid down in Ref. 2, satisfies the intentions of the NLR recommendation 4-1.
It has been found that the Swiss national safety policy is widely supported by the aviation stakeholders. It is also believed that the policy will provide a basis for further safety initiatives within the foreseeable future.

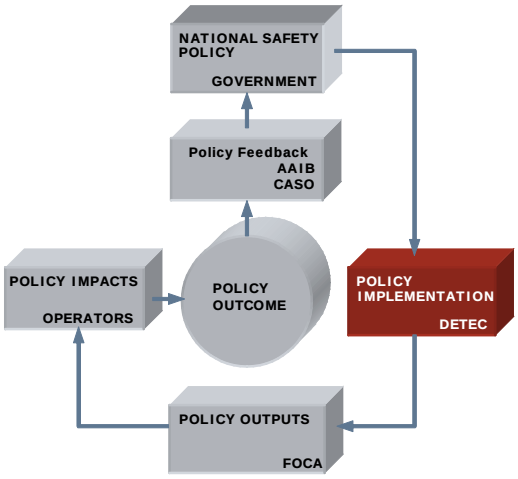
Summarizing the state of implementation of the recommendation concerning the national aviation safety policy given to the Swiss Federal Government yields the following picture:

Recommendation	**Implementation**	**Management support and sustainability remarks**
Recommendation 4-1: Development of a national aviation safety policy	Fulfilled	Clear management support, and strong commitment within DETEC, Aviation Authorities and Sector parties.

5 Implementing the aviation safety policy – the role of DETEC

5.1 Introduction

In correspondence with the original REACH study in 2003, each of the chapters 4 through 11 is about a single element of the public policy process as introduced in Chapter 2. To assist the reader in maintaining awareness of which part of the public policy process is addressed in the current chapter, the diagram shown to the right hand side of this text is provided. The dark red box indicates which element is being addressed.



This Chapter 5 is about Policy Implementation.

First a short summary is given of the findings concerning this element of the policy cycle in the original NLR report in 2003. This summary focuses on those issues that are relevant to understand the background of main recommendation in this area (Recommendation 5-1), concerning the appointment of dedicated aviation responsible within the Swiss Federal Department of Environment, Transport, Energy and Communication (DETEC). Subsequently the main developments since 2003 within the DETEC to implement this recommendation will be described, as well as the effectiveness of the chosen implementation to strengthen DETEC's function to implement the national safety policy. Also, the way DETEC has translated both the government policy objectives and the recommendations from the Swiss Aviation Accident Investigation Board (BFU) into action towards the aviation sector and supervises and guides the work of FOCA are addressed.

5.2 Observations concerning the aviation safety policy implementation in 2003

In the original NLR study several issues with respect to the role of DETEC in the policy cycle model have been discussed. A survey has been given of the Swiss aviation legislation from a safety perspective. It was concluded that Swiss aviation legislation did not differ significantly from the legislation in other western states and the Swiss legislation was well developed in its provisions to make international regulations and standards mandatory in Switzerland. The original NLR report did not formulate any recommendations for direct changes in the Swiss legislation, other than Recommendation 11-1 concerning amendment of the ordinance on accident investigation and 11-5 concerning the implementation of non-punitive reporting of occurrences. The present status of implementation of these particular recommendations will be

treated in Chapter 11, as an important element of the feedback cycle from “Safety Outcomes” to “National Policy”.

With respect to the role of DETEC the original NLR report observed that in general DETEC had a very wide area of responsibility, covering the domains of environment, transport, energy and communication. It was established that in the transport section of DETEC’s wide portfolio, aviation was a relatively minor component, in comparison with rail and road transport. Therefore aviation had to compete strongly for attention and priorities within the department. The total amount of resources devoted to all aviation related tasks (of which safety was only a small part) within DETEC was much less than one full time equivalent. Moreover, specific aviation expertise was not available within DETEC. It was obvious that the underdeveloped role of DETEC was not due to a lack of safety consciousness on an ethical/political level, but to a general drive to maintain a small federal government.
The logical consequence of this situation was that aviation related activities of DETEC were almost fully delegated to FOCA and that DETEC did not possess the necessary resources and expertise, to supervise FOCA in an effective manner.
A second consequence was that DETEC was unable to intervene effectively in case of disputes with a technical character that for instance could occur between the Swiss AAIB and the FOCA concerning the implementation of safety recommendations.
For that reason it was deemed necessary to strengthen the role of DETEC within the aviation safety policy process.
This led to the following recommendation (5-1):

Recommendation 5-1: Appointment of dedicated aviation responsible
It is recommended to DETEC to establish a new full-time position within DETEC

- to strengthen the ability of DETEC to give guidance to FOCA;
- to monitor the performance of FOCA on a regular basis;
- to act on behalf of the Swiss government in state level aviation policy matters; and
- to act as the delegated accountable manager of the Minister of Transport with regard to the implementation of the recommendations of AAIB.

5.3 Developments concerning the implementation of the national aviation safety policy

5.3.1 The role of DETEC

The Swiss aviation safety policy, as addressed in Chapter 4, describes the approach towards ensuring aviation safety within Switzerland as a three layered system, acting at three different levels:

1. The *first level* is based on the own responsibility of the aviation sector parties, and involves the safety management at company level;
2. The *second level* is based on the role and responsibilities of FOCA to set the regulatory framework and to supervise its application within the aviation sector;
3. The *third level* is based on the responsibility of the Federal Council to define the basic principles of the aviation safety policy and to ensure that this safety policy is adopted in practice.

The present Chapter focuses on the third level of the integral Swiss aviation safety management system. DETEC, and in particular the General Secretariat of DETEC, plays an essential role at this level. The Federal Council has entrusted DETEC with the responsibility for the safety policy cycle, and as such DETEC has to ensure that the safety loop is effectively closed at the highest governmental level. In connection with this responsibility DETEC represents the highest authority in Switzerland with respect to controlling aviation safety.
The motivation for the NLR recommendation 5-1 was indeed to strengthen this element of safety management at federal level by establishing a new full-time position within DETEC.
It was felt to be essential that DETEC would become more actively and competently involved in aviation safety matters in order to ensure that the safety policy process would not fail at the federal level. An important initiative in the respect has been the appointment of a so-called Civil Aviation Safety Officer (CASO). The CASO function and tasks are discussed in more detail in the next paragraphs.
Apart from the function of CASO itself it is also important to understand the role of DETEC in relation to CASO. Because the CASO is a new and unique function within DETEC it is of particular interest to address the interface and mutual relationship between CASO and DETEC at the highest level (that is at the level of the Secretary General).
For this reason interviews have been conducted with both the Secretary General (GS) of DETEC (GS-UVEK) and the CASO.

The GS-UVEK has indicated that the main function of CASO is to provide support to oversee FOCA and to monitor the implementation of the safety recommendations of the AAIB. With respect to aviation safety these functions are clearly and unambiguously delegated to CASO. The experience of GS-UVEK with this set-up is positive. Furthermore, the aviation expertise embodied within CASO provides added value to the department, enabling it to play an active role in the safety policy process. As a source of in-house expertise, CASO is consulted by GS-UVEK on a case-to-case basis to provide independent advice in strategic matters or specific aviation issues.
Despite this positive experience it is however also observed that the interface between GS-UVEK and CASO is somewhat unilateral. The given functions are delegated to CASO and are

expected – and also perceived– to be performed well. However, the internal feedback-channel from GS-UVEK to CASO appears as yet not to be fully effective. For GS-UVEK the CASO represents in fact the “eyes and ears” of the department with respect to aviation safety issues. For the CASO the safety monitoring function is regarded as an essential input into the safety policy process. It enables the adjustment of the safety policies at governmental level, based on observed safety trends or developments, in order to ensure that pro-active safety measures can be taken. In this context CASO regularly provides information to the GS-UVEK –mostly in the form of internal reports– concerning the state of aviation safety at all levels within Switzerland, and signals potential deficiencies.
This is regarded as the “early warning” function that is an inherent part of a well developed safety policy process.
The GS-UVEK has stated that this information is handled at full and, if deemed necessary, appropriate measures are taken.
In practice however, it is for the CASO not always clearly evident, to which extent the safety information is processed and actually used at the level of the GS-UVEK It may be that the information provided by CASO to the GS-UVEK does not always fully land. From analyzing a number of the internal reports it is concluded that the information provided to the GS-UVEK is quite detailed and extensive. Typically reports do cover eight or more pages. Although mostly relevant safety issues are addressed, these reports are in general not sufficiently tailored to the information requirements of the GS-UVEK to rapidly understand the issues and initiate the appropriate actions. In light of the very wide portfolio of the General Secretary it is essential that relevant information is provided in the most concise way and that undue detail is avoided.

It is understandable that due to the unique position of CASO within DETEC it takes time to develop a fully effective working relationship, including reporting practices and feedback. Presently, it has been observed that the relationship between GS-UVEK and CASO has not yet fully crystallized out. In light of this observation the distribution of tasks and responsibilities between CASO and GS-UVEK should be more clearly defined. In particular the “early warning” role of CASO could be better defined. In this context it is also important that GS-UVEK clearly demonstrates that the activities of CASO are approved and supported, and that also feedback is provided to CASO concerning the supplied safety information and the associated actions. In addition CASO should take care that internal information is better tailored to the information requirements of GS-UVEK.

5.3.2 The Civil Aviation Safety Officer

The main action undertaken by DETEC in order to implement this NLR Recommendation 5-1 has been to create a new function within the department, designated as the Civil Aviation Safety Officer (CASO).

At present the CASO function in fact comprises two full-time positions. A CASO and a deputy-CASO have been appointed.
The appointed persons bring the following qualifications and expertise to the CASO function:

- *CASO:* 20 years of professional experience in leading positions in the aviation industry (in particular maintenance, engineering, airport operations and navigation systems), IT and organizational development, and production planning and logistics. In addition he was an airport representative on national and international bodies. He holds a University degree in mechanical engineering.
- *Deputy-CASO:* 13 years of professional experience in airline aviation. He holds an air transport pilot's license and has worked as an air transport pilot in charter, short-haul and long-haul sectors, flying aircraft types like A320 and A330. He holds a University degree in Physics and a postgraduate degree in Management, Technology and Economics. Furthermore has been a company representative in international organizations (e.g. IATA) and has managed several strategic projects in the Operations Department.

Based on these qualifications, the CASO and deputy-CASO are considered to be well chosen to perform their function. The aviation expertise and competence embodied within the CASO functionaries is clearly sufficient to give them credibility and acceptance within the aviation sector.
As such, the first condition for implementing NLR recommendation 5-1 (i.e. establishment of a full-time position within DETEC) has been adequately satisfied.

However, some additional remarks have to be made. First of all the appointments of the CASO and deputy-CASO are of a temporary nature. The CASO has a five-year contract at DETEC, ending within two years, and the deputy-CASO has a three year contract, ending next year. This creates some uncertainty whether the CASO function will be sustained after the termination of the contracts. This uncertainty is further compounded by the fact that the CASO function is a unique function within DETEC, only implemented for the aviation part. Other transport modalities (such as rail and road traffic) do not employ a similar function. This might raise questions whether, at larger departmental scale, the CASO function is regarded as a clear responsibility of DETEC, requiring the necessary share of the (always limited) available budget an resources.
It is underlined here that the NLR Recommendation 5-1 was not intended to be of a temporary nature. The assurance that the policy process will continue to function, and that the associated tasks are performed, is a matter of permanent nature in order to avoid repeating the failures of the past. This is regarded as an inherent responsibility of DETEC. Therefore, DETEC should not consider delegating the CASO functions to outside parties. In particular for a highly

complex sector, like the air transport sector, with multiple national and international interactions it is essential that DETEC remains actively involved in the safety policy loop.
The GS-UVEK has indicated to agree with this vision and has declared that the function of CASO is meant to be of permanent nature. It has been pointed out that the instrument of assigning temporary contracts was used for administrative reasons.

5.3.3 The tasks of the CASO

The specific tasks to be assigned to the CASO function were defined in Recommendation 5-1, as:

1. to strengthen the ability of DETEC to give guidance to FOCA;
2. to monitor the performance of FOCA on a regular basis;
3. to act on behalf of the Swiss Federal Government in state level aviation policy matters; and
4. to act as the delegated accountable manager of the Head of DETEC with regard to the implementation of the recommendations of AAIB.

In order to assess whether the activities employed by the CASO functionaries since 2003 are commensurate with above mentioned tasks first the formal work description of the CASO of DETEC has been analysed (see Ref. 3, '*Arbeitsprogramm der LuSiBe des UVEK'*)
This document provides a general description of the functions of the CASO, and a more detailed description of the responsibility, tasks and competencies of the CASO.
The general description shows that the functions of the CASO include:

- Supervision of the FOCA w.r.t. to the implementation of policy of the Federal Council;
- Advice to the Head of the department (DETEC) concerning technical questions in the area of aviation safety;
- Advice to the representatives of the owners of Skyguide in technical matters;
- Review of the national aviation safety policy and proposal of changes, if necessary.

From this general function description it is not directly evident that the CASO functions fully cover the task description in NLR Recommendation 5-1. The task description of CASO in Ref. 3 is more specific in this respect. The most relevant tasks – in the context of the implementation of Recommendation 5-1 – mentioned are:

- Supervision of the aviation safety objectives and strategies of the FOCA
- Monitoring of the performance of FOCA on a regular basis
- Support of the extension of aviation technological know-how at DETEC to the required level
- Evaluation of safety recommendations published by the Swiss AAIB, and decision making on their implementation
- Support of the Secretary General of DETEC in the area of aviation safety

This description of tasks can be regarded as largely in line with the intentions of NLR Recommendation 5-1. However, the third element of the recommendation (“*to act on behalf of the Swiss government in state level aviation policy matters* “) appears to be not or not fully addressed. It has been construed as to provide general advice within Department (DETEC) on aviation specific issues (such as in press matters, departmental standpoints, aviation technical assessments, etc.).
In comparison with the intention of Recommendation 5-1 this appears to be a somewhat limited interpretation. The intention of the recommendation was to transfer some of the responsibilities in the area of aviation policy making back from FOCA to the Department. This could make responsibilities in the area of aviation policy making more clear. The FOCA would then be more of a supporting agency in the area of aviation policy, while the responsibility would clearly reside with DETEC, represented by the CASO. Also this would have made explicitly clear that the main task of FOCA would be to guard safety within the Swiss aviation sector, and not the promotion and support of the aviation sector in general.
However, with hindsight it is perhaps not the most efficient and clear approach to combine the “safety” function and the “policy” function within one person at DETEC, as worded in the recommendation. The motivation was at the time mainly based on practical reasons and giving due account of the fact that extensions of DETEC in the area of aviation could only be of limited size in order to avoid creating an unbalance with other modalities within the department.

From the interviews with FOCA and DETEC it has become clear that the message of the original NLR report, for making a clear separation between aviation safety and aviation policy matters and assigning clear responsibilities for these separated areas both to DETEC and FOCA, has been well understood. Within the last three years FOCA has been fully reorganised to implement a clear separation between “aviation safety” and “aviation policy” (see Chapter 6). Interfaces and responsibilities between DETEC and FOCA appear to be well organised.
For this reason, it is believed that concerns regarding the possible interference between safety and policy matters have been adequately addressed by the re-organisation. Also it is therefore believed that the somewhat limited role of CASO in aviation policy matters can be well argued, and still is in agreement with the overall intentions of the recommendations.
In this context the third element of NLR Recommendation 5-1 is therefore considered to be obsolete.

The next question to be addressed is whether the actual activities employed by the CASO functionaries are in line with the function description and the correspondingly specified tasks. The main tasks of the CASO occur in the interface with FOCA (for monitoring and guidance) and the Swiss AAIB (with respect to safety recommendations).
The completion of these tasks by CASO is discussed in the next chapters.

5.3.4 The interfacing tasks with FOCA

According to the NLR Recommendation 5-1, the objective of the installation of CASO was amongst others to monitor on behalf of DETEC whether the FOCA is adequately fulfilling its supervisory tasks concerning the aviation safety, and if necessary to provide guidance to FOCA to align its activities with the objectives of the national aviation safety policy.
After installation of CASO in 2003 a proposal has been drafted for a formal concept of supervision of FOCA by CASO.
This concept describes four instruments for supervision in increasing order of gravity:

- The assessment of standard information – this involves documents that are produced on a regular basis by FOCA and provide general information concerning the performance of FOCA (e.g. planning documents);
- Monitoring – CASO can act as observer for selected projects or within selected working groups;
- Technical information requests *("Fachanfrage")*– CASO can request FOCA to provide information concerning technical issues in order to support specific focal areas within DETEC or if required for ad-hoc issues;
- Audits and Inspections.

The sequential order of these instruments may also provide a path for escalation, if so required.
The above mentioned concept for supervision has been approved within DETEC, but still needs to be further agreed with FOCA. Presently the concept already serves as a basis for the activities of CASO, and CASO acts accordingly, so far with exception of the application of the "audit and inspection" instrument.
In 2004/2005 FOCA was in a state of reorganisation (also as a consequence of the NLR recommendations). In light of the transition that was taking place and the high workload involved, FOCA requested DETEC to refrain from conducting formal inspections and audits at FOCA. This was further underpinned by the fact that several other organisations (ICAO, FAA, JAA) were conducting large audits at that time. This request was granted by the Secretary General.
This means that at the time of writing of this report the actual supervisory concept has not yet been fully effectuated.
According to the CASO functionaries, it is believed that FOCA, after it's reorganisation is currently working in a stable mode of operation. Therefore, CASO intends to apply the instrument of audits and inspections at FOCA within the near future, on a regular basis.

The other three instruments of the supervisory concept have been applied by CASO on a regular basis. The CASO functionaries spend a substantial amount of time in attending selected working groups and observing selected projects (such as the UAC project, and the FAA audit).

In particular during the first years of existence of CASO these activities have been very important; firstly it created within the aviation sector a clear awareness of the involvement and commitment of government representatives for safety critical issues; secondly, it created for CASO access to a network of aviation safety specialists and provided CASO with a general perception of the actual state of affairs within the sector.
These activities have certainly strengthened the ability of DETEC to give guidance to FOCA.

Also the instrument of technical information requests ("Fachanfrage") to FOCA has been applied on a regular basis. In 2006 seven of such requests have been put forward to FOCA (until October 2006).
A recent example is the request to FOCA to provide a survey of all non-compliances from the ICAO standards that are accepted within the Swiss aviation system, and furthermore to indicate whether these non-compliances have been formally announced to ICAO, and what kind of mitigation measures have been taken to compensate for the non-compliances.
Such request is considered to be highly relevant in the context of the monitoring of the performance of FOCA.
Another example is the request to provide the criteria for the release of Batches 6 & 7 of the Skyguide UAC project. Without going into detail on the actual implementation issues of the UAC project, this request is also considered to be of high relevance in light of the failure of the UAC project during implementation of Batch 8.
Based on the gathered information the instrument of "technical information requests" is considered to be an effective tool, that is used in a prudent way by the CASO.

Basically, it can be concluded that the described supervision concept, combined with the way it has been implemented in practice by CASO, is an acceptable and satisfactory approach to monitor FOCA, and is in agreement with the intentions of NLR Recommendation 5-1.

In addition to the supervisory approach also activities are employed by CASO to strengthen the ability of DETEC to give guidance to FOCA, as mentioned in Recommendation 5-1. As already stipulated in Chapter 5.3.1, the capabilities of DETEC have been strengthened without doubt by the qualifications and the technical aviation expertise embodied by the selected CASO functionaries.
In this context a first initiative of CASO has to be mentioned; i.e. the development of a so-called Top-Ten List of safety risks. The Top-Ten list was issued by CASO immediately after the installation of CASO in order to complement the NLR study with more specific technical and operational issues.

The Top-Ten list was issued as a departmental work order towards FOCA. As such this is regarded as an initiative of CASO to provide guidance to FOCA to focus on technical-operational areas that requires most attention.
The Top-Ten List comprises issues like runway incursion, airproxes, the situation concerning runway 28 at Zürich, mixed VFR/IFR traffic, etc. The Top-Ten List is supported by a document providing details concerning the identified hazards and formulates underlying questions that should be addressed by dedicated projects, to be performed by FOCA. In general the list appears to address fair and realistic concerns. Nevertheless it should be noted that the list is composed without giving a clear order of importance and has been based primarily on the own experiences of CASO without a clear structured analysis of accident or incident data, or occurrence reports. In this context it should be noted that it is also an important task of the Safety & Risk Manager (SRM) at FOCA is to maintain a risk portfolio and to identify the main safety threats for the aviation system in Switzerland. These activities are an implementation of NLR Recommendations 6-3 and 6-4, and are considered to be a clear responsibility of FOCA. As far as could be established (see also Chapter 6) the SRM of FOCA indeed follows a structured approach for safety risks and safety trend identification, using all safety information available (occurrence reports, incident reports, inspection results, etc.).
The fact that CASO is involved in a similar activity might create confusion concerning the validity of either list. This might diminish the effectiveness of this -in principle- very good approach towards identifying the weak spots and trends in the aviation system as a means to focus available resources in the most efficient way.

The CASO has indicated that the issued Top-Ten list is regarded as a temporary measure and the issuance of such a list and work orders to FOCA is not considered one of its tasks. The normal CASO task would be to monitor the performance of FOCA's SRM or, in other words, the ability of FOCA to assess the topmost risks and problems themselves.
Nevertheless, it is noted that the CASO Top-Ten list at present still is active, given the fact that CASO has recently requested FOCA to provide the status of actions in response to the Top-Ten list, through "Fachanfrage (2006-6)".
However, based on the mentioned supervisory concept of CASO it is concluded that the potential problem of confusion concerning the validity of various risk lists will be avoided in future. The approach to monitor the performance of FOCA's SRM (in stead of maintaining a separate CASO Top-Ten list) is clearly in line with the intention of NLR Recommendation 5-1.

5.3.5 The COSAR process

NLR recommendation 5-1 formulated that the CASO should act as the delegated accountable manager of the Head of DETEC with regard to the implementation of the recommendations of AAIB.

The background for this recommendation can be found in Chapter 11.3.4 of Ref. 1. In essence it was found that accident reports of AAIB were addressed to FOCA. And FOCA was responsible for taking position on the AAIB Safety Recommendations and their implementation. It was concluded that the relationship between AAIB and FOCA in this area was unacceptably dysfunctional at the time. This led to the situation that DETEC was forced to mediate regularly between AAIB and FOCA, while in light of the limited domain knowledge at DETEC this role was difficult to fulfill.
Further analysis of the source for the dysfunctional relation between AAIB and FOCA revealed that several factors played a role.
Safety recommendation were usually based on proper analysis and justified, but sometimes:

- Focusing on a specific implementation in stead of on the general solution of the underlying problem;
- Formulated such that implementation was difficult to achieve;
- Duplicating or interfering with other recommendations;
- Giving insufficient account of other (safety) consequences.

Furthermore a potential mix of interests was identified at the level of FOCA. FOCA could be an involved party in the accident chain, and at the same time responsible for taking position and for implementation of safety recommendations at the level of FOCA itself.
It was therefore felt necessary to clearly assign the final responsibility for the implementation of the recommendations to the Minister and Transport. Due to the aviation expertise embodied within in CASO it was considered most efficient to assign CASO the function of accountable manager for this task on behalf of the Head of DETEC.
The NLR Recommendation did not express explicitly how this function of should be shaped or organized in order to take on the responsibilities associated with the function.

The interpretation of the NLR Recommendation by CASO has led to the definition of the so-called COSAR process (COnsultation of SAfety Recommendations). This process provides a translation of the original AAIB safety recommendation into a so-called Safety Project Directive (SPD). The SPD is in fact an instruction to implement a certain measure in response to one or more (clustered) AAIB safety recommendations. The SPD is a result of a consultation process which involves representative specialists from all relevant sector parties (FOCA, airlines, airports, service providers, air force, technical companies, etc.), with exception of the AAIB itself. The objective of this process is to find an optimal and widely supported solution to solve an identified problem, taking into account all consequences. This may address issues like practicality of the implementation, the costs and benefits, and the potential interaction with other safety related issues. The basic rationale for setting up the COSAR process is to mobilize

the collective wisdom of the aviation sector to find the most efficient and effective implementation of safety recommendations with a broad support.
The COSAR process comprises a number of defined process stages:

1. Presentation of the safety finding
2. Situation analysis
3. Formulation of objectives
4. Synthesis and analysis of solution elements
5. Assembly of overall concept
6. Verification of efficacy

The set-up of the process is such that step 1 is provided by CASO, subsequently steps 2, 3 and 4 are processed within the involved organizations, and results are discussed (if necessary) and consolidated during a COSAR meeting. Next, steps 5 and 6 are again processed within the involved organizations and the resulting measure or concept is consolidated during a meeting and laid down in the so-called Safety Project Directive.
It should be noted that this process in practice is applied with some flexibility, and is tuned to the complexity of the case at hand. The complete process is usually only applied to the most complex cases.

Evidence provided by CASO concerning the Safety Project Directives that have been put in effect since 2004 shows that the COSAR process in general lead to clear directives. Sometimes these directives extend well beyond the original safety recommendation (e.g. in the case of the introduction of English phraseology). Also it is shown that during the COSAR process new and unexpected aspects have been uncovered that were not addressed by the original recommendation.
Therefore, it is believed that the COSAR process certainly has added value. It is a structured approach to solve the underlying problems that were identified as part of one or more accident investigations. Moreover, it clearly takes into account the implementation aspects of safety measures. This has led to a better support and acceptance within the sector for the proposed safety actions. Consequently, the COSAR process has contributed to the solving the issues mentioned earlier related to the implementation of AAIB recommendations, as identified in the original NLR study.

Feedback from the sector parties in aviation confirm that in general the COSAR process is considered as a positive development (see also Chapter 5.4). The opportunity to provide input and expert advice to this process is appreciated and avoids potential controversies during the implementation phase. However, some parties identified that also drawbacks are associated with the COSAR process. These drawbacks are related to the time consuming and procedural nature

of the COSAR process, which could lead to delay in response to safety recommendations. Also the COSAR process was sometimes found to reduce transparency; AAIB safety recommendations are less directly coupled to associated safety actions.

In this context it should be pointed out that the primary intention of the NLR Recommendation 5-1 was to contribute to the solution of the dysfunctional safety feedback process; i.e. from safety recommendation to safety action.
However, this recommendation should not be regarded in isolation to achieve this objective. Also a number of recommendations were formulated towards the Swiss AAIB, that together were aimed to provide the solution. In this context also NLR Recommendation 11-1 is of relevance, stating:

> *that an obligation is placed upon the agency addressed in a AAIB recommendation to:*
>
> - *take the recommendation into consideration and, where appropriate, to act upon it;*
> - *send to the Minister of Transport a message containing details of the measures taken, or an explanation as to why the recommendation is not implemented.*

The function of the accountable manager for the Head of DETEC should be regarded in the light of the second bullet. The accountable manager should be the decisive authority on whether the measures taken to implement a safety recommendation, or the explanation for non-implementation, are acceptable or not.
In addition also NLR Recommendation 11-3 should be taken in consideration that advised to reorganize the AAIB to incorporate a Board with amongst others the tasks to:

- *review and approve AAIB accident reports*
- *organize and chair a public hearing regarding the draft final report*

In other words, some of the functions that now are part of the COSAR process, under responsibility of CASO, were in the original NLR report recommended to be performed as part of the functions of the -to be installed- board of the AAIB.
However, as is addressed in Chapter 11, the change in the ordinance on accident investigation, as reflected in NLR Recommendation 11-1, and the re-organization of AAIB to incorporate a board, cf. NLR Recommendation 11-3, have not yet materialized.
In light of these observations the initiative of CASO to develop the COSAR process can be regarded as a necessary action in order to ensure the implementation of the safety recommendations.

However, it should also be realized that the COSAR process is time-consuming, straining the available resources of the CASO functionaries. In light of all other tasks of the CASO, it is questionable whether the COSAR process can be fully sustained at the level of DETEC with the present level of available resources. Due to the special position of CASO within DETEC it is not likely that DETEC will be able to extend the resources assigned to CASO in order to support the COSAR process. Therefore, the risk exists that due to lack of resources the COSAR processes are increasingly delayed and that the backlog of safety recommendations, waiting for implementation, might grow to an unacceptable level.

It should also be noted that the necessary changes in Swiss aviation legislation are currently in progress such that the NLR recommendations (11-1 and 11-3) are expected to be implemented in 2008.
Once this has been achieved it should therefore be re-evaluated whether to continue the COSAR process in its current form, or to put the consultation process back in the hands of the Swiss AAIB, as part of the accident investigation and reporting process.

5.3.6 The pro-active role of CASO

In the previous paragraph the role of CASO in the implementation of safety recommendations has been discussed. This has to be conceived as a reactive role of CASO; it concerns the implementation of a corrective measure after an accident or serious incident has occurred. Modern safety management principles imply however that reactive measures are insufficient to ensure or further improve current safety levels. So-called pro-active measures are required to prevent that accidents do happen in the first place. In order to be able to identify timely the correct and effective pro-active measures it is necessary to closely monitor safety trends and to identify potential weak spots in the system. This may referred to as an “early warning system”. Within the original NLR study the importance of such an early warning was emphasized at several places, in particular in relation to the operational parties and FOCA.
However, at the level of DETEC the importance of the early warning system has remained relatively underexposed. The lay-out of the policy process might have also given the impression that feedback of safety outcomes to the safety policy would be merely mechanized through a reactive response to accidents and serious incidents via the AAIB.
As clearly worded in Chapter 3 this impression is not correct. The policy process needs to be fed with both information from accidents and serious incidents (via the AAIB) and information on safety trends and potential safety threats (via interfaces operational with operational parties).

It should be noted that the NLR Recommendations addressed to DETEC did not specifically mention to strengthen pro-active activities within DETEC in relation to the policy process. The tasks envisaged for the CASO did not explicitly include the set-up of an early warning

mechanism. However, based on the original NLR report it can be concluded that great value is attributed to pro-active safety management at all levels, see for instance NLR Recommendations 6-3, 6-4, 7-4, 7-5, 8-3 and 11-5. Evidently, it is also an implicit role of DETEC to utilize all available safety information and to ensure that the policy process is fed with this information.

It is reassuring to see that this element has been pick-up within the department.
The CASO working program (Ref. 3) literally states as one of the tasks of CASO:
"Managing of an "early warning system", in order to identify potential emerging safety threats such that appropriate pro-active measures can be taken."
According to the CASO this task is considered to be one of most important tasks of CASO. This task has not been specifically addressed in this way in NLR Recommendation 5-1, which could be considered an omission of this recommendation. Therefore NLR wants to state here that it strongly underlines the importance of the "early warning" task.

It is noted that CASO indeed has developed a system that performs an early warning function. This system is fed with information derived from contacts with industry as well as with FOCA. Within the scope of the present study the functioning of this system has not been analyzed in depth. Therefore, a well founded judgment of the system can not be provided here. It is noted however that the system provides a survey of "hot-spots" within the aviation sector and that this is used in the reporting to the GS-UVEK. As such the system appears to serve its purpose.

In this context it should also be noted that Safety & Risk Manager (SRM) at FOCA performs a similar "early warning function" within FOCA. For this purpose he maintains a risk portfolio and employs a system to identify the main safety threats for the aviation system in Switzerland. It is emphasized here that results of both systems employed by the SRM of FOCA and CASO should be as consistent as possible in order to avoid confusion concerning the identified safety threats.
From an institutional viewpoint it may be even recommendable when the SRM of FOCA would be responsible for the operation of the "early warning" system, while the main task of CASO would be to monitor the functioning of the system and use the forthcoming safety information in the policy process. This would avoid duplication of efforts, add independent quality control to the system, and ensure the consistency of the results.
It has been confirmed by the GS-UVEK that this is indeed in line with the approach of DETEC. GS-UVEK considers the task of early warning as a CASO task as far as it is related to setting the correct priorities within FOCA or the ability of FOCA to fulfill its duties in the foreseeable future. It is not a CASO task to duplicate the tasks of FOCA's SRM.

5.3.7 Other tasks of CASO

In addition to the tasks of CASO that are directly related to the implementation of NLR Recommendation 5-1, as discussed in the previous chapters, CASO has been assigned a number of tasks that in a more general sense are aimed to strengthen the safety policy process at the level at DETEC.

As described in Ref. 3 (*Arbeitsprogram CASO)* these functions include:

- Organization and moderation of platforms for exchange of information and experience, focusing on safety analysis and planning of coordinated measures, with FOCA, AAIB, industry and, possibly, foreign bodies;
- Participation in SALT (Swiss Aviation Leadership Team) and in ASAB (Aviation Safety Advisory Board);
- Support of DETEC in formulation and control over the fulfillment of the safety objectives for Skyguide (in the context of the owner function of DETEC);
- Support of the press and information services of DETEC in the area of aviation safety.

These tasks are considered relevant in the context of safety and indeed have the potential to strengthen the role of DETEC.

In particular the support of CASO in formulation and control over the safety objectives of Skyguide is important in this respect. It allows DETEC -in its function of owner of Skyguide- to be more independent from the regulator. Before the CASO function was installed, the strategic objectives of Skyguide were largely a translation from regulator performance indicators (so-called "*Regulator-Kennzahlen*"), as specified by FOCA. This could blur the role of DETEC as being both the owner of Skyguide and -via FOCA- also the regulator of Skyguide.

Due to the present role of CASO, confusion concerning DETEC's ownership and regulatory role can be avoided. Using the expertise of CASO, DETEC is now capable to define the strategic objectives of Skyguide without direct support from FOCA. This is reflected in the presently defined strategic objectives (Ref. [47]), that clearly surpass regulatory directives, i.e.:

- Skyguide needs to achieve an exemplary standard of service provision by means of a Quality and Safety Management System dedicated to continuous improvement;
- Skyguide pursues a high standard of Safety Culture; and
- Skyguide implements the recommendations following from the SAFIR project.

It should be noted however that abovementioned tasks also add to the workload of the CASO functionaries.

Although within the present study not a full workload analysis of the CASO functions has been performed, it is anticipated that the workload to accomplish all tasks, as they are currently performed, well exceeds a single full-time equivalent.

Based on information from CASO, it has been estimated that the combined CASO tasks would require around 3.5 full-time equivalent, at present.
It should be noted that some of the tasks performed are of temporary nature. In particular the involvement of CASO in the SAFIR project and the reorganization of FOCA and AAIB will wind down in the near future, as those reorganizations will near completion.
However, taking this into account, it can not be expected that all remaining activities can be sustained by a single CASO officer.

5.4 Acceptance of the national aviation safety policy implementation

From the interviews conducted the general impression exists that within the aviation sector the strengthened role of DETEC is clearly recognized. The most visible exponent of DETEC is the CASO. Within the roughly two years of existence of this function within DETEC, CASO has managed to build an extensive network within the industry. The COSAR process and COSAR team has been instrumental to develop this network. Also CASO has revitalized within the aviation sector the awareness of DETEC's role in implementing the national aviation safety policy.
Evidence (reflected in special technical information requests to FOCA and –confidential-internal reports) shows that CASO has played an important role in several safety-related projects within the aviation sector. A good example is the UAC project of skyguide. This project aimed to unite skyguide's Upper Airspace Control above Flight Level 245, by merging the Zürich and Geneva Upper Area Control (UAC) centers. This project was of high strategic importance for skyguide in light of the Single European Sky implementation. However, just before the final activation of the merged control center, FOCA decided to not accept the associated safety case.
Clearly this led to a difficult position at the highest political level within DETEC, because an initiative of strategic importance had to weighed against the safety concerns, as perceived by FOCA. As an observer to the UAC project CASO had been able to objectively assess the facts underlying the decision of FOCA. As such CASO has played an important role to support the findings of FOCA, and to formulate the standpoint within DETEC to support the decision of FOCA in the best interest of safety. The presence and active involvement in this particular project has avoided a potential controversy at the level DETEC, that could have arisen when DETEC would have had to weigh a matter of strategic importance against safety concerns, without the proper and impartial expertise of CASO.

This role of CASO is in general well appreciated, both at FOCA and at the aviation sector parties.

Another important role of CASO is in the set-up and management of the COSAR process. It needs to be observed that during the original NLR study several critical remarks were noted sector concerning the functioning of the Swiss AAIB, in particular with respect to the formulation of safety recommendations.
During the interviews conducted for the present investigation no such comments were mentioned anymore. In general the functioning of the Swiss AAIB is highly praised throughout the industry, as being professional and efficient.
Clear improvements are also recognized in the functioning of the interface of both the sector parties and FOCA with DETEC.
These improvements are to a large extent attributed to the functioning of CASO and the set-up of the COSAR process. In general this is well appreciated.
Some relevant quotes from conducted interviews with sector parties are;

"It is working much better now. This is a result of the installation of the CASO. The BFU had not the possibility to get the attention they expected from BAZL. With the installation of CASO the situation has improved. Before we had some emotional reactions, these have gone now."

"CASO is a big improvement. 3 years ago BFU was much too strong, as compared to BAZL and UVEK. The situation is now much better. The right balance has been restored"

"From an institutional point of view the installation of CASO is excellent. It is ideal to be able to reach someone who is neutral and competent."

Nevertheless also some critical remarks with respect to the COSAR process were noted.
Due to the time-consuming nature of the COSAR process the possibility exists that safety actions in response to AAIB safety recommendations are unnecessary delayed. Due to the level of available resources to CASO concerns are expressed that these delays may increase in future to unacceptable levels.

The main critique with respect to the COSAR process was put forward by the Swiss AAIB itself. The AAIB –on purpose– does not participate in the COSAR process, as this might affect its impartiality. In the eyes of the AAIB the COSAR process reduces transparency; it is not, or less, clear what actions are taken by FOCA in response to a particular safety recommendation. The FOCA is directed to specific actions by means of the so-called Safety Project Directives and not by the AAIB safety recommendation itself.
The AAIB is of the opinion that involved parties should respond to the AAIB in writing to provide their comments to the draft of the investigation report and/or to announce their decision concerning implementation of a certain recommendation. In this context the response of the

CASO would only be important in case a party would decide to not implement a certain safety recommendation. The AAIB contends that the COSAR process extends –in their perception– beyond the responsibilities of DETEC. It is questioned who would be responsible in the hypothetical case that in future an accident would occur due to incorrect or insufficient interpretation of a safety recommendation of the AAIB.
This issue has already been addressed in Paragraph 5.3.5. It suffices here to state that NLR agrees that the current COSAR process implies a more direct involvement of DETEC than anticipated on the basis of NLR Recommendation 5-1. However, NLR understands the reasoning behind the set-up of the COSAR process and recognizes the added value. Due to this process the likelihood that incorrect or insufficient measures are taken in response to AAIB safety recommendations is substantially reduced. Therefore, the potential negative consequences of the process as reflected by the AAIB are not shared by NLR. Nevertheless, as mentioned in Paragraph 5.3.5, the COSAR process and responsibilities could be subject of review after the reorganization of the AAIB has been established.

5.5 Conclusions concerning the national aviation safety policy implementation

Based on the observations and analyses provided in the present Chapter, the following conclusions are drawn. These conclusions pertain directly to the implementation of NLR Recommendation 5-1.

1. *General.* A dedicated aviation responsible has been appointed within DETEC. This responsible has been designated as the Civil Aviation Safety Officer (CASO). The CASO is assisted by a deputy. The resources assigned to the CASO office exceed the minimum required level of a single full-time position. The CASO officers are clearly well qualified for their function. Therefore it is concluded that the basic conditions to satisfy NLR Recommendation 5-1 have been met.
   However, it has been noted that the CASO functionaries have temporary contracts with DETEC. It is emphasized here, that the objective of the recommendation was of a permanent nature, and the implementation should therefore not end with the termination of the CASO contracts.
2. *Monitoring of FOCA.* Among the basic tasks of the CASO should be to provide guidance to FOCA and to monitor the performance of FOCA. These tasks have been elaborated in a concept for supervision of FOCA. This concept is considered to provide CASO with the proper instruments and responsibilities to fulfill mentioned tasks. Up till now the supervision concept has not been put into effect to its full capabilities; the instrument of audits and inspections has not yet been exercised. Nevertheless, based on the use of the other instruments mentioned within the supervision concept, the level of supervision of FOCA by CASO is considered to be effective and in agreement with the intentions of NLR Recommendation 5-1.

3. *Representation in policy matters.* Among the basic tasks of the CASO should be to act on behalf of the Swiss Federal Government in state level aviation policy matters. As yet this task is basically not fulfilled by the CASO. In this respect the task of CASO is limited to provide general advice within Department (DETEC) on aviation specific issues. In light of other developments, such as brought about by the reorganization of FOCA (realization of a clear division between safety and policy matters) it is however concluded that the need for assigning CASO an extended policy support function has largely disappeared. Therefore, no further action is required to satisfy this particular part of Recommendation 5-1.
4. *Accountability for the implementation of safety recommendations.* Among the basic tasks of the CASO should be to act as accountable manager of the Head of DETEC with regard to the implementation of the recommendations of the AAIB. The current situation is such that the CASO has fully adopted the function of accountable manager for the implementation of safety recommendations. In order to be able to accept the associated responsibilities the CASO has defined the so-called Consultation of Safety Recommendations (COSAR) process. It is concluded that the current organization and processes within DETEC represent a clear implementation of the function of accountable manager at the level of DETEC. Therefore, this element of NLR Recommendation 5-1 has been fully satisfied.
   It should however be noted that the implementation of the function “accountable manager” in this area is considered to exceed the original intention of Recommendation of 5-1 that also has to be seen in connection with other actions and reorganization of the AAIB. This relates in particular to the consultation process. The value of the COSAR process has been clearly demonstrated during the past years and is widely supported within the sector. Nevertheless, it was intended that this process would take place under responsibility of the –to be formed– board of the AAIB. Since, this as yet has not been realized, it is understandable that the consultation process has been institutionalized by CASO at the level of DETEC as part of the function of accountable manager.
   This situation however has some risks.
   First of all, it has to be established that the COSAR process is quite labor intensive. The GS-UVEK has stated clearly that it will not be possible to provide additional resources. Therefore it is questionable whether the available resources are sufficient to fully support the COSAR process on a permanent basis such that the time duration from safety recommendation to actual implementation directive remains within acceptable limits. The GS-UVEK has pointed out that priorities for CASO have to be set by a portfolio approach.

NLR would like to stress, that in the light of the wide portfolio of CASO, this approach might easily lead to structurally insufficient attention for the COSAR process, as this work would have to compete with other priorities.

Secondly -as pointed out by the AAIB- the COSAR process (in which the AAIB decided not to participate) complicates the tracking of the relation between AAIB safety recommendations and the resulting safety measure implementation. For that reason the COSAR process is less appreciated by the AAIB. The present study has established however that the reporting of CASO to AAIB concerning the implementation status of recommendations provides in principle sufficient tracking information.
Based on abovementioned observations it could be considered to re-evaluate the current set-up and implementation of the consultation process, once the reorganization of the AAIB has been completed, or even as part of this reorganization process.

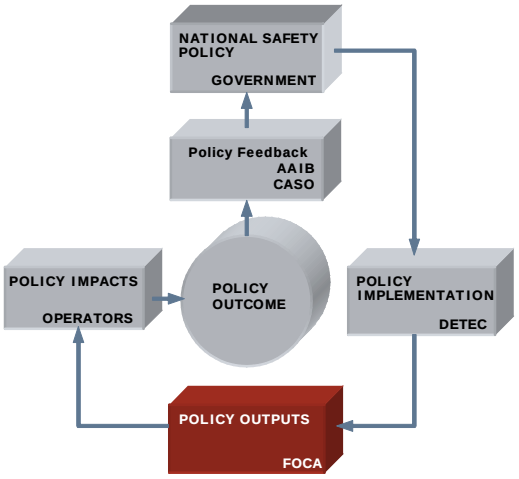
Summarizing the state of implementation of the recommendation concerning the implementation of the national safety policy given to DETEC yields the following picture:

Recommendation	**Implementation**	**Management support and sustainability remarks**
Recommendation 5-1: Appointment of dedicated aviation responsible	Largely fulfilled	CASO function is an operational success and should be continued. General management support exists within DETEC for CASO, but function is not fully embedded within department. Sustainability of CASO function is not fully ensured. Current task-load of CASO exceeds the available resources. COSAR process might be reviewed after reorganisation of the AAIB.

6 The output of the aviation safety policy – the role of FOCA

6.1 Introduction

In correspondence with the original REACH study in 2003, each of the chapters 4 through 11 is about a single element of the public policy process as summarized in Chapter 2. To assist the reader in maintaining awareness of which part of the public policy process is addressed in the current chapter, the diagram shown to the right hand side of this text is provided. The dark red box indicates which element is being addressed.



This Chapter 5 is about the output of the aviation safety policy – the role of FOCA. It summarizes the findings and associated recommendations as reflected in the original REACH study. Next, an assessment is made of the current status of the implementation of the recommendations and the activities initiated by FOCA in this context.

6.2 Observations concerning the output of the aviation safety policy in 2003

During the original REACH investigation, a safety management approach was used for the investigation of FOCA. Against the background of the safety management framework, summarized in Chapter 3, the following observations were made and recommendations were given:

6.2.1 Safety organisation of FOCA

The organisational structure of FOCA in 2003 was a process-oriented organisation in the form of a matrix of processes and competence centres. It was observed that:

- There was no identifiable safety process and safety accountability;
- The processes reflected the different parts of the aviation system in Switzerland (Infrastructure Planning, Aviation Facilities, Flight Training and Licensing, Air Transport Companies, Aerotechnical Organisations, Type Certification and Airworthiness and Registry), not the main tasks of a safety regulator (rulemaking, approvals, surveillance, enforcement, information and education);
- The aviation industry was reflected as ‘Clients’;
- The activities not related to safety regulation, in the area of policymaking and policy advice, were not identified as a process. There was no separation between policy tasks & economic regulation and safety regulation.

This organisational structure was particular catered to the needs of the aviation industry, which was regarded as the Client. The choice for a relationship between FOCA as the provider of regulatory services and the industry as the Client for those services had important implications for the conduct of FOCA as a safety regulator. It was concluded that the appropriateness of this stance of FOCA as a safety regulator had to be carefully reviewed.

The fact that the tasks of FOCA related to safety regulation and the tasks related to policy advice and the promotion of aviation were fully integrated throughout the organisation had also important implications for the conduct of FOCA as a safety regulator. It was shown that the resulting lack of primacy of safety and the lack of clear accountability for safety ultimately leaded to poor oversight of the industry.

The following recommendation was given:

Recommendation 6-1: Separation of safety regulation and aviation policy within FOCA
It is recommended to change the organisation of FOCA into a separate unit for Safety Regulation and a separate unit for Aviation (Policy). Each unit should report to its own Director of Safety Regulation resp. Director of Aviation (Policy), with both directors reporting to a Director of FOCA.

6.2.2 Safety policy

The safety policy is of vital importance to an organisation that is responsible for safety. It provides the employees with a frame of reference for decision-making in their day-to-day duties, it supports the accountability of the organisation because it states what the organisation wants to achieve and sends a powerful message to the industry and general public. The safety policy of FOCA in 2003 read (ref. 32):

"The FOCA puts forward aviation safety as main focal point, and furthermore relies consequently on international standards".

This safety policy was in the original report summarized as "Safety First" and "Adherence to the International Rules". "Safety First" is very common but not very accurate because it suggests that safety should take precedence in any decision in which a safety consideration is involved, which is not the case. In reality there is always a balance between safety and other considerations. What is needed is a safety policy that assures that the right balance is found, that adequately fulfil its role in a safety management framework. It must at least address:

- What safety performance of the organisation FOCA wants to achieve (in measurable terms);
- What is the individual and management responsibility for safety performance;

- A statement about the priority ascribed to flight safety relative to commercial, operational, environmental and working practice pressures – including an explanation of what the safety priority statement means in practice;
- A statement about compliance with safety standards and regulatory requirements with regard to safety.

Given this observation, the following recommendation was given:

Recommendation 6-2: Formulation of a FOCA safety policy
It is recommended to FOCA to formulate a safety policy that meets all requirements to make it the main pillar under FOCA's safety management as a matter of urgency. This FOCA safety policy must be formally approved by DETEC.

6.2.3 Safety monitoring

In order for FOCA to be effective and efficient in their efforts to ensure safety, it is necessary to monitor developments in safety at the level of safety outcomes, *accidents and incidents*, and at the level of the output of FOCA, *surveillance results*.

During the original investigation it was concluded that, with the exception of the SAFA activity, safety monitoring within FOCA was, both at the level of safety outcomes and at the level of the output of FOCA, virtually non-existent. As a consequence, FOCA management had insufficient awareness of relevant trends, emerging problems, and the compliance levels they achieved in the industry. This prevented the maintenance of a sharp and up-to-date awareness of the safety of the industry. It also made it difficult to identify threats, to match FOCA's performance against its goals, and to inform the public. As there was is a need to monitor the safety output of FOCA (*surveillance results*) as well as the safety outcome (*accidents & incidents*), action was required on both needs. The following recommendation was given:

Recommendation 6-3: Development of a safety performance data monitoring process.
It is recommended for FOCA to:

- work with AAIB to ensure that AAIB does prepare and publish appropriate analyses of accident and incident data such that the AAIB analyses (also) meet the needs of FOCA, and
- to develop as a matter of urgency, a safety performance data monitoring process for FOCA, at least to include the data from the FOCA surveillance activity.

6.2.4 Threat identification & risk assessment

During the original investigation it was observed that FOCA did not have and maintained a risk portfolio. There was no common awareness and agreement in FOCA on which threats to safety

warranted formal priority and dedicated action by FOCA. Having such a risk portfolio will allow FOCA to appropriately focus their limited resources, and, if the resulting priorities are well communicated and made public, it will help FOCA to substantiate its resource needs and reduce vulnerability to 'priorities of the day' that are not necessarily strongly related to safety.

Recommendation 6-4: Development of a formal process for threat identification
It is recommended that FOCA develops a formal process to identify threats, to develop a risk assessment process, and to build and maintain a risk portfolio.

6.2.5 Oversight of Skyguide

In 2003 it was observed that over the last decade, counted from 2003, oversight by FOCA over the Air Navigation Service provider (now Skyguide) had been virtually non-existent. Licensing of air traffic controllers by FOCA was only an administrative procedure. FOCA had well understood the need to improve their oversight of Skyguide and had developed a new oversight philosophy already. While the philosophy was well developed and met the requirements for modern and effective oversight, it had not resulted in significant oversight yet. Therefore, the following recommendation was given:

Recommendation 6-5: Initiation of surveillance regime for oversight of Skyguide
It is recommended to FOCA to implement as a matter of urgency, a short term surveillance regime, based on the new philosophy, to ensure that actual oversight of Skyguide commences with immediate effect.

In view of the tasks ahead for FOCA concerning the oversight of Skyguide, i.e. monitoring the development of the safety management system, approving ESARR compliance and the validation and approval of safety cases, it was further concluded that the available resources were insufficient. It was recommended that:

Recommendation 6-6: Reviewing staffing level related to evaluation of ATM safety cases
It is recommended to FOCA to conduct a critical analysis of the staffing levels at FOCA needed to face the tasks ahead to Skyguide oversight and the need to approve safety cases. If this analysis reveals the need for additional resources and capabilities, it is imperative that these resources are made available.

6.2.6 Airline oversight

In 2003, the process of FOCA tasked with the approval and oversight of the airlines experienced a considerable surge in workload due to the need to manage the JAR-OPS certification of a large number of operators and the developments around Swiss. This strained the resources

beyond their capacity, with serious consequences for the process of AOC approvals and airline oversight by means of audits and inspections. It became evident that part of the staffing problems had resulted from the fact that inspectors spent a large percentage of their time helping the airlines prepare for the AOC approval. While this was in accordance with the corporate image of FOCA as a regulatory service provider, the remaining resources for surveillance were so little that oversight of the airlines through audits and inspection had seized almost completely. Also, AOC approvals were processed in an administrative manner, based on the submitted documents, but without verification through inspections or audits.

Based on the presented facts it appeared that the surveillance philosophy of FOCA relied fully on confidence in the operators' own responsibility and integrity. The role of FOCA towards the operators was mainly that of a co-operative and administrative body. It was more important to promote aviation than to promote safety, because safety was regarded as an inherent attribute of the airline operations. In this respect Swissair played for many years a role model, as an air operator with an almost unmatched safety and quality record.
Strict and rigorous surveillance of such an airline was in general considered unnecessary or even unwanted. However, with the emergence of new Swiss operators, stimulated by deregulation, the Swissair oversight concept was easily projected on new entrants, without clear verification of their operational and safety policies.

FOCA became aware of the deficiencies in the oversight program. A new oversight regime was developed in early 2003, including a new audit program. Given the available resources, the investigators stressed the importance of a realistic annual audit plan. Further, it was stressed that the success of the new regime would ultimately depend on the extent to which the follow-up on deficiencies would be sufficiently persistent. The ability to do so depended completely on the future role of FOCA management. As FOCA management was still closely involved in the role of FOCA as a promoter of aviation, the success of the new surveillance regime would be a test of the strengthened commitment to primacy for safety in FOCA management. This is ultimately not a matter of statements or procedures but a matter of culture. If FOCA is to become an excellent safety regulator, the recommended actions with regard to the organisation, priorities, activities, and procedures, must be accompanied by a strong initiative to develop and instil the necessary cultural attributes within FOCA.

Recommendation 6-7: Strengthening the surveillance regime over the airline operators
It is recommended to FOCA to:

- sharply increase the surveillance of the operators;
- conduct audits and inspection when awarding or renewing AOC licenses, regardless of whether JAR-Ops could be interpreted such that inspections are not required;

- analyse the findings of audits across the surveillance activity with the purpose of finding root-causes and identifying adverse trends;
- take findings of previous audits into account in subsequent audits and verify implementation;
- ensure that audit findings are brought to the attention of the certification inspectors;
- review the new audit program for its feasibility and adapt it as needed, regardless of JAR or ICAO recommended audit intervals;
- perform a first risk assessment and use the results to focus the audit program in accordance with the findings.

6.3 Developments concerning the output of the aviation safety policy and the implementation of the recommendations given

6.3.1 Safety organisation of FOCA

Recommendation 6-1: Separation of safety regulation and aviation policy within FOCA
It is recommended to change the organisation of FOCA into a separate unit for Safety Regulation and a separate unit for Aviation (Policy). Each unit should report to its own Director of Safety Regulation resp. Director of Aviation (Policy), with both directors reporting to a Director of FOCA.

After publication of the original REACH report, the Head of DETEC decided to reorganise FOCA as one of the measures to improve the safety of civil aviation in Switzerland. This decision was taken in autumn 2003. The reorganisation officially ended on the 30th of June 2005.

FOCA now works with a new defined Safety Policy, corporate vision and strategy, a new defined business model and a new defined corporate structure. In the corporate vision, which corresponds with the National Aviation Safety Policy and the FOCA Safety Policy, as well as in the strategy, a clear distinction has been made between safety regulation and the policy tasks & economic regulation (the promotion of civil aviation). The aim to achieve / ensure a high standard of safety is mentioned first, the promotion of a (sustainable) development of aviation is mentioned thereafter (ref. 33):

Vision FOCA:
"We aim to achieve a high standard of safety and security, and to promote the sustainable development of civil aviation in Switzerland".

Strategy FOCA:

1. *"As an independent regulator, we ensure a high standard of safety and security in Switzerland's civil aviation sector".*
2. *"We promote civil aviation in Switzerland while taking account of the three dimensions (economic, ecological and social) sustainability. In this way we also help keep Switzerland an attractive location".*
3. *"We are actively involved in international civil aviation organisations so that we are able to safeguard Switzerland's interests".*
4. *"We provide reliable and professional services. Thanks to our ability to respond appropriately to each situation and act with the necessary degree of foresight, we enjoy a high level of acceptance among the general public, in the economy and in the political arena".*
5. *"We communicate professionally, punctually and in comprehensible manner".*
6. *"We greatly value conscientious and highly qualified staff, and support them in the form of specialised training and further education".*

The distinction between safety regulation and the policy tasks & economic regulation (the promotion of civil aviation) is reflected in the new organisational structure (see figure 6-1, ref. 32). The organisation is not any longer a process-oriented organisation in the form of a matrix of processes, with responsible process managers, mapped upon the different categories of actors in the industry (the Clients), and competence centers. Not any longer reflects the organisation an orientation towards the efficient provision of regulatory services to the Clients. Instead, the organisation is now mapped upon the primary tasks of FOCA. Three Safety Divisions (Aircraft, Flight Operations and Infrastructure) are identified, responsible for safety regulatory tasks as approvals (*certification*), surveillance, enforcement, information and education. Separated from these Safety Divisions one Aviation Policy and Strategy Division is identified, responsible for the promotion of a sustainable development of civil aviation in Switzerland, and for ensuring that Switzerland plays an appropriate role within civil aviation organisations both in Europe and throughout the world. With this new organisational structure, FOCA reflects a strong commitment for both safety and the promotion of aviation.

With the clear separation between Aviation Policy and Safety Regulation, it is now avoided that both tasks are fully interwoven within the organisation. The aim of the new structure is to avoid that individual employees are tasked with considerations and trade-offs around safety and economy at the same time. Specific safety policy matters are still covered in the Safety Divisions, in separate Standardisation and Enforcement Units mainly staffed with lawyers. All other policy matters, particularly those involving multiple aspects such as safety, economy and environment, are dealt with in the Aviation Policy and Strategy Division. This does not mean

that it is no longer possible for the Aviation Policy and Strategy Division to make use of the expert knowledge available within the Safety Divisions. As already argued in the original report, it is very important to have expert knowledge available when dealing with policy issues. For a small country as Switzerland, it is unrealistic to strive for a comparable level of expert knowledge available in both the Safety Divisions and in the Aviation Policy and Strategy Division, completely separated from each other.

With the involvement of experts in policy issues, it is a requirement that the different responsibilities are laid down clear. In the new organisational structure this is realised. All three Safety Divisions and the Aviation Policy and Strategy Division have their own Director with clear responsibilities. As these Directors form, together with the directors of the Division Resources & Logistics and the staff division Corporate Services, the Board of Directors, with the Director General as President, it is realised that final considerations around safety and economy are now made on the highest possible level in the organisation.

From a process point of view, it can be concluded that the separation of safety regulation and aviation policy is accomplished. If it works, in all possible cases in the day-to-day practice, is a question that could not be answered yet given the limited time available for the investigation. However, important pre-requisites are in place.

Besides the Safety Divisions and the Aviation Policy Division, an important additional element in the organisation is the Safety Risk Management Division. This division is an independent staff division, responsible for all aspects of safety risk management. To remain independent, the director of the SRM Division is not within the Board of Directors. He is reporting directly to the Director General.

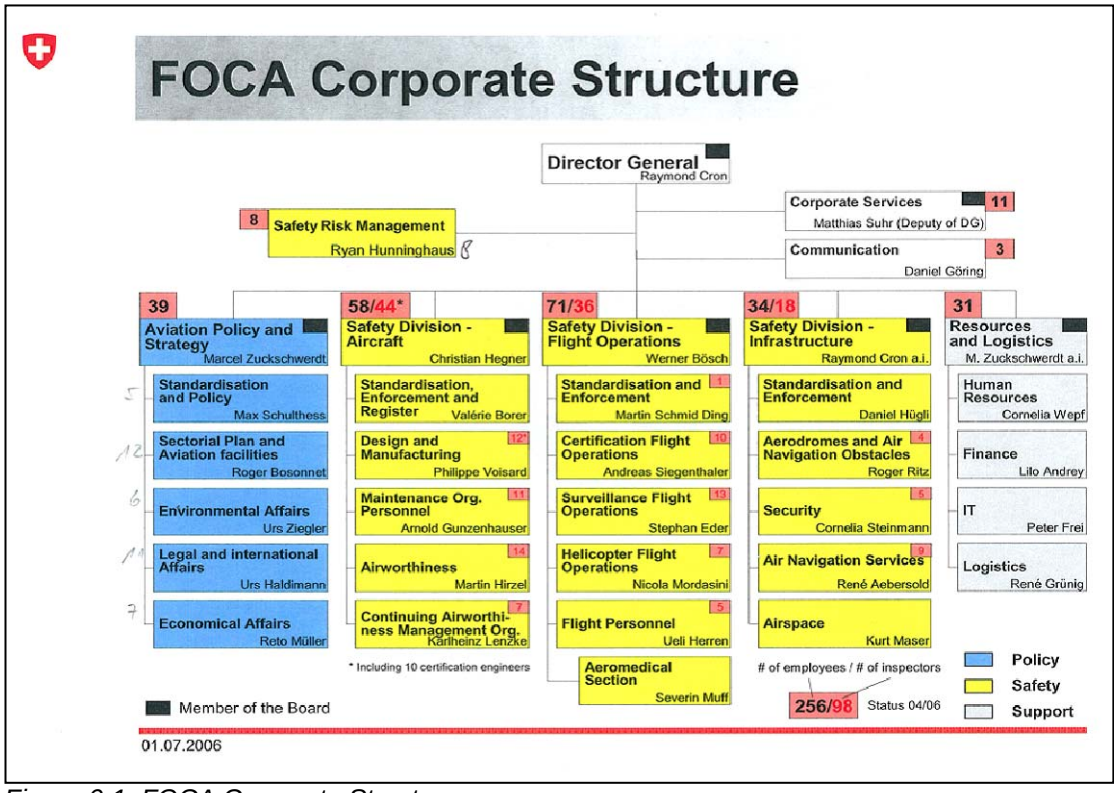


Figure 6-1: FOCA Corporate Structure

The different roles of the Safety Divisions and the Aviation Policy and Strategy Division are also illustrated in figure 6-2 (ref. 32). It is now made explicit that the Safety Divisions, being the safety regulator, the supervisory authority, do not any longer consider the sector parties as 'Clients'. As the Aviation Policy Division is in favour of, among others, the promotion of civil aviation, they still talk about 'Clients'.

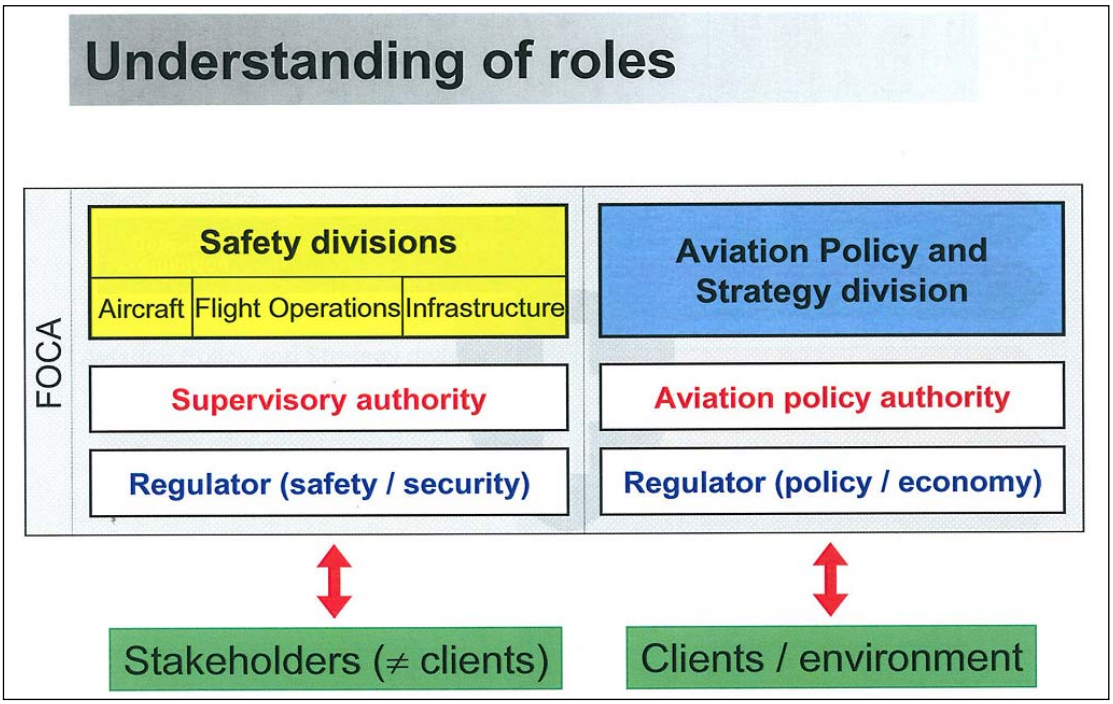


Figure 6-2: Understanding of roles

Based on the new organisation model, the organisation now works with a process oriented management system. Working processes are described in detail, with reference to all necessary documents and means. The aim is to realise a more structured and standardised way of working. All the interviewed managers stressed that they now have a (much) better view on the work being processed, that the responsibilities are laid down more top down, and that because of the clear defined processes it is easier to manage the organisation.

6.3.1.1 Conclusions concerning the implementation of recommendation 6-1

Against the background of the arguments behind the first recommendation given in 2003, it can be concluded that recommendation 6-1 has been implemented. Major improvements have been realised. A clear separation has been realised between Safety and Aviation Policy. The primacy of Safety Regulation has been laid down in the vision and strategy. The directors of the three Safety Divisions bear the responsibility for safety regulation, the director of the Aviation Policy and Strategy Division for, among others, the promotion of civil aviation. These four directors are all in the Board of Directors, with a comparable position towards the President of the Board. The primacy of Safety Regulation is supported by the fact that the Safety Divisions do not any longer consider the aviation industry as the Client. With the separation it is also realised that considerations and trade-offs around safety and economy are now made at the highest level of FOCA. The reorganisation made FOCA more manageable as well.

Concerning management support, it can be concluded that the new defined corporate structure and business model has the full support from the management above. As mentioned, the organisation is better manageable now, and responsibilities are laid down more top-down. FOCA top-management determined that this set-up was the best method to comply with the recommendations given in the original report, as the structure of FOCA had to be totally reorganised and a large number of additional personnel had to be hired, on which NLR agrees. However, the acceptance of the *consequences* of the new corporate structure and business model by the employees is important as well. At the working floor there are policies and guidelines now, and who is the boss is very clear. In the past it was more bottom-up. The room for inspectors how to do their work is limited now. As the employees are high-educated specialists, there is a danger that they get the impression that they are less esteemed, that their input, their quality of work in the past, is neglected. This impression is supported by the fact that a significant part of the new middle managers is hired from outside FOCA. Further, it is not only the structure of the organisation that has changed, the management style has changed as well – to realise the changes. All of this might lead to frustrations, which was actually mentioned during several interviews. With the – at this very moment – rapidly changing marked conditions in the aviation industry in Switzerland, there is a danger of specialists resigning, most probably the best ones first. The management of FOCA stressed that they are aware of these aspects, and that they have made several efforts already to improve the involvement of the employees on the working level.

Summarizing the state of implementation of this first recommendation yields the following picture:

Recommendation	**Implementation**	**Management support and sustainability remarks** ***Suggestions for further improvements***
Recommendation 6-1: Separation of safety regulation and aviation policy within FOCA	Fulfilled	The new defined corporate structure and business model has the full support of the (top) management. The implementation led to changes in the position of the employees on the work floor. A danger of frustration exists. *For future sustainability, attention should be paid to broad acceptance and the management style used.*

6.3.2 Safety policy

Recommendation 6-2: Formulation of a FOCA safety policy
It is recommended to FOCA to formulate a safety policy that meets all requirements to make it the main pillar under FOCA's safety management as a matter of urgency. This FOCA safety policy must be formally approved by DETEC.

The first key-element of the safety management framework as summarized in chapter 3 is the Safety Policy. The whole safety management system starts with a Safety Policy, which should explicitly specify the safety objectives of the organisation involved, FOCA in this case. With explicit safety objectives, the Safety Policy provides the employees of the organisation a frame of reference for decision-making in their day-to-day duties. As requirements the following aspects were mentioned in the original REACH report:

- What safety performance of the organisation FOCA wants to achieve (in measurable terms);
- What is the individual and management responsibility for safety performance;
- A statement about the priority ascribed to flight safety relative to commercial, operational, environmental and working practice pressures – including an explanation of what the safety priority statement means in practice;
- A statement about compliance with safety standards and regulatory requirements with regard to safety.

The new FOCA Safety Policy (ref. 4) consists out of 4 elements:

1. Basis
The National Aviation Safety Policy forms the basis of the new FOCA Safety Policy. Referring to the National Aviation Safety Policy it states as its basis:
"(.....), guaranteeing a high standard of safety in comparison with other European countries is fundamental to the successful implementation of an aviation policy, for the effective performance of the transportation system, and for the prosperity of market participants. Aviation safety is to a large extent a question of the values, attitudes and qualifications of all participants (the "safety culture")".
As mentioned in chapter 4, this basis expresses a clear ambition of the Swiss Federal Government. Further details are given in that chapter.

2. Aim
The FOCA Safety Policy continues with the aim, the safety objectives, of FOCA:

"*Despite increasing volumes of traffic, users and others connected with aviation expect no increase in the number of accidents and serious incidents. Specific safety targets are defined on the basis of international benchmarks. Only comprehensive safety management and a high degree of individual responsibility on the part of those involved can continuously improve the level of safety in Swiss civil aviation. Overall, Switzerland is aiming for a high level of safety in comparison with the rest of Europe"*.

These objectives are identical to the objectives mentioned in the National Aviation Safety Policy. As already discussed in chapter 4 of this report, at the level of the government this high level Safety Objective suits its purpose fine. On the level of FOCA it is an important fact that the primacy of Safety is laid down. However, the Safety Objective could have been expressed more specific, as the FOCA Safety Policy needs to provide guidance to the employees of FOCA in their day-to-day decisions. In more detail, the following remarks can be made:

- First of all, reference is made to the fact that "..... users and others connected with aviation *expect* no increase in the number of .....". The role FOCA wants to play in this is not made clear. Only the expectation of users and others (….) is expressed.
- Second, it is mentioned that "*Specific safety targets are defined on the basis of international benchmarks*". In formulating an objective this way, it is expected that the reader knows *which* specific safety targets are defined and what the ambition of FOCA is.
- Finally, the objective that "*(....) Switzerland is aiming for a high level of safety in comparison with the rest of Europe"* is not the logical consequence of the preceding text. The Safety Policy only *implicitly* indicates that "comprehensive safety management and a high degree of individual responsibility on the part of those involved" are the means of *how* to reach this objective. Nothing is said about *when* it should be reached and when it *is* actually reached.

Only after reading the Safety Risk Management Handbook, the above-mentioned items become clearer. It is actually this Handbook that provides the necessary guidance.

3. Strategy

Third, the FOCA Safety Policy provides the strategy of how to reach its safety objectives. The responsibility of FOCA as supervisory authority is laid down, and it is stated that FOCA exercises its role as supervisory authority according to the "Safety First" principle. As already mentioned in the original REACH report, mentioning the "Safety First" principle alone is not very adequate as it suggests that safety should take precedence in any decision in which a safety consideration is involved, which is not the case. In reality, there will always be a balance between safety and other considerations. Therefore, attention should be paid to the last sentence of the first paragraph, in which this aspect is covered: "*Safety First should also take into*

account the business interests of the aviation industry, wherever it is reasonable in the circumstances". This could be expressed more explicit, for instance by making reference to the strategic safety goal of the FOCA SMS (ref. 5): *"to reduce the safety-risks to As Low As Reasonable Practicable (ALARP)"*. The important role of the Safety Management System of FOCA when it comes to realising its safety objectives is made clear in the strategy as well.

4. Measures

The last element of the FOCA Safety Policy is about the measures FOCA is taking to ensure the requisite safety standards. These are formulated very clear. For further details please refer to this document.

As already mentioned, the FOCA Safety Policy should be read together with the SRM Handbook. However, the FOCA Safety Policy should also be read together with the document "*Sicherheitspolitik und ihre Umsetzung*" (ref. 6), especially because in this document the responsibilities of the Director General, executives and employees are made clear. Explicit mentioning the overall responsibility of the Director General is certainly a missing element in the FOCA Safety Policy.

6.3.2.1 Conclusions concerning the implementation of recommendation 6-2

FOCA has defined a new Safety Policy. Against the background of the requirements defined for a Safety Policy, the following conclusions can be made:

The first requirement, *"what safety performance of the organisation FOCA wants to achieve"*, has been fulfilled. However, the objectives and the role FOCA plays in realising these objectives could be expressed clearer.

The second requirement, *"what is the individual and management responsibility for safety performance"*, is addressed in the "Sicherheitspolitik und ihre Umsetzung". Especially the overall responsibility of the Director-General is worth mentioning in the Safety Policy document.

The third requirement, *"a statement about the priority ascribed to flight safety relative to commercial, operational, environmental and working practice pressures"*, has also been fulfilled. Reference could be made to the ALARP principle.

The fourth requirement, *"a statement about compliance with safety standards and regulatory requirements with regard to safety"*, is covered in the first measure in the FOCA Safety Policy.

Given these conclusions, the overall conclusion concerning the implementation of recommendation 6-2 is that it is largely fulfilled. Summarizing the state of implementation yields the following picture:

Recommendation	Implementation	Management support and sustainability remarks
Recommendation 6-2: Formulation of a FOCA safety policy	Largely fulfilled	Full management support for the primacy of safety and the ambitions formulated. Sustainable.

6.3.3 Safety monitoring & threat identification

As summarized in chapter 3, a desired level of safety is achieved by a structured process of setting safety objectives in a safety policy, monitoring actual safety performance and taking safety actions if needed. Because an adequate safety management process cannot purely rely on a re-active approach, it has been recognised that potential safety threats, as much as possible, need to be identified before they are affecting the accomplished level of safety, and to be dealt with by appropriate pro-active and risk mitigating actions. These re-active and pro-active approaches are subject of recommendation 6-3 and 6-4. Therefore, these two recommendations are dealt with together.

Recommendation 6-3: Development of a safety performance data monitoring process.
It is recommended for FOCA to:

- work with AAIB to ensure that AAIB does prepare and publish appropriate analyses of accident and incident data such that the AAIB analyses (also) meet the needs of FOCA, and
- to develop as a matter of urgency, a safety performance data monitoring process for FOCA, at least to include the data from the FOCA surveillance activity.

Recommendation 6-4: Development of a formal process for threat identification
It is recommended that FOCA develops a formal process to identify threats, to develop a risk assessment process, and to build and maintain a risk portfolio.

In paragraph 6.3.1 it was already mentioned that an important additional element in the new organisation of FOCA is the Safety Risk Management Division. This division is responsible for all aspects of safety risk management, and therefore for the actual implementation of these two recommendations. Within SRM a pilot expert, an engineer expert and an ATC expert are available. They have contact with the safety experts in the different units of the Safety Divisions. These safety experts spend 10% of their time to SRM matters.

6.3.3.1 FOCA Safety Management System

The FOCA Safety management System, adopted to regulate the safety aspects of Swiss aviation, is defined in the FOCA Safety Risk Management Handbook. As stated in this Handbook, it has been written in support of, and to expand upon, the FOCA Safety Policy.

Against the background of the two recommendations given, the introduction of the SRM Handbook already stresses a few important items. At first it states that *"FOCA deploys a feedback control system to constantly improve safety in aviation"*, which is also stated in the FOCA Safety Policy. Further, it states that *"Rolling planning procedures ensure early visibility of future safety trends allowing an optimal resource allocation that maximises the FOCA's impact"* and *"Priority areas for FOCA will be dictated by the potential harm posed by risks as well as the frequency of occurrence of the risks. For this, the FOCA maintains a well-developed safety risk management process"*. All of these items were exactly missing three years ago.

The purpose of the Handbook is also mentioned. Given the primacy of safety at FOCA, the SRM Handbook has been developed to provide the necessary guidance to the personnel in the planning and execution of the organisation's safety responsibilities. As mentioned in paragraph 6.3.2, it is with this Handbook that the guidance, in the Safety Management framework asked from the Safety Policy to deliver, is realised.

In volume 1 of the Handbook, the following definition of SMS is given:

Safety	Condition where risks are managed to acceptable levels;
Management	Allocation of resources
System	Organised set of programs, principles, processes and procedures.

Compared to the definition of safety management used in the original REACH investigation, it can be concluded that in both reference is made to *acceptable* levels of safety.
FOCA makes this more explicit by defining the following strategic safety goal of the FOCA SMS: *"The strategic safety goal of the FOCA SMS is to reduce the safety risks to As Low As Reasonable Practicable (ALARP). In order to achieve this the SMS must be pro-active, ongoing and fully integrated throughout the organisation and all of its activities"*.

Further, the following general overview of the FOCA SMS is given:

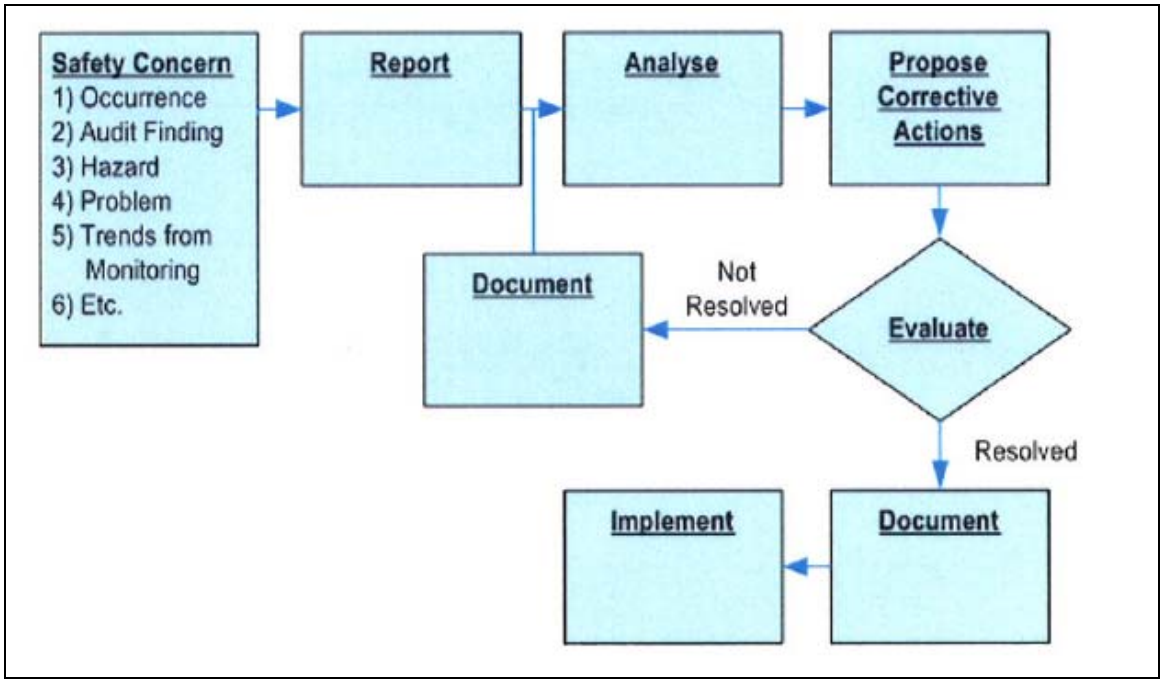


Figure 6-3: Safety Management System of FOCA

Of this general overview no further explanation is given. The figure does not provide a complete system overview. It provides an overview of the feedback system concerning proposed corrective actions. If a corrective action, after evaluation, is implemented, the monitor process becomes important again to check if the safety concern really is resolved. However, only the possible "results" of the safety monitoring process and threat identification process are given in terms of safety concerns.

Volume 1 ends with describing 16 principles of the systematic approach to meeting the basic safety obligation of FOCA (table 6-1):

1	Safety Management System	FOCA will establish, maintain and continuously improve the SMS containing systematic processes and best practice. It must review the performance of the SMS and extend the SMS whenever new information makes this necessary.
2	Systematic Processes	FOCA will undertake its activities following systematic processes.
3	Safety Responsibility	FOCA must identify and document safety responsibilities and record the transfer of such responsibilities.
4	Safety Culture	FOCA will put "Safety First".
5	Competence and Training	FOCA must make sure that all staff who are responsible for or contribute to safety related activities are competent to carry them out. FOCA must give them adequate resources, support and authority to carry out their responsibilities.
6	Communication	FOCA must put in place arrangements enabling staff to communicate safety

		related information effectively and efficiently without barriers.
7	Co-ordination	Within FOCA personnel will work with others ensuring they co-ordinate their SMS activities and will also facilitate interfaces between the FOCA and other appropriate organisations.
8	Managing Hazards	FOCA must make a systematic and pro-active approach to manage any possible hazards and must consider the consequences and classify the risk resulting from the hazard.
9	Reducing Risk	FOCA will use measures available to it as a regulator to reduce the overall aviation system risk. It must decide whether each measure is reasonably practicable and, if so, must take it. If FOCA finds that any risk is intolerable, it must take rapid action to alleviate it.
10	Target Levels of Safety	FOCA must set TLS for the operation of the Swiss Industry.
11	Change Management	When faced with a change to the aviation system FOCA should assure themselves that the change will not be detrimental to the safety of Swiss aviation.
12	Supervision, Monitoring and Improvement	FOCA must establish arrangements for supervision and monitoring of the Swiss aviation industry.
13	Configuration Management	FOCA will have a configuration management system that covers everything which is important to achieve or to demonstrate safety.
14	Evidence of Safety	FOCA must ensure that risks have been reduced to an acceptable level and support its arguments with objective evidence.
15	Records	FOCA must maintain auditable records of all SMS activities.
16	Audits	SMS activities carried out by the SRM office must be periodically reviewed by competent resources who are independent and not involved in the activities being reviewed.

Table 6-1: SMS Principles

The implementation of these principles is described in detail in volume 2 of the SRM Handbook. The different principles are followed one by one. As a detailed evaluation of the SRM Handbook is beyond the scope of the Post Implementation Audit, our attention is mainly focussed on the processes recommended. Besides this, some general observations are made.

In the introduction of volume 2, the guiding principles of FOCA's proactive safety regulation are given (figure 6-4). In this figure, the gray elements are elements within the safety data monitoring, the white within the risk assessment.

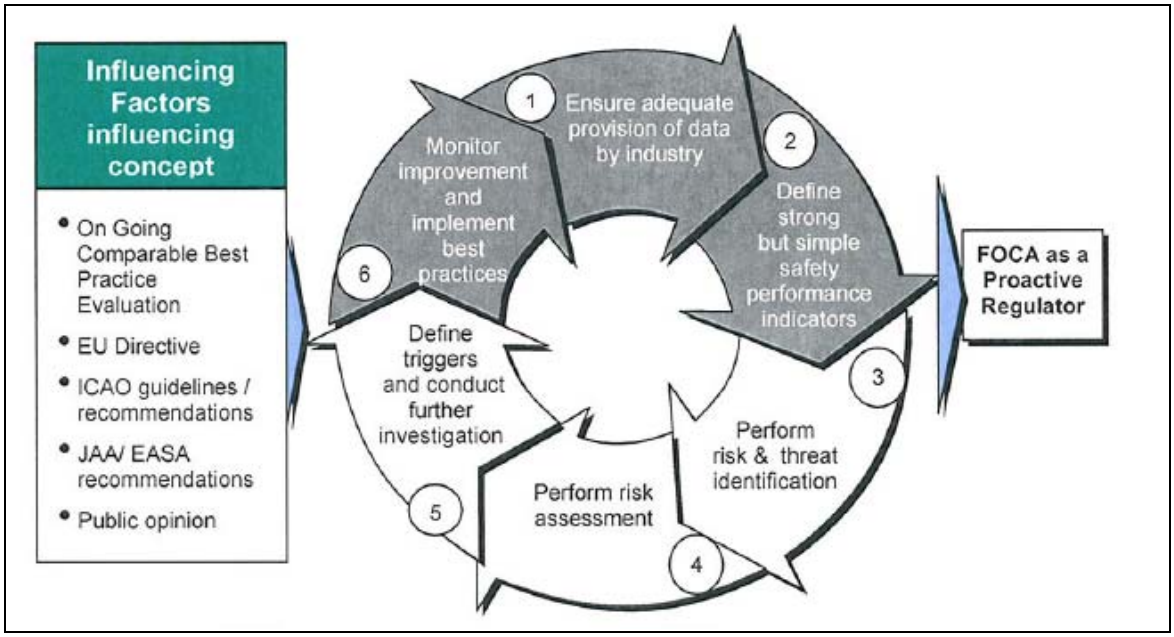


Figure 6-4: Principles of FOCA's proactive safety regulation

Each of the steps is defined in more detail in table 6-2, providing an overview of the SRM activities:

	1. Ensure adequate provision of data by industry	2. Define strong simple safety performance indicators	3. Perform risk and treat identification	4. Perform risk assessment	5. Define triggers and conduct further investigation	6. Monitor improvement and implement best practice
Input	• Industry SMS input • Audit/inspection findings	• European levels of safety • Swiss levels of safety	• Request for analysis/report • Trend indications • Occurrence report • Finding tags	• Description • Severity • Frequency • Consequences	• Best practices • Provide information for decision making • Lessons learned	• ECCAIRS data • BETRA data • Risk portfolio
Tasks	• Routine data collection • Co-operate/share data with stakeholders • Comparison with external sources	• Compare with Swiss averages • Compare with international levels • Perform trend analysis	• Identify risk & threat • Hazard analysis	• Assess risks • Quantitative analysis • Qualitative assessment	• Further investigation • Define risk tolerance boundaries	• Performance-based surveillance activity • Stakeholder interaction • Comparison with industry and NAAs
Output	• ECCAIRS database • BETRA database	• Target levels of safety • Safety performance indicators	• PHA/HAZOP • Hazard identification / assessment • "Top-10" hazard areas	• Risk assessment documentation • Mitigation proposal • Risk portfolio	• Recommendations for audit emphasis • Recommendations concerning corrective actions	• Reporting to AL • Recommendations for process development

Table 6-2: Overview SRM activities FOCA

In this overview, both feedback loops as mentioned in the safety management framework can be identified. Among others, audit / inspection findings, industry SMS input and occurrence reports are mentioned as input, target levels of safety, performance indicators and a "top-10" of hazard areas are defined, a risk portfolio is built and recommendations for audit emphasis and corrective actions are given.

Concerning the implementation of the 16 principles, the following observations are made:

Principle 1 Safety Management System
In the text related to the implementation of this principle, it is clearly stated what safety management is, and that it provides a formal framework within which FOCA is able to:

- Identify risks,
- Determine in a justified and traceable manner if those risks are acceptable, tolerable or unacceptable, and
- Monitor and proactively reduce the risks.

Further, a statement is made concerning Quality Management. Reference is made to the FOCA quality control process. However, during the interviews it became clear that so far, internal experts have indeed performed one assessment of the SRM process, but that a formal quality control process within FOCA is not in place yet. This will be set up in the near future, under the responsibility of the Corporate Services Division.

Principle 3 Roles and Responsibilities
In the text related to the implementation of this principle, the key safety roles and responsibilities are laid down clear.

Principle 4 Safety Culture
In the Handbook, a lot of attention is given to the safety culture. The importance of the Safety Policy in this is stressed, and reference is made to the fact that "the SRM will assess the organisation to ensure that the safety policy is being implemented". It did not became clear to the auditors of these kind of assessments have already been executed.

An important element of a good safety culture within an organisation is the possibility of all employees, managers and people on the work floor, to speak free about their concerns, about problems within the organisation with possible consequences for safety. All employees should be actively involved in continuously learning, continuously improving, and therefore should be open for any possibilities for improvement. Against this background the auditors do find it remarkable that all interview sessions were accompanied by the deputy Director-General. It was pointed out that the main tasks of the deputy Director-General include the coordination of

international audits and visits to FOCA. The assignment of this task to the deputy Director-General was a direct result of the experience with audits of FOCA in the past. The auditors confirm that the role of the deputy Director-General during the visits had mainly a coordinating and facilitating character. Nevertheless, the auditors were a few times reminded of their mandate, when questions were asked that were considered to be out of scope.
The auditors stress that they do not have the impression that the outcome of the audit has been affected by the occasional interference of the Deputy Director-General during the interview sessions.
It is well understood that past experience may have shown that the presence of top ranking FOCA management during audits is required to avoid misunderstandings. However, from a wider perspective this is also regarded as a sign that the safety culture within FOCA is not yet fully developed to a level of maturity that unconditionally promotes trust and openness concerning safety information exchange.

Principle 5 Competence and Training

It is very positive that a lot of attention is paid to resources, competence and training of the staff, in the Handbook as well as, on a higher level, in the Safety Policy. During the interviews the auditors were informed that there has been mandatory training in the SRM principles for all safety employees, safety experts and management, for each group on a different depth. During a second training session, the trainees provided input for (procedural) improvements. After adjustments (implementation of FAA HAFAS taxonomies) new training will be provided. Recurrent training will be provided in future as well.

Principle 8 and 9 FOCA Risk Management

The FOCA Risk Management process is described in detail in the Handbook and in supporting documentation as the FOCA Preliminary Risk Assessment Process (ref. 34). First of all it explicitly states that *"the monitoring of aviation safety is an essential part of the FOCA regulatory function. By monitoring the safety performance of the aviation system, FOCA can assess whether the safety risks are being properly controlled by the industry and public and can identify areas where safety may need to be approved"*. Different safety data are available and used by FOCA to monitor these safety risks, for instance accident and incident data, occurrence reports, incident reports, surveillance data et cetera. In addition, it is mentioned that risk assessment and trend monitoring are vital components as well. Reference is made to a common approach to risk assessment:

- Identification of hazards that lead to accidents or incidents;
- Evaluation of the safety risk;
- Implementation of a risk mitigation strategy;
- Monitor of mitigation strategy results.

The process description continues with the scope of the FOCA risk management and a categorisation of risks. Three types are identified, namely initial risk, current risk and residual risk. Reference is also made to the options FOCA has to control risks: options intended to reduce the rate of occurrence and options intended to limit the consequences of an event due to the hazard once it has occurred.

Concerning hazard and risk analysis, reference is made to a risk classification (varying from negligible to totally unacceptable) and to the fact that risk can be reduced – against certain cost. The ALARP triangle is used for this. Reference is also made to the importance of risk monitoring to be able to monitor trends.
A complete overview of the risk assessment process is given in appendix C of the Handbook (six stage framework). An overview of the FOCA risk management activities is provided in figure 16 – 18.

FOCA now has and maintains a risk portfolio and a "List of Top Safety Risks". A ranking has been set up (H/M/L risk, priorities) and mitigation actions for the Top Safety Risks are defined. These form to-do lists for the Safety Departments. The monitoring of the implementation / realisation is a key task of the SRM Division.

Principle 10 Target Levels of Safety
With the implementation of principle 10, FOCA has set Target Levels of Safety (TLS) for the operation of the Swiss Aviation Industry. The TLS are the result of a European benchmark. As the TLS are formulated on a rather high level, a safety target for accidents and a safety target for fatal accidents, more specific TLS are necessary if the aim is to use TLS in decision-making. Further, actually using the above mentioned TLS for "ranking Switzerland" requires a lot of national data before conclusions can be drawn.

Principle 11 and 12 Monitoring and improvement
As stated in the Handbook, the arrangements for monitoring should as a minimum identify and record any deterioration in the performance of safety significant systems. Safety performance indicators defined by the SRM office are used to systematically oversee an improvement of aviation safety in Switzerland, which will focus resources. This dedicated role of safety performance indicators, together with a target as depicted in Figure 19 of the Handbook, stresses the importance of a good reporting culture within the industry. Meeting the targets is strongly influenced by reporting. It is therefore not so easy to "ensure adequate provision of data by the industry".

With the procedures described in the Handbook and supporting documents, the missing items mentioned in the original REACH report are well covered – on paper. The next question is about the actual implementation of these procedures within FOCA. Are the procedures *used*? Does FOCA comply with its own procedures?

It appears to the auditors that this is indeed the case. At first, there is evident commitment of the management, and training in the well described system is indeed provided. Further, the contents of the different reporting documents provided by the SRM Division support this opinion as well. *Safety Findings Summaries* are prepared, providing a statistical overview of the audits and inspections by the FOCA Safety Divisions. Are these Summaries only providing figures (amount of audit / inspections, amount of findings, categorized), in quarterly *Safety Performance & Surveillance Summaries* an analysis of the audit/inspection findings and occurrence reports is provided. Noteworthy categories of incidents and findings are identified, recommendations are given to the (sections of the) Safety Divisions and trends in the occurrence data are monitored. Safety Findings Summaries are distributed to the FOCA Board only, the Safety Performance & Surveillance Summaries to the FOCA Board and Section Heads of the Safety Divisions.

An overview of the audit and inspection findings, planning ratios and the result of the safety analysis of significant findings is also provided in monthly *Audits & Inspection Reports*, together with an overview of the status of SRM recommendations. These monthly reports are flagging key items, show the highlights of last month, but again only to the line management. It is their responsibility to inform their employees. Safety Bulletins are provided to highlight issues which came up to support the solving of these issues by the division managers and section heads.

Besides the reporting SRM provides also input for the inspection programs of the safety divisions. The inspection program of for instance the Safety Division Flight Operations runs 3 year. It consists of a fixed part and a variable part with the latter focussing on specific items. In autumn of each year there is a planning week for the details of next year's inspection program, based on feedback of last years inspections and input from SRM.

It was mentioned a few times that the reporting is only to the management. Apart from the fact that it is important to provide the information to the sector parties (finally *they* are the ones who have to provide safe operations), it is also important to realise maximum involvement of the employees on the working floor (they are the ones who are supervising, certifying et cetera), as already mentioned in paragraph 6.3.1. One of the tools for this is *providing information to them*

as well, information concerning the positive and negative results of the new structure, the new procedures, the safety and risk management, et cetera.

6.3.3.2 Conclusions concerning the implementation of recommendation 6-3 and 6-4.

Given the information provided above, it can be concluded that the recommendations are implemented, not only on paper, but also in daily practice. As also mentioned in paragraph 6.3.1, there is room for further improvement concerning the continuous involvement of all experts available within the organisation. An instrument to realise this could be the improvement of feedback towards the working floor level. Summarized:

Recommendation	**Implementation**	**Management support and sustainability remarks** ***Suggestions for further improvement***
Recommendation 6-3: Development of a safety performance data monitoring process	Largely fulfilled	Top-down support is there, however, the involvement of the employees on the working floor is equally important as well.
Recommendation 6-4: Development of a formal process for threat identification		*An instrument could be the improvement of feedback towards the working floor level.*

6.3.4 Oversight of Skyguide

As the recommendations 6-5 and 6-6 are both related to the oversight of Skyguide, they are dealt with together.

Recommendation 6-5: Initiation of surveillance regime for oversight of Skyguide
It is recommended to FOCA to implement as a matter of urgency, a short term surveillance regime, based on the new philosophy, to ensure that actual oversight of Skyguide commences with immediate effect.

Recommendation 6-6: Reviewing staffing level related to evaluation of ATM safety cases
It is recommended to FOCA to conduct a critical analysis of the staffing levels at FOCA needed to face the tasks ahead to Skyguide oversight and the need to approve safety cases. If this analysis reveals the need for additional resources and capabilities, it is imperative that these resources are made available.

Compared to the situation observed in 2003, oversight of Skyguide has changed. It is no longer virtually non-existent. Based on documents as *Skyguide: Aufsichtsphilosophie BAZL* (ref. [39]), the further developed *ANS Sicherheits-Aufsichtskonzept* (ref. [40]) and the *Safety Oversight Manual for Air Navigation Services* (ref. [41]), actual oversight of Skyguide (inspections and audits) has started at the end of 2003. The number of audits and inspections increased in the years that followed. The supervised activities varied from ESARR compliance / SES certification up to TWR/APP/ACC activities, ATIS/METEO services, airshows, the licenses of controllers on duty et cetera. The audits and inspections have a rolling 12-month planning, with an intermediate revision after 6 months.

The department responsible for the supervision of Skyguide, the Air Navigation Services Department, has a staff of 9 persons, including the manager. The staff consists out of one experienced, ISO certified lead auditor, two operational specialists (no ATCO experience, but trained in ATC), two technical specialists (former SWISS pilots, one electrical engineer and one software engineer) and two additional staff (for non ANS businesses). Currently there is one vacancy. Hence, for ANS audits/inspections there are 5 specialists available, but only one is really qualified to perform audits.

This limited capacity appears to create problems. In the last three years, FOCA had to contract external auditors from Swedavia to assist FOCA in auditing Skyguide. Swedavia audited the fields of Training and Selection, Skyguide Department Technics, Apron Control Units (GVA/ZRH), ACC Units (GVA/ZRH), TWR/APP Units (GVA/ZRH) and Skyguide (Safety) Management. The last audit performed by Swedavia was in June 2006.

The limited capacity also became clear in the last few months. As the oversight of ESARR compliance scheduled for 2005 and the first half of 2006 had to be postponed to the second half of 2006 because of delays in implementation within Skyguide, there was no capacity left to carry out inspections in the last 6 months. Understaffing is also felt in the fields of METEO and CNS. Experts are missing.

Besides capacity, it appears that the knowledge gap can sometimes create problems, too. During the interviews at Skyguide it was mentioned that the operational expertise, necessary to perform operational inspections, is not very good. It was even questioned whether all the inspectors were sufficiently qualified to do operational inspections. From the other hand, it was mentioned that the FOCA inspectors were well accepted and appreciated, that the experiences within the ESARR certification process were very good, that the competence is clearly growing and the quality of the audits is improving.

Concerning safety cases, the knowledge gap appears to be a problem as well. Major safety cases can be very complex and requiring an in-depth knowledge. During the interviews it was stated that this in-depth knowledge is not really available. As a result, the main focus of FOCA is on the process: is the hazard identification performed correctly, is expertise available (within Skyguide), are mitigating measures in place, et cetera.

The UAC case is an example of the active role of FOCA in supervising Skyguide. At the start of the project, FOCA had problems assessing the case due to a lack of resources and experience. During the project, new staff was appointed, and FOCA was more and more able to express concerns. The main problem was missing evidence. At batch 8, the last batch, a go or no-go decision had to be made. To be able to make this decision, FOCA performed a deep assessment (2 persons for 2 weeks) and came up with a list of all missing evidence. A postponement followed, and new evidence was provided by Skyguide. For FOCA this new evidence was still not satisfactory and therefore had to decide to reject the case.

Concerning regulation, Skyguide is clearly missing some kind of guidance. It is not clear for Skyguide how FOCA is interpreting the different regulations. As FOCA is not a consulting company, it is not up to FOCA to actually help Skyguide. It is up to Skyguide to interpret the regulations and provide FOCA with evidence of how they will comply. A pro-active attitude is to be expected. From the other hand, providing some kind of explanatory and advisory material is part of the Aviation Authorities job as well. Not exactly telling how Skyguide should comply, but the FOCA interpretation of the regulations should at least made clear.

6.3.4.1 Conclusions concerning the implementation of recommendation 6-4 and 6-5

During the investigation it became clear that the oversight of Skyguide has changed. The situation that oversight of Skyguide is virtually non-existent is no longer valid. FOCA supervises Skyguide actively. They have to be convinced by facts, not any longer by good faith in Skyguide. Skyguide has needed to get used to that. Beside some doubts about the competence of FOCA inspections when performing operational inspections, FOCA oversight is considered to be “O.K.” by Skyguide. FOCA is growing in their role of supervising Skyguide.

Concerning regulation, the opinion of Skyguide is quite different. Skyguide is missing some kind of guidance. As FOCA is not a consulting company, it is up to Skyguide to interpret the regulations and provide FOCA evidence of how they comply. From the other hand, providing some kind of explanatory and advisory material is part of the Aviation Authorities job as well. At least the FOCA interpretation of the regulations should be made clear.

Given these considerations, it can be concluded that recommendations 6-5 and 6-6 are largely fulfilled. Attention should be paid to the availability of sufficient, properly qualified experts. Summarizing the state of implementation yields the following picture:

Recommendation	**Implementation**	**Management support and sustainability remarks** ***Suggestions for further improvements***
Recommendation 6-5: Initiation of surveillance regime for oversight of Skyguide	Largely fulfilled	The improved oversight of Skyguide has full management support. It is in correspondence with the new FOCA Safety Policy. *Attention should be paid to the staffing level and to the regulatory part of the work of FOCA.*
Recommendation 6-6: Reviewing staffing level related to evaluation of ATM safety cases		

6.3.5 Airline oversight

Recommendation 6-7: Strengthening the surveillance regime over the airline operators
It is recommended to FOCA to:

- sharply increase the surveillance of the operators;
- conduct audits and inspection when awarding or renewing AOC licenses, regardless of whether JAR-Ops could be interpreted such that inspections are not required;
- analyse the findings of audits across the surveillance activity with the purpose of finding root-causes and identifying adverse trends;
- take findings of previous audits into account in subsequent audits and verify implementation;
- ensure that audit findings are brought to the attention of the certification inspectors;
- review the new audit program for its feasibility and adapt it as needed, regardless of JAR or ICAO recommended audit intervals;
- perform a first risk assessment and use the results to focus the audit program in accordance with the findings.

Also concerning airline oversight the current situation is quite different. Three years ago, the surveillance regime was virtually non-existent, due to the high burden on inspectors certifying airline operators according to JAR-OPS 1. As a result of the NLR investigation, the decision

was taken to revitalize the inspection program. The first action taken was to clearly split the certification activities and surveillance activities, to avoid that in future, a high burden for certification would marginalize the surveillance program again. Two teams were created, Team Certification and Team Surveillance, with strictly separated responsibilities. The current organisation of FOCA is an institutionalization of this set-up. Within the Safety Department Flight Operations, there are now separate units for “Certification Flight Operations” and for “Surveillance Flight Operations”. Between these two units, there is more or less a “brick wall”. The units do not exchange personnel on a temporarily basis to relieve in workload.
For helicopter flight operations, certification and surveillance tasks are still performed within a single unit. It is advisable to make a same kind of separation here as well.

The new inspection regime started in 2004. An inspection program for 3 years ahead was planned. It consists out of a fixed part (quality system audits, base inspections, flight inspections, training inspections et cetera) and a variable part, focussing on specific items. Specific items are based on feedback of last year’s inspections and input from SRM.

For each inspection a special “inspection folder” is used. A standard checklist is defined, findings and open items from previous inspection are summarized (currently a specific EXCEL type tracking system is used, next year all will be integrated in a specific database system BETRA). Inspections are normally carried out with 2 inspectors. One of them needs to have the proper type-rating. Results of the inspections are findings and recommendations. Findings are tracked by FOCA with a due date. If proof of action has been received, the finding will be preliminary closed. During the next inspection the item will be re-inspected, and if satisfactory the finding will be closed. Recommendations are not tracked.

It is also possible that findings are related to certification (for instance Operations Manual deficiencies). In that case the finding is handed over to the Certification Unit and they will take action (request for revision). Inspection reports are sent to the Certification and Surveillance units and to the SRM Division.

Concerning staffing, the number of Flight Operational Inspectors (FOIs) increased significantly. In 2003, there were only 7 (fixed wing) FOIs. At this very moment, there are 20 (fixed wing) FOIs, of which 7 are working in Certification and 13 in Surveillance. For helicopter operations, there are 7 FOIs. Together with 2 Inspectors for Synthetic Training Devices, 2 Theory inspectors and 1 Station Facility Inspector, the total amount of inspectors is 33.

Despite the significant increase, the staffing level still seems to deliver some problems. External companies perform Quality Assurance audits and Ground Station Facility checks. One FOCA

inspector assists. Inspectors of FOCA perform follow up audits, if necessary (in case of findings). FOCA also hires FOIs from CAA-UK for flight inspections on aircraft no FOCA inspector is rated on. The responsible manager would be very pleased to double the amount of inspectors. At this very moment, a total of approximately 100 fixed-wing audits/inspections are carried out, and approximately 70 rotary-wing.

The more strict/intense surveillance regime of FOCA (in terms of numbers, regularity and quality of flight inspections) is confirmed by the airlines interviewed. Both quantity and quality has improved. As was stated during one interview: "*They have the qualifications needed. There is still room for improvement, but the trend is o.k. I see a stronger and more competent authority*". Complaints were about the long delays for approval of documentation, the delayed implementation of EASA Part M, the missing single contact point for certification matters and the communication and coordination between both the Certification and Surveillance teams.

6.3.6 Conclusions concerning the implementation of recommendation 6-7

The oversight of airlines changed significantly over the last three years. The surveillance regime is now much more strict and intense. Clear inspection programs have been set-up, the responsibility for execution of the programs is laid down, inspection procedures are defined, etc. The staffing level has increased with well qualified inspectors, but remains a bottleneck. A reasonable organisational separation was made between Certification and Surveillance (fixed wing). A same kind of separation is advisable for rotary wing.
The conclusion is that recommendation 6-7 is largely fulfilled. In summary:

Recommendation	**Implementation**	**Management support and sustainability remarks** ***Suggestions for further improvement***
Recommendation 6-7: Strengthening the surveillance regime over the airline operators	Largely fulfilled	Full management support, staffing level still a bottleneck despite the already significant increase. *Further increase of staffing level; separation between Certification and Surveillance (rotary-wing).*

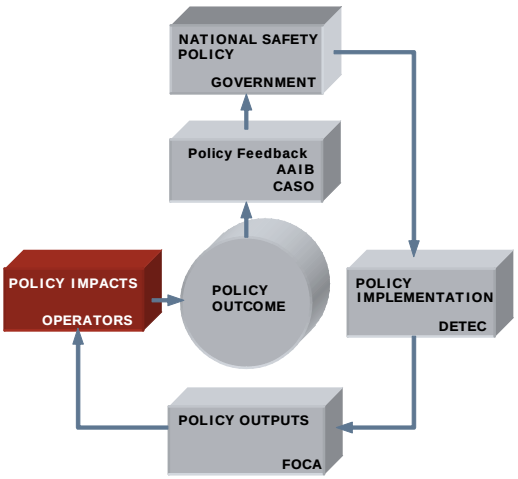
6.4 Conclusions concerning the implementation of the recommendations given

Summarizing the states of implementation of all the recommendations given to FOCA, complemented by miscellaneous observations or remarks regarding management support and sustainability, yields the following picture:

Recommendation	Implementation	Management support and sustainability remarks ***Suggestions for further improvements***
Recommendation 6-1: Separation of safety regulation and aviation policy within FOCA	Fulfilled	The new defined corporate structure and business model has the full support of the (top) management. The implementation led to changes in the position of the employees on the work floor. A danger of frustration exists. *For future sustainability, attention should be paid to broad acceptance and management style used.*
Recommendation 6-2: Formulation of a FOCA safety policy	Largely fulfilled	Full management support for the primacy of safety and the ambitions formulated. Sustainable.
Recommendation 6-3: Development of a safety performance data monitoring process	Largely fulfilled	Top-down support is there, however, the involvement of the employees on the working floor is equally important as well. *An instrument could be the improvement of feedback towards the working floor level.*
Recommendation 6-4: Development of a formal process for threat identification		
Recommendation 6-5: Initiation of surveillance regime for oversight of Skyguide	Largely fulfilled	The improved oversight of Skyguide has full management support. It is in correspondence with the new FOCA Safety Policy. *Attention should be paid to the staffing level and to the regulatory part of the work of FOCA.*
Recommendation 6-6: Reviewing staffing level related to evaluation of ATM safety cases		
Recommendation 6-7: Strengthening the surveillance regime over the airline operators	Largely fulfilled	Full management support, staffing level still a bottleneck despite the already significant increase. *Further increase of staffing level; separation between Certification and Surveillance (rotary-wing).*

7 The impact of the aviation safety policy – how *Skyguide* manages safety

7.1 Introduction



Each of the Chapters 4 through 11 is about a single element of the public policy process as introduced in Chapter 2. To assist the reader in maintaining awareness of which part of the public policy process is addressed in the current chapter, the diagram shown to the right hand side of this text is provided. The dark red box indicates which element is being addressed.
This Chapter 7 is about Policy Impact at Skyguide. The next chapters (8 and 9) are about the same element of the public policy process as the current chapter. This element of the public policy process is split into three chapters for practical purposes (size).

The chapter begins with recapitulating the state of safety management at Skyguide in 2003 given in Ref. 1, and the recommendations given to Skyguide in that report. Next the current state of implementation is assessed and aspects such as effectiveness, management support and sustainability are discussed. The concluding section summarizes the results.

7.2 An evaluation of safety management at Skyguide in 2003

This section summarizes the evaluation of safety management at Skyguide in 2003, given in Section 7.4 of Ref. 1. The corresponding recommendations to Skyguide are included, as well.

7.2.1 Safety organisation

The organisation of safety in Skyguide distinctly changed after the appointment of the present CEO in 2001. Safety and quality management became a staff function, reporting directly to the CEO, and safety accountability was made explicit and transparent. Safety management and risk management were introduced as separate organisational entities within the Quality & Safety department, showing commitment of executive management to implement and conduct safety management and risk management as essential processes. The organisational set-up as in 2003 was considered a significant improvement, because it reflects a clear recognition of the importance of managing safety.
Nevertheless, it was also established that safety management in 2003 was still in a developing stage and that it did not progress as planned. The efforts were mainly directed to show

compliance with governing Eurocontrol Safety Regulatory Requirements (ESARRs), and safety and risk management were not yet considered as fully effective and operational tools to control safety.
Moreover, the resources committed to the introduction of safety management, in general, and risk management, in particular, as well as the safety experience and know-how of the involved staff, appeared insufficient to deliver an effective safety management system within the required time-frame.
Against this background, the following recommendation was made:

Recommendation 7-1: Strengthening of safety management expertise and staff
Skyguide is recommended to increase level of expertise and staffing within its safety management department, and assure adequate support by operational departments for the timely introduction of an ESARR compliant safety management system.

7.2.2 Operational personnel

The operational departments were considered to be understaffed in 2003 and it was indicated that this may have and actually had serious consequences:

- Training capacity was judged to fall short, with the bottleneck in on-the-job training, and sometimes unsatisfactory provision of refresher training;
- High workload within the operational departments, occasionally leading to deployment of personnel for tasks for which they are insufficiently qualified and application of single manned operations without proper assessment of the safety impact of such operations; and
- Scarce availability of operational resources and expertise for the implementation of Skyguide's safety management system and the conduct of risk assessments.

Against this background, it was recommended to reduce shortage of air traffic controllers as soon as possible:

Recommendation 7-2: Reduction of shortage of Air Traffic Controllers at increased pace
Skyguide is recommended to reduce the shortage of functional Air Traffic Controllers at increased pace. To this end the possibilities to increase the throughput of the training curriculum shall be investigated, especially in the area of on-the-job training.

7.2.3 Technical personnel

In the interviews performed for Ref. 1, concern for a decreasing level of technical expertise and for the asymmetry of licensing and certification of air traffic service technical personnel and equipment was expressed. Although statistical evidence had not been produced, the concern

seemed justified and it was recommended to investigate licensing of technical personnel as a potential safeguard against erosion of technical expertise within Skyguide:

Recommendation 7-3: Licensing of Air Traffic Control technical personnel
Skyguide is recommended to investigate the practicalities and potential effectiveness of a licensing program for Technical Personnel. The eventual set-up of such a program shall be in agreement with Eurocontrol ESARR 5 requirements for Technical Personnel.

7.2.4 Safety policy

Version 1.0 of the Skyguide Safety Policy, dated 21 October 2001, and reproduced in Section 7.3.1 of Ref. 1, was considered a clear and complete description of the company's vision and strategy regarding safety. The following shortcomings were identified:

- A lack of specification of who has the final accountability for safety within the organisation; and
- A lack of a statement extending the safety policy to sub-contractors.

No formal recommendation was given in this respect.

7.2.5 Safety monitoring

In 2003, Ref. 1 considered the basic safety occurrence reporting mechanisms to be in place within Skyguide, by availability of

- Operational Internal Reports;
- Air Traffic Incident Reports and
- Safety Improvement Reports.

However, safety monitoring, based on these reports, still appeared to have an ad-hoc character. A major flaw in the overall monitoring process was the poor reporting culture within Skyguide. The Swiss legal framework contributed to this situation, as confidential reporting of safety occurrences was not supported.

Recommendation 7-4: Enable confidential incident reporting
Skyguide is recommended to work with FOCA and DETEC, on the establishment of proper adaptations to current Swiss legislation in order to enable confidential incident reporting, with adequate safeguards for protection against judicial prosecution, and in accordance with ICAO Annex 13 [para. 5.4.1, and 8.1-8.3].

7.2.6 Threat identification

The TriNET auditing programme appeared to be a well-organised and effective contribution to the identification of potential safety threats. Apart from the results from the audit programme, threat identification within Skyguide showed to some extent an ad-hoc character. Skyguide did

not maintain a risk portfolio identifying and prioritizing potential threats, arising from external factors or changes in operational procedures.

Recommendation 7-5: Definition and maintenance of a risk portfolio
Skyguide is recommended to define and maintain a risk portfolio that provides an inventory of all identified threats to Skyguide's operations and means to prioritise most severe risks in a structured way.

7.2.7 Risk assessment

In 2003, risk assessment was still in an early stage within Skyguide. Firm initial steps had been taken, and a number of safety cases had been initiated. However, the development and performance of risk assessments had been assigned to a single person, which was considered a gross under-estimation of the required effort.
Without increased staff and sufficient operational support it was considered neither feasible to introduce meaningful risk assessment according to ESARR 4 standards within the timeframe required by Eurocontrol, nor to keep pace with the operational decision making processes it must support.

Recommendation 7-6: Strengthening of risk management expertise and staff
Skyguide is recommended to increase level of expertise and staffing within its Risk Management department, and to assign high priority to support of operational and technical departments in the process of performing safety cases.

7.2.8 Safety actions

Whereas the safety actions arising from the TriNET auditing process appeared to be well organised and effective, the process of identifying and performing safety actions arising from internal incident reporting and investigation appeared to be less effective. The latter process was mainly hampered by some reluctance to report and insufficient personnel for incident investigation.

Recommendation 7-7: Review staffing level for internal incident investigation
Skyguide is recommended to ensure that internal incident investigation processes are not hampered by lack of qualified personnel or other resources.

7.3 The recommendations' states of implementation in 2006 and an evaluation

7.3.1 Safety organisation, risk management and safety actions

Due to their close relation, Recommendations 7-1 and 7-6, on strengthening of safety respectively risk assessment expertise and staff, are treated together with Recommendation 7-7 on reviewing staffing level for internal incident investigation:

Recommendation 7-1: Strengthening of safety management expertise and staff
Skyguide is recommended to increase level of expertise and staffing within its safety management department, and assure adequate support by operational departments for the timely introduction of an ESARR compliant safety management system.

Recommendation 7-6: Strengthening of risk management expertise and staff
Skyguide is recommended to increase level of expertise and staffing within its Risk Management department, and to assign high priority to support of operational and technical departments in the process of performing safety cases.

Recommendation 7-7: Review staffing level for internal incident investigation
Skyguide is recommended to ensure that internal incident investigation processes are not hampered by lack of qualified personnel or other resources.

An organisation chart of Skyguide, with emphasis on safety, has been inserted in Figure 7-1. Safety management is organised as a section directly reporting to the CEO. The Safety Management section consists of three subsections (Ref. 7):

- Systems Safety Management, comprising six full time equivalents (FTEs), including the head. This subsection concerns risk assessment and mitigation for changes of the ATM system. The role of Systems Safety Management is shifting from performing these assessments itself to supervising and providing expertise the performance of these assessments by the respective Operations or Technics department;
- Audit Management, staffed with three FTEs, including the head. One of the FTEs is currently a vacancy. The Audit Management subsection is responsible for the internal audit process and it coordinates the TriNET audit program that Skyguide performs together with the German and Austrian Air Navigation Service Providers DFS respectively Austro Control; and
- Occurrence Management, staffed with about 7.5 other FTEs, including the head. This section deals with the investigation of ATM operational occurrences which are significant for safety and takes care that corrective action is taken.

Apart from these subsections, a safety expert is employed as a staff member.

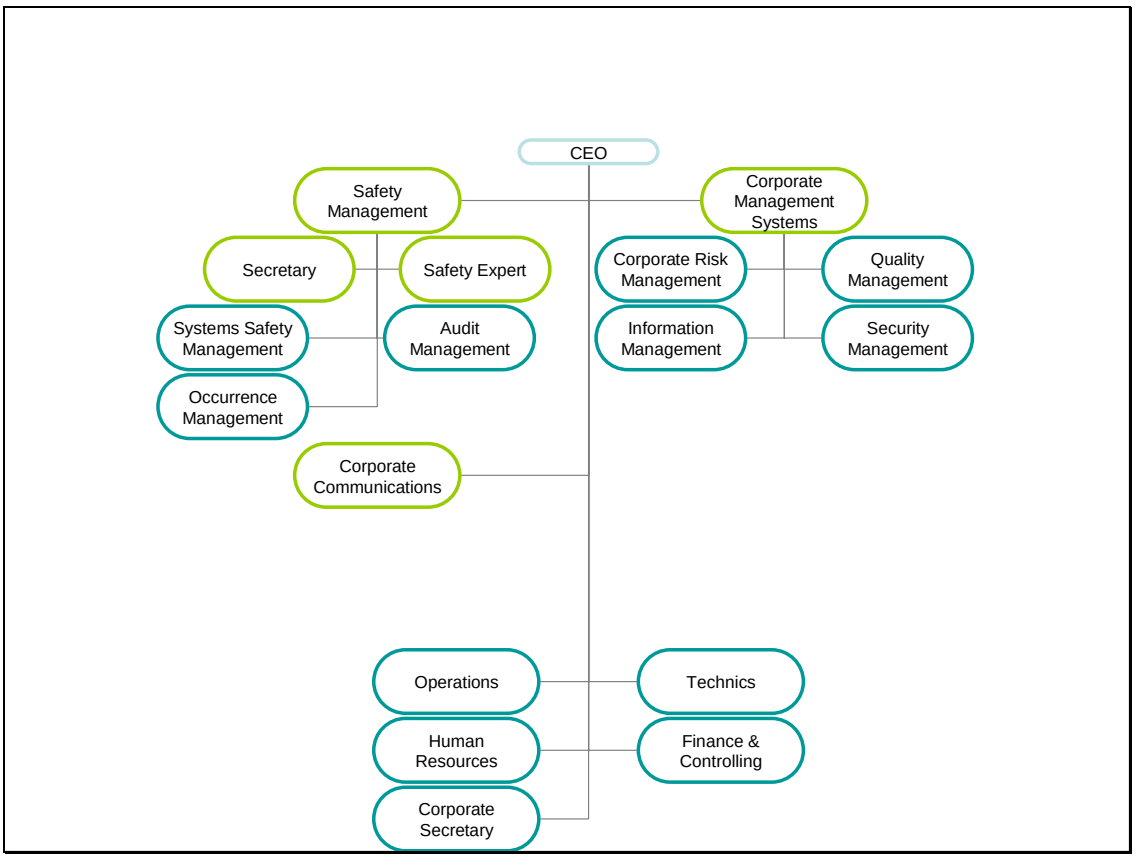


Figure 7-1: Organisation chart of Skyguide (with emphasis on safety)

The Safety Management section –excluding the secretariat– hence is staffed by about 17.5 full time equivalents, plus a vacancy for one (the figures are of 1 July 2007 from Refs. 8 and 9). This is a large increase of the number of staff with respect to the situation at 1 January 2003, when there were about 7 FTEs concerned with comparable safety management functions (2 FTEs in safety management, 1 in risk assessment, 2 in audit management and an estimated 2 in occurrence management).

Apart from the increased staffing of the safety management subsections, it is important to note that safety management is now a separate section, whereas in 2003, it was combined with quality management and information management in a Quality and Safety Management department. This reorganisation has been motivated by the increasing size of the department and, in particular, the CEO's recognition that the various safety management processes were in need of increased acceptance, implementation and actual usage on the operational level. The new manager of the Safety Management section has extensive operational experience and expertise as a former pilot and safety manager of Swiss/Swissair. Despite his lack of

background in ATM, this makes him particularly suited for improving safety management practice in the operation.
Another reorganisation aspect is that the Occurrence Management subsection did not exist in 2003.
It is noted that safety management is now a section containing subsections Systems Safety Management (i.e., risk assessment and mitigation), Audit Management and Occurrence Management, whereas, in 2003, it was a subsection on the same level. This is a logical restructuring in view of safety management generally being considered as the overall process, with sub-processes risk assessment and mitigation, auditing, et cetera.
The former head of Safety and Quality Management is now heading the Corporate Management Systems section, which contains the subsections (Ref. 7):

- Corporate Risk Management (new);
- Quality Management;
- Information Management; and
- Security Management (new).

Apart from the Safety Management section, several safety platforms exist within Skyguide:

- The Safety Steering Group, consisting of members of Executive Management and the Safety Manager, and representing the highest authority regarding safety. This group meets every 4 to 6 weeks, defines Skyguide's overall safety guidelines and parameters and for instance approves safety cases;
- The OPS Safety Group, consisting of Domain Safety Managers (previously Safety Officers) from the Operations division, discussing operational occurrences and exchanging experience between units;
- The TEC Safety Group, where the manager of the Technics division meet to discuss safety aspects of technical systems; and
- The SIR Safety Panel, meetings of staff of the Operations and Technics divisions to discuss Safety Improvement Reports.

The latter group and panel had not yet been recognized as explicit safety platforms in Ref. 1.

Regarding staffing, an increasing number of employees outside the Safety Management section (Ref. 8) is involved in safety management:

- 6 FTEs in the Operations division; and
- 9 FTEs in the Technics division.

This is a large increase compared with the 1 January 2003 figures of 2 + 2 FTEs (Ref. 8).
The 6 FTEs in the Operations division concern ATCos temporarily dedicating themselves full time to risk assessment and mitigation. It is not clear which part of the effort from the Technics division is dedicated to this.

Regarding the expertise within the Safety Management section, it has been identified that:

- The head of Safety Management is a former pilot and safety manager of Swiss/Swissair;
- The head of Occurrence Management is (also) an air traffic controller;
- All Occurrence Management staff has been trained by Eurocontrol; and
- Since 2003, when the Systems Safety Management subsection consisted only of the present head, it has been reinforced by two people from within Skyguide, one trainee controller that changed to safety, a pilot with education in risk management[3] and a risk specialist from another industry.

In addition, it is noted that the Systems Safety Management section in 2005 has given one week training to 40 Skyguide employees in risk assessment (80 planned for 2006), and that new Skyguide employees get a 1.5 hour briefing in safety management.

Safety management and risk assessment and mitigation principles, responsibilities, procedures and processes have been developed and formalized in extensive documentation; see for instance the Skyguide Safety Assessment Framework (Ref. 10). Inside the company, this formal part of safety management and risk assessment and mitigation is recognized as being of good to excellent quality.

Within the framework for the present report, no thorough assessments of the framework (Ref. 10) and of safety cases produced by Skyguide have been performed. It is noted that the framework contains documentation regarding:

1. Reference documents – constituting the basics of Skyguide's safety management system;
2. Context level – indicating the approach to safety assessments;
3. Related processes – indicating the link between safety assessment and changes;
4. Procedure level – describing how safety assessments shall be performed;
5. Support level – providing guidance, templates and tools to support the performance of risk assessments;
6. An "academic" example application;
7. Level 3 training in risk assessment of minor changes – presentations on various steps in risk assessment; and
8. ESARR 4 and various documents related to its implementation.

The amount of documentation is more than adequate. The framework is evidence of the effort spent and expertise built up in risk assessment and mitigation – indeed a considerable step forward has been made. Although the framework generally seems comprehensive and of good quality, it leaves, together with other documentation available for the research performed for this report, open the question whether Skyguide has really mastered difficult risk assessments of

[3] By November 2006, information was received that this person has left Skyguide.

large changes. Guidance on risk assessments for major changes is still in draft, and the Safety Decisional Paper on UAC-CH (Ref. [46]) provided for this study does not shed light on Skyguide's expertise in this sense. Insufficient expertise regarding specific difficult assessments does not necessarily imply a flawed risk assessment and mitigation process – such a gap may be dealt with by hiring specialized expertise for difficult risk assessments.

Concerning the actual implementation and acceptance of safety management in general, it has been noted that within the Operations and Technics divisions there are persistent perceptions that safety management is working in the background and insufficiently alive. Line managers are sometimes perceived to consider safety management procedures as a burden and to approach them with a tick box mentality. Some people see changes and wonder why no risk assessment has been performed.

Regarding practical application of risk assessment and mitigation the following is observed:

- On an annual basis, several dozens of safety cases are produced and presented to FOCA. Most of the safety cases are for relatively minor changes, some are for bigger changes and these safety cases may be complex;
- Most of the safety cases have been approved by FOCA, but there are a few exceptions where no approval has been given – the case for a single Swiss Upper Area Control (UAC-CH) is a well-known example; and
- Risk assessments are not yet performed fully according the framework (Ref. 10).

It is positive to see that risk assessment and mitigation in a couple or years has developed from something completely new to an increasingly standard process in Skyguide.
The situation is not without challenges yet. Risk assessment and mitigation is a difficult subject and whereas the disapproval of the safety case for UAC-CH may be partly due to developing acceptance criteria on the side of FOCA, it is also widely recognized within the company that safety was not yet sufficiently demonstrated.
Although resources and expertise is often a challenge in a quickly changing context, inadequate staffing does not seem the problem: although no benchmarking for safety assessment and mitigation staffing has been performed in the framework of this report, the amount of 6 FTEs within the Safety Management section and 6 FTEs of ATCo expertise does not seem inadequate.
The documentation available for this research leaves insufficient expertise as a possible explanation for the failure of the UAC-CH case: for large changes it may be very complicated to perform a risk assessment and to demonstrate safety of the changed operation, especially in the context of limited time and resources. Mistakes may be made, important details can be overlooked or failures to develop and document a convincing argumentation may occur. Such occurrences should however be caught by independent critical review.

Therefore, a more adequate explanation seems that for UAC-CH, the focus has rather been on timely implementation of changes and the *availability* of safety cases required for that, than on firmness of evidence of acceptable safety of changes. This would be a manifestation of safety being regarded as other people's business instead of safety being everybody's first priority. When safety is everybody's first priority, the possibility of people making mistakes and omissions in safety assessments, is recognized, acknowledged and taken care off by independent critical review and documentation enabling such review – safety cases may not be accidentally flawed. Similarly, expertise insufficient to achieve convincing argumentation should have been recognized and dealt with.
Although such reviews are to be performed inside the company, it is positive to note that FOCA functions as a safeguard by double-checking risk assessments for major changes.

Regarding the investigation of occurrences, there is, apart from the recognition of its importance from an organisational point of view, evidence of actually improved performance:

- Although this is not apparent yet from Skyguide's Annual Report 2005 (Ref. 11), all Skyguide representatives interviewed in this respect indicate a significant increase in the number of Operational Incident Reports (OIRs)[4]; and
- Despite this increase in reports, the backlog in investigating operational incidents has disappeared and initial and final reports are generally produced in standard periods. Staffing of Occurrence Management is judged adequate.

Compliance of Skyguide's safety management and risk assessment and mitigation processes to ESARR 3 respectively 4 (Refs. 12 and 13) is currently assessed by FOCA as part of the certification of ANSPs against the common requirements for the provision of air navigation services in the single European sky (Ref. 14 and underlying regulations).

It is concluded that:

- Recommendations 7-1 and 7-6 have been fulfilled to the extent that staffing and expertise of safety management and risk assessment and mitigation have strengthened significantly and are probably no longer a bottleneck for the effectiveness of these processes. Also the support of these processes by the Operations and Technics divisions has been staffed considerably better, although it is not clear to what extent the support of the Technics division concerns risk assessment and mitigation. It is noted that quality problems have occurred in safety cases. These problems might in principle be due to insufficient staffing and expertise for complex risk assessments, but the impression is

[4] Skyguide's Annual Report 2005 indicates 673 OIRs received in 2005, 1055 in 2004 and 696 in 2003.

rather that thoroughness of the assessment has not been the first priority in a context of many pressures.

Skyguide is suggested to keep a close finger on the pulse regarding quality of assessments by applying independent critical review, and to keep on developing expertise. Quality and effectiveness of the risk assessment and mitigating process is vital for continued application and acceptance.

The safety management and risk assessment and mitigation processes have not yet been recognized as ESARR 3 and 4 compliant, but the assessment process by FOCA is ongoing in the framework of certification of ANSPs against the Common Requirements for the provision of air navigation services in the single European sky.

- Recommendation 7-7 has been fulfilled. The staff investigating incidents and other events relevant to safety have been organised into the Occurrence Management subsection, which is headed by a controller. The staffing now appears adequate. Despite the increase of the number of operational incident reports, there is no large backlog anymore in investigation and reporting the occurrences.
- The management support of all of the Recommendations 7-1, 7-6 and 7-7 is clear: the large increase of staff and expertise, the organisational changes putting focus on safety management and its subprocesses, the appointment of managers with operational expertise and the involvement of a considerable amount of effort from the Operations and Technics departments are clear indicators of the active support of top management regarding staffing, expertise and operational involvement in safety management.
- Sustainability of effective safety management, and its subprocesses occurrence management and especially risk assessment and mitigation, is an important point of interest. There are persistent perceptions that actual application and acceptance of safety management and risk assessment and mitigation in the Operations and Technics divisions is insufficient and in need of further improvement.

  The appointment of a former safety manager and pilot of Swiss/Swissair as head of Safety Management, an ATCo as head of Occurrence Management and the involvement of several FTEs from the Operations and Technics divisions in safety management are good actions to address this problem. Achievement of acceptance and actual application remains a challenge.

7.3.2 Operational personnel

Recommendation 7-2: Reduction of shortage of Air Traffic Controllers at increased pace
Skyguide is recommended to reduce the shortage of functional Air Traffic Controllers at increased pace. To this end the possibilities to increase the throughput of the training curriculum shall be investigated, especially in the area of on-the-job training.

Although precise figures for the number of ATCos have not been identified in the interviews with Skyguide representatives, the common message given is that the shortage of controllers has not changed significantly since 2003. This picture is confirmed by the figures from Eurocontrol's Performance Review Report 2005 (Ref. 15), which indicates 283 ATCos in operational services for 2005, 286 for 2004 and 288 for 2003[5].

A lot of effort has been put in training new controllers, but many foreign controllers (especially from Scandinavia) have moved back to their home country and there have been a lot of retirements. It has proved difficult to find more sufficiently qualified candidates. The job image may have suffered from the Überlingen accident and issues with combining Upper Area Control in Geneva. On the job training is still a bottleneck, both in terms of capacity and percentage of trainees failing.
One strategy is to increase the training success rate by the program "Training for success", which involves, inter alia:

- Improved screening of candidates;
- Smaller classes and better support for candidates;
- Definition of performance criteria for future controllers;
- Improved monitoring of the candidates' progress;
- More time for simulator training; and
- Additional support to solve shortcoming in on-the-job training.

The number of drop-outs has reduced due to the program.
Also, it is noted that a new training centre at Dübendorf is opened in the autumn of 2006.

The new head of operations recognizes that the Training for success program alone will not solve the shortage of controllers and that out-of-the-box thinking and new initiatives are required. In this respect, the head of Operations has contacted the French research centre CENA to cooperate in investigating whether on-the-job training can be (partially) replaced by simulator

[5] Note that these figures seem hard to compare with the number of 343 ATCos in Skyguide in 2000 indicated in Ref. [1], which was taken from an earlier Performance Review Report, and with the number of 450 air traffic controllers within the Skyguide workforce indicated in the Skyguide media release of 5 October 2006 (Ref. Sk10). Apparently different definitions have been used.

training. Also he is considering collaboration with France and Germany regarding recruitment and training for the Swiss control centres. Apart from indicating the recognition of the persisting shortage of controllers, these initiatives indicate creativity and strategy of the new head of operations to handle the shortage of controllers.

Skyguide seems to cope with an ATCo staffing level that has not essentially changed since 2003. Delays have not changed despite the increasing traffic levels of the last few years. There are enough ATCos to control the air traffic, but little time is left for other tasks, although the 6FTEs of controllers for risk assessment and mitigation work is a remarkable positive exception. It has not been possible within the scope of this investigation to verify to what extent these controllers actually spend significant parts of their time on the safety duties.

It is concluded that Recommendation 7-2 to reduce shortage of ATCos at increased pace, has not been fulfilled. Due to the effort Skyguide has spent, the shortage has not deteriorated further. The new head of operations shows out-of-the-box thinking to address the problem.

7.3.3 Technical personnel

Recommendation 7-3: Licensing of Air Traffic Control technical personnel
Skyguide is recommended to investigate the practicalities and potential effectiveness of a licensing program for Technical Personnel. The eventual set-up of such a program shall be in agreement with Eurocontrol ESARR5 requirements for Technical Personnel.

There are several organisations developing approaches to demonstrate proper qualification of technical personnel.

- SATTA – the Swiss Air Traffic Control Technical Association – with members from Skyguide, airports and the armed forces, is strongly advocating licensing of technical personnel, analogous to for instance licensing of aircraft mechanics, as a solution to safeguard against erosion of technical expertise. Such licensing could also improve career perspectives for young technicians, provided it would be possible to take such a license along from one organisation to another. SATTA is actively carrying out these ideas at Eurocontrol and in Europe, but does not receive much resonance.
- Skyguide has initially approached demonstration of proper qualification of technical personnel by means of qualification sheets.
  Regarding the investigation of practicalities and potential effectiveness of a licensing program for technical personnel, Skyguide has indicated doubts regarding the suitability of licensing of technical personnel, pointing out the impracticality of a third party (the State) defining and evaluating required skills and knowledge. Skyguide also finds

licensing technical personnel a too strong means and indicates that it would be the only ANSP in Europe doing this.
Skyguide states that considerable development of a qualification system for technical personnel has taken place since the summer audit and the interviews underlying the present post implementation audit. A scheme identifying all safety related tasks has been developed, together with the associated required knowledge/ skills/ competences. Technical personnel are not allowed to perform a safety related task if the associated requirements are not met. The resulting three-level qualification regime, as part of a refined training and certification scheme has been submitted to FOCA for approval.

- FOCA has in 2005 chosen for a personnel licensing scheme as means to demonstrate proper qualification of technical personnel; this is for instance indicated in Skyguide's Annual Report 2005 (Ref. 11). FOCA has set up a coarse outline of the concept ("Grobkonzept") for such a scheme.
- Although formal feedback on the Grobkonzept has not yet been provided by SATTA, it seems that FOCA's approach is in line with SATTA's ideas. Part of the work to be done in setting up a licensing scheme is identifying those technical tasks for which a license is required and for which not. SATTA has identified the safety critical and safety relevant tasks for which they find licensing necessary (Ref. 18).

Demonstrating proper qualification of personnel of ANSPs, including technical personnel, is part of the audits currently performed in the framework of certification of ANSPs against the Common Requirements for the provision of air navigation services in the single European sky (Ref. 14). Regarding qualification of personnel, these audits are based on ESARR 5 (Ref. 19). This is in progress at the time of the post implementation audit:

- FOCA audited Skyguide with respect to ESARR 5 in the summer of 2006, and although no official results have been used for the present report, it is clear from the interviews that there were several findings; and
- The three-level qualification regime, developed in the second half of 2006 as part of a refined training and certification scheme, is believed by Skyguide to be compliant to ESARR 5 and has been submitted to FOCA for approval.

It is concluded that, whereas the interviews have not clearly identified Skyguide's investigations regarding a licensing program for technical personnel, these investigations have not resulted in the immediate development of a licensing program. There does not seem to be full management support of this approach.
The development of alternative means to demonstrate proper qualification of technical personnel was ongoing at the time of the interviews underlying the present post implementation audit. The initial means to comply with ESARR 5 proposed to FOCA in the summer of 2006,

received several findings. By the time of writing, Skyguide has submitted a refined training and certification scheme to FOCA.
For the longer term, the FOCA board of directors has decided to introduce licensing for technical personnel, and an action plan has been made.

A disadvantage of the observed difference between demonstrating qualification of the controller community and technical personnel is that technical personnel might perceive the current situation as evidence of a different appreciation of the importance of both communities for the operation. This perception is not in accordance with the increasing reliance of the operation on advanced technology and will eventually have a negative influence on motivation and safety culture.

7.3.4 Safety policy

Although Ref. [1] has not made formal recommendations regarding the safety policy, shortcomings has been identified pertaining to:

- The lack of specification of who has the final accountability for safety within the organisation; and
- The lack of a statement that extends the safety policy to sub-contractors.

Both of these shortcomings have been appropriately addressed in the latest version of Skyguide's safety policy (Ref. 20), signed by the CEO and approved by Skyguide's board of directors, which indicates full management support. The policy moreover indicates a clear first priority for safety.

7.3.5 Safety monitoring

Recommendation 7-4: Enable confidential incident reporting
Skyguide is recommended to work with FOCA and DETEC, on the establishment of proper adaptations to current Swiss legislation in order to enable confidential incident reporting, with adequate safeguards for protection against judicial prosecution, and in accordance with ICAO Annex 13 [para. 5.4.1, and 8.1-8.3].

Skyguide has actively participated in the creation of legal provisions permitting implementation of a confidential incident reporting system, both on a national level by contributing to the task force set up under the leadership of the DETEC aviation safety office and giving input to the legislative process for the amendment of the Swiss Federal Ordinance on Aviation, and on an international level by contributing to relevant Eurocontrol task force/ action group.

As a reaction to the above recommendation, adaptations to Swiss legislation are indeed in progress.

Moreover, it has been identified from the interviews and from the Skyguide Occurrence Reporting Policy (Ref. 21) that Skyguide has developed reporting within the organisation that is to some extent confidential and non-punitive.
Confidentiality to limited extent is arranged by having all OIRs (Operational Internal Reports) except for the severest (of category A and B), and all SIRs (Safety Improvement Reports) sent to the Safety Manager who de-identifies the reports before they are processed further. Line management receives only de-identified reports.
Confidentiality is relative in the present legal framework since FOCA and AAIB are legally entitled to require any information. Unless the reporter authorizes disclosure of identity and unless required by FOCA, AAIB or by law, Skyguide will not release the name of the person submitting the report.
Regarding non-punitive reporting, Skyguide has, in its Occurrence Reporting Policy, indicated not to "institute measures in respect of unintentional or inadvertent breaches of procedure which come to its attention only because they have been reported under the reporting process, except in cases involving dereliction of duty amounting to recklessness, or circumstances indicating an individual's repetitive cycle of human error".

Although no detailed numbers of OIRs and SIRs have been available to enable a quantified investigation of the effect of the new reporting policy and practice, it is remarked by many of the interviewees that these numbers have recently increased and that the process is working well.
From within the Technics and Operations divisions, there are nevertheless critical remarks:

- There are still reports being interpreted negatively instead of being welcomed;
- Some people still fear negative consequences of filing reports; and
- People do not always feel their reports are actually used for improvement.

These signs do not merit the conclusion that the new reporting policy and practice are dysfunctional, but it makes clear that significant effort and showing the right practice is needed to gain trust and reach general acceptance and application.

In principle, confidentiality could be strengthened by sending all reports, before further processing, to an external person – for instance a lawyer – for de-identification, but at this point it seems that the Safety Manager is trusted and considered sufficiently independent. The question whether it is appropriate that precisely the classes A and B occurrences are excluded from de-identification has not been addressed.

It is noted that the applied way of de-identification works better for large operational units (where many people do comparable work) than for smaller operational units or technical personnel (where a given report can more easily be correlated to particular persons). It seems hard to find a practical solution for this.
The Occurrence Reporting Policy (Ref. 21) does reflect Skyguide's effort and management support to formulate a just culture in the sense of Reason (Ref. 22). Although this may need further development and implementation, this is a good step forwards.

It is concluded that Recommendation 7-7 is largely fulfilled, since Skyguide has invested considerable efforts to promote the required adaptations to the legal framework, both on a national as well as international level and since it has, to a limited extent possible within the current legislative framework, set up confidential and non-punitive reporting. These adaptations would not have been made without management support. The new reporting process may need further development and definitely needs effort to be accepted and practiced generally, the first signs of its functioning are encouraging. Sustainability of effective incident reporting is a matter of continuous attention; more firmly established confidentiality by proper adaptations to the legislative framework is also an important ingredient for long term success.

7.3.6 Threat identification

Recommendation 7-5: Definition and maintenance of a risk portfolio
Skyguide is recommended to define and maintain a risk portfolio that provides an inventory of all identified threats to Skyguide's operations and means to prioritise most severe risks in a structured way.

Skyguide has started development and implementation of a safety risk portfolio in 2005 (Ref. 11). The portfolio has been developed by the Safety Management section and the related actions are managed by the Operations division. The risks are monitored by the Safety Steering Group for an overview on a regular basis (once per semester).
Although audit reports and Safety Improvement Reports are also mentioned as input for the risk portfolio, the risks in this portfolio are compiled on the basis of incident reports, because "Safety risks are seen most clearly when an incident actually occurs" (Ref. 17).
It has been decided to focus on the occurrences' underlying factors, since these give clues for improving safety. The underlying factors identified are:

- Airspace structure;
- Frequency separation;
- Unfrequent task;
- Training;

- Work load;
- Weather;
- Technical aspects + maintenance; and
- Handover process.

Since Skyguide's new occurrence reporting system in 2005 was only introduced in the Area Control Centres of Geneva and Zurich, these ATC units have so far been the only sources for occurrences and their underlying factors. 25 occurrence reports have been fed into the safety risk portfolio.
The progress of the portfolio's development has stocked as the translation of occurrences into the main underlying factors is problematic. Extension of the source from the ACC units to all of the Technics and Operations divisions is planned for 2006.

It is concluded that only a beginning has been made with implementing Recommendation 7-5 on defining and maintaining a risk portfolio. The vision behind the development of Skyguide's safety risk portfolio may be a good way to getting overview of the occurrences reported, insight in recurrent underlying factors and clues for effective safety actions. However, as it is set up and developed, this portfolio does not reach the aim of a high-level overview and prioritization of the most severe safety risks and threats to the Skyguide operation – it only considers "outcome" of the present operation in the form of "occurrences", and (at least until recently) only a few of the necessary occurrence sources have been used.
To reach the aim of a high-level overview and prioritization of the most severe safety risks and threats to the Skyguide operation all potential input sources for such threats need to be considered, including results from active searches for potential threats from developments outside Skyguide and results from risk assessments. Although the latter process is intended for evaluation of changes to the present situation, it may well indicate weaknesses of the present operation.

Although in an otherwise perfectly functioning safety management system a risk portfolio can be considered as a kind of redundancy, it is does not seem that Skyguide has recognized the risk portfolio of the full scope intended as an effective and efficient means for the highest management to manage the most important safety risks. Skyguide is suggested to reconsider whether a full scope risk portfolio is an effective tool to manage the most important safety risks and threats by the highest management, and to take appropriate action if necessary.

7.4 Conclusion

Summarizing the states of implementation of the recommendations given to Skyguide, complemented by miscellaneous observations or remarks regarding management support and sustainability, yields the following picture:

Recommendation	Implementation	Management support and sustainability remarks *Suggestions for improvement*
Recommendation 7-1: Strengthening of safety management expertise and staff	Largely fulfilled	Clear management support *Actual acceptance and usage need to be improved.*
Recommendation 7-2: Reduction of shortage of Air Traffic Controllers at increased pace	Not fulfilled	Due to Skyguide's efforts, the shortage has not deteriorated. Recognition of the problem and new initiatives from the new head of Operations.
Recommendation 7-3: Licensing of Air Traffic Control technical personnel	Partially fulfilled	Skyguide has submitted means to demonstrate proper qualification of technical personnel in compliance with ESARR 5 to FOCA for certification in the single European sky. Checking is in progress For the longer term, FOCA has chosen for development of a licensing scheme, although Skyguide's management at least initially did not support this approach.
Recommendation 7-4: Enable confidential incident reporting	Largely fulfilled	Skyguide has actively contributed to adaptation of the Swiss legal framework and has internally arranged reporting that is to some extent confidential and non-punitive. This would not have succeeded without management support. *General acceptance and practice of reporting needs to be improved further for sustainability. Suitable adaptations to the legislative framework are similarly necessary.*

Recommendation 7-5: Definition and maintenance of a risk portfolio	Partially fulfilled	Skyguide uses the risk portfolio to manage safety risks on a regular basis by the highest management. Only a very premature risk portfolio exists however: the input is only of occurrence type, interpretation difficult and not all necessary sources are used. Sustainability is a question mark since the effectiveness of the present portfolio is limited. *Skyguide is suggested to reconsider the scope of the risk portfolio as developed to make it into an effective tool to manage the most important safety risks and threats.*
Recommendation 7-6: Strengthening of risk management expertise and staff	Largely fulfilled	Demonstrable safety needs to be first priority. Continuing development of expertise needed. Clear management support, but acceptance and actual usage in the operational practices need to be improved for sustainability. *Skyguide is suggested to keep a close finger on the pulse regarding quality of assessments by applying independent critical review, and to keep on developing expertise. Quality and effectiveness of the risk assessment and mitigating process is vital for continued application and acceptance.*
Recommendation 7-7: Review staffing level for internal incident investigation	Fulfilled	Clear management support. General acceptance and usage needs to be improved for sustainability.

Skyguide has successfully addressed the staffing and expertise problems in safety management, risk management and incident investigation observed in 2003. The efforts indicate clear management support. General recognition, acceptance, practise and “internalization” of safety management however need further improvement for sustainability of an effective safety management system. Demonstrating safety for changes needs to have priority above other considerations. Skyguide is suggested to keep on developing expertise and especially to secure quality of assessment by independent critical review.

Despite its efforts, which have prevented the situation from deteriorating, Skyguide has failed to reduce the shortage of ATCos. The new head of operations is determined and creative in handling this issue.
Skyguide has proposed means (different from a licensing scheme) to demonstrate proper qualification of technical personnel to comply with applicable regulations, and submitted this to FOCA. The first proposed means received several findings in the summer of 2006; a further development has been submitted to FOCA and is currently checked. For the longer term, FOCA has chosen for development of a licensing scheme.
Skyguide has contributed to the adaptation of the Swiss legal framework, and has developed an internal reporting process that is confidential and non-punitive to some extent. The process still has to prove itself. Confidence and actual usage need further improvement. Suitable adaptations to the legislative framework are similarly necessary.
Skyguide does use a risk portfolio to manage safety risks on a regular basis by the highest management. However, the scope and maturity of the present risk portfolio is insufficient for an effective means to manage the most important safety risks. Skyguide is suggested to reconsider whether a full scope of risk portfolio is an effective addition to its SMS and to take appropriate actions if necessary.

A recurring problem associated to several implementations is related to insufficient recognition, acceptance and actual practice of safety management and insufficient priority for (demonstrable) safety. This has been recognized by the highest management and is addressed by considerable appropriate effort with (new) personnel and programmes such as the Individual Responsibility and Ethical Awareness Programme (IREAP) addressing:

- Independence and responsibility;
- Self-criticism;
- A resolution and feedback culture;
- Errors and dealing with them;
- Coping with the fear that comes with any specialisation; and
- Safety and quality awareness.

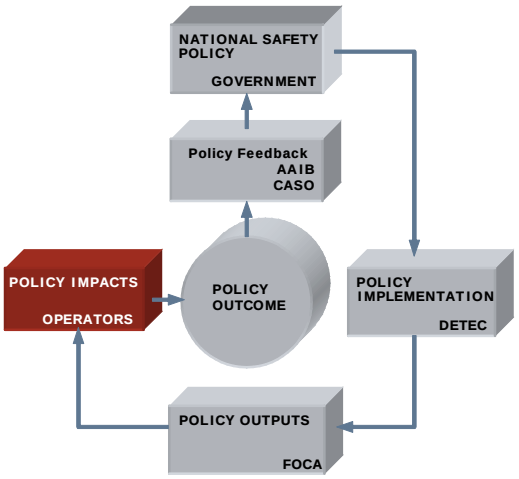
The whole staff of Skyguide has been exposed to this program and a safety culture survey is planned to monitor its effectiveness.
The top management’s recognition and action regarding the softer aspects of safety as attitudes, priority and behaviour deserve credit and support, but progress proves a lengthy process.

Several themes concerned by the recommendations are now regulated more strongly. Formal closure of such themes is now increasingly in the hands of FOCA, by means of FOCA’s supervision of Skyguide or in the audits for certification of Skyguide in the framework of provision of air navigation services in the single European sky.

8 The impact of the aviation safety policy – how *the airlines* manage safety

8.1 Introduction

Each of the chapters 4 through 11 is about a single element of the public policy process as introduced in Chapter 3. To assist the reader in maintaining awareness of which part of the public policy process is addressed in the current chapter, the diagram shown to the right hand side of this text is provided. The dark red box indicates which element is being addressed.



This Chapter 8 is about Policy Impacts at the airlines. Hence, this chapter is about the same element of the public policy process as the previous chapter 7 and the next chapter 9. This element of the public policy process is split into three chapters for practical purposes (size).

8.2 Observations concerning safety management at airlines in Switzerland in 2003

In 2003, two airlines, SWISS and EasyJet Switzerland, were selected out of a total of 24 airlines holding a Swiss Air Operator Certificate at that time to give a general impression of safety management at airlines in Switzerland. It was concluded that the safety management process at both airlines was reasonably well developed.

At SWISS, safety management was still in a build-up phase, but definitely developed in the direction of the former and highly regarded Swissair system. It was observed that SWISS was confronted with specific problems of joining two different safety cultures and operational processes. The management of SWISS addressed these problems by taking specific actions, such as the introduction of the SWISS Safety Advisory Board (SSAB) and screening of the entire pilot corps. However, the controversy between both pilot corpses remained worrisome and had the potential to increase operational risks. Another aspect was the financial pressure existing at that time, what ultimately could have had a negative effect on the safety priorities within the company and the level to which safety management was further developed according to former Swissair standards.

The following recommendations were given to SWISS:

Recommendation 8-1: Re-formulation of SWISS' safety policy
It is recommended to SWISS to re-formulate the current safety policy of SWISS in order to clearly reflect the strategy and intentions of the executive management, and to serve as a clear guideline for the entire company.

Recommendation 8-2: Continuation of the SWISS Safety Advisory Board
It is recommended to SWISS to allow the SSAB to continue its work for the foreseeable future in order to highlight latent safety threats and ensure that appropriate safety standards and procedures are implemented throughout the company.

At EasyJet Switzerland safety management was assessed above average for a fairly small airline, also as a result of extensive synergy with its parent company in the UK. A point of critique could have been the fact that a flight data monitoring system was not implemented yet. As is was (and is) the responsibility of FOCA to require and supervise the implementation of flight data monitoring systems, the following recommendation was given to FOCA:

Recommendation 8-3: Introduction of flight data monitoring programs
It is recommended to FOCA to take appropriate actions to ensure the introduction of flight data monitoring programs at all Swiss AOC-holders, in accordance with ICAO (Annex 6, Part I, par. 3.2.2) requirements

8.3 Developments concerning the impact of the aviation safety policy – how the airlines manage aviation safety – and the implementation of the recommendations given

8.3.1 Developments concerning SWISS

Organisation
In the last three years, some major changes took place at SWISS. After Crossair had taken over Swissair in September 2001, the new company SWISS was built on Crossair, with the former CEO of Crossair as the new CEO of SWISS. As mentioned already in the REACH investigation in 2003, there was a serious cultural problem between the former Swissair pilots and the former Crossair pilots. In March 2004, after publication of the results of the Bassersdorf accident investigation, the CEO of SWISS decided to resign. His successor reorganised the company. A new company SWISS European (SE) was created, operating the regional aircraft with the former Crossair pilots. This company was separated from SWISS International Air Lines (SI), operating the Airbus fleet with the former Swissair pilots. In 2005 the SWISS Group, SI and SE, was bought by Lufthansa. Lufthansa and SI operate a multi-hub strategy, with Frankfurt, Munich and Zurich as their mainports.

Financially the situation is much more stable now. SWISS is making profit, market share has increased, and seat load factor is improved. SI is planning to grow.

Concerning the safety management organisation, safety management falls under the responsibility of the Chief Operating Officer of the Group. The COO is also the accountable manager for SI. The Vice President (VP) Safety reports to the COO but has still the right to contact anybody in the organisation concerning safety, the CEO as well as the Board of Directors. The VP Safety has a group function; he is responsible for SI as well as for SE. Within the Safety Division, SI has 7.2 FTE shared over 13 persons and SE 0.8 FTE shared over 2 persons. Legally responsible for SE concerning safety is the Flight Safety Manager. He reports to the accountable manager for SE, who falls functionally under the responsibility of the COO. This organisation is about to change from the 1st of March, 2007. Safety, security and quality will be combined administratively, but the three VP's functionally report to the COO. The combination will be called Operational Risk Management.

Safety Policy

SWISS re-formulated its Safety Policy. For SI it now reads as follows (ref. [42]):

General policy for safety and quality

Our customers perceive and experience us as a leading airline in safety and quality terms because:

- A safe operation on ground and in the air is our paramount commitment and concern.
- Our safety culture is based on the company wide firm convincement that a solid safety standard is the precondition for a sustainable airline operation.
- Our safety standards comply with the best industry practice.
- In safety terms we strive to be the benchmark for other airlines.
- We meet quality levels which live up to our promises and match our customers expectations.
- Our endeavours to protect the environment exceed the respective regulations.

In view of the above:

- SWISS' senior management is fully committed to safety in all endeavours and promotes a corporate culture in which safety is the prime focus.
- Our operational performance is prioritized to deliver "Safety First", then reliability, efficiency and effectiveness.
- Our quality system provides systematic support to achieve SWISS' safety and quality objectives and to constantly improve the safety-relevant processes in all areas.

The Safety Policy is signed by the CEO and COO (accountable manager). SWISS European has an identical Safety Policy and is signed by the accountable manager of SWISS European (ref. [43]).

In chapter 6 it was stated that a safety policy, to adequately fulfil its role in a safety management framework, must at least address:

- What safety performance of the organisation SWISS wants to achieve;
- What is the individual and management responsibility for safety performance;
- A statement about the priority ascribed to flight safety relative to commercial, operational, environmental and working practice pressures;
- A statement about compliance with safety standards and regulatory requirements with regard to safety.

Against the background of these requirements, the following conclusions can be drawn:
The first requirement, *"what safety performance of the organisation SWISS wants to achieve"*, has been fulfilled on a high level. A clear safety objective is formulated: SWISS (International as well as European) strives to be the benchmark for other airlines concerning safety. This objective is however not very detailed to provide the necessary guidance to the company personnel. Also *how* SWISS will realise this objective is not further mentioned. These items are actually covered in the SWISS Safety Document (ref. [44]).
The second requirement, *"what is the individual and management responsibility for safety performance"*, is not addressed in detail. The commitment of the senior management for safety is made clear, and the highest responsible manager(s) signed the Safety Policy. Individual responsibilities are not mentioned. Again, these are covered in the SWISS Safety Document.
The third requirement, *"a statement about the priority ascribed to flight safety relative to commercial, operational, environmental and working practice pressures"*, has also been fulfilled. The priority of safety is made clear.
The fourth requirement, *"a statement about compliance with safety standards and regulatory requirements with regard to safety"* is not mentioned.

Concerning the implementation of the Safety Policy, it appeared that all the employees have the Safety Policy in their manuals. Sometimes the Safety Policy is part of recurrent training programs.

Safety Management
The management of SWISS qualifies the current safety management within SWISS International and SWISS European as equal to that of the former Swissair organisation, or even

better, as cabin safety is included now as well. The safety organisation now takes care of both SI and SE. This opinion is – in broad terms – shared by relevant other organisations interviewed.

The safety monitoring processes are organised the same way as in 2003, except for the fact that cabin safety is added. There are 4 branches now:

- Safety Awareness (the psychologists of SWISS);
- Flight Data Monitoring;
- Flight Safety Investigation;
- Cabin Safety.

These activities are still reflected in the organisation of the flight safety department.

Concerning Safety Reporting, the Flight Safety Department reports by means of a monthly activity report safety related information to the CEO and the accountable managers of SWISS International and SWISS European. The information addresses general safety related items and more specific safety related information of each of the above mentioned 4 branches, like the number of consultations of the psychologists and main subjects addressed in these consultations, Flight Data Monitoring Statistics (of the airbus fleet as well as of the regional fleet), Cabin Safety items (technical aspects as well as information concerning workload, SOP Breaches, etcetera), technical reliability figures, closed serious cases/investigations, new reportable serious incidents and noteworthy Air Safety Incidents. Information concerning the corrective actions taken by the accountable managers is given as well.

Besides the above mentioned monthly activity report is safety related information also provided by means of Air Safety Reports. ASRs concern safety related incidents that need a further flight safety investigation. The results of the flight safety investigation are disseminated through a monthly update report that summarizes all incidents and calculates the so-called monthly Flight Safety Index, based on frequency and severity of occurrences and the associated number of flight operations. The index, used to signal general safety trends, is just an indication. There is no absolute or target level. Over the last three years the index improved slightly, meaning that the risks generated by the operation have been lowered a bit.

In 2003 it was concluded that the main potential danger to the well developed reporting system was the reporting culture. Between the former Swissair pilots and the former Crossair pilots large differences existed. The reporting culture was by tradition very good within Swissair, because of a non-punitive reporting system on an anonymous basis. Within Crossair, the situation was contrary. Within Crossair there was a fear of punishment. This led to the situation that in the merged company, the ex-SwissAir corps remained on the same reporting level, while the ex-Crossair corps needed many years to learn that they can go to the Flight Safety Officer

and report. Finally, as stated by the management, the reporting culture has improved to an acceptable level.

SWISS Safety Advisory Board

In 2002, the SSAB was set up because of apparent safety problems within the new company SWISS. Between June 2002 and September 2005, the SSAB made findings, identified safety concerns and gave recommendations for action to the Board of Directors. As stated in the final Safety Advisory Board Report (ref. [45]), most of the recommendations given by the SSAB were implemented in September 2005. Table 8-1 provides an overview of the, for the "Post Implementation Audit" relevant, recommendations and implementation status:

SSAB recommendations	**Implementation status September 2005**
Company Organisation	
CEO should personally emphasize safety as a company focus and priority	Safety specified as priority in company Policy Manuals
CEO to receive and acknowledge a monthly safety report	CEO and COO receive and acknowledge monthly safety reports
Fill jobs with most appropriately qualified staff	Qualified and capable personnel in top company positions
Separate mainline and regional crews to avoid conflicts	Separate regional airline now being established (SWISS European)
Set up new regional company (SWISS Express)	
Safety Department	

Adopt best industry practice
• Safety Department should be independent
• Supervise other Operational Departments
  • Cabin
  • Maintenance
  • Ground
  • Ramp
• Should report direct to CEO
	• Safety department reports to COO
	• Access to CEO if required
	• COO receives safety report monthly
	• Cabin staff oversight included
	• QA has oversight of
	  • Ground safety
	  • Maintenance Department safety

Cockpit	

Re-screen all regional crews to ensure proficiency	• All crews fully screened immediately
	  • High proficiency level achieved
	  • SOPs and CRM introduced
	  • FDM established for much of regional

Introduce SOPs and CRM practices (*regional fleet*)	

Develop FDM and Incident Reporting system (*regional fleet*)	fleet • Regional fleet operating to high professional standards
Separate mainline and regional crews to avoid conflicts	New regional company being established (SWISS European)
Set up new regional company (SWISS Express)	

Table 8-1: SSAB Recommendations and Implementation Status, September 2005

The SSAB concluded that "Big changes for the better" were made within SWISS and that they had no remaining undue concerns. Therefore, the SSAB was ended.

NLR recommended to SWISS "*to allow the SSAB to continue its work for the foreseeable future in order to highlight latent safety threats and ensure that appropriate safety standards and procedures are implemented throughout the company*". Given the major changes that took place at SWISS in the last three years, the active role of FOCA nowadays when supervising airlines and the appearance of SWISS as a more stable organisation compared to three years ago, NLR is of the opinion that the decision to end the SSAB is defendable. However, this does not mean that there are no safety concerns any longer. The rejected Collective Labour Agreement with the SE pilots is one of the main safety issues at this very moment. Serious crew planning / scheduling problems are mentioned. Differences seem to exist between the management expectations concerning the necessary flexibility of pilots and the opinion of the pilots themselves. The SE pilot corps experiences the pressure exercised by the management as a threat to safety. The result is a high absence through illness, and only a few weeks ago the SE pilots decided to strike. Positive is the fact that this issue is explicitly mentioned in the safety reporting and acknowledged by the top management.

8.3.1.1 Conclusions concerning the implementation of recommendation 8-1 and 8-2

It can be concluded that recommendation 8-1 has been implemented. It is important however, that the Safety Policy is read together with documents as mentioned under ref. [44]. The SSAB was continued until September 2005. As the main safety concerns were solved, there was no longer a reason to continue. The main safety concern at this very moment is with the pilots of Swiss European.

Recommendation	Implementation	Management support and sustainability remarks
Recommendation 8-1: Re-formulation of SWISS' safety policy	Largely fulfilled	Clear management support of the policy
Recommendation 8-2: Continuation of the SWISS Safety Advisory Board	Discontinued. No need for substitution.	

8.3.2 Flight Data Monitoring and experiences of EasyJet

In the context of the original NLR study EasyJet Switzerland was selected as a representative "low-cost" carrier. A sample survey was made of the safety management practices within this company. This survey came to the following (mostly positive) conclusions:

- There is a well defined safety policy;
- Safety management within EasyJet Switzerland is well organised;
- The safety reporting system is functioning, safety actions are defined and implementation of risk mitigating actions is monitored;
- EasyJet Switzerland safety management is assessed above average for a fairly small airline, also as a result of extensive synergy with its parent company in the UK.

The only point of critique was the fact that a flight data monitoring system was not implemented yet. Therefore, NLR recommendation 8-3 was specified and addressed to FOCA in order to ensure that flight data monitoring programs were introduced at all Swiss AOC-holders.

In the context of the present investigation EasyJet Switzerland was re-visited in order to assess progress made with the introduction of the flight data monitoring system and possible further improvements of the safety management system.

EasyJet Switzerland demonstrated that the safety management process has matured further in the last three years. It was shown that continuous efforts are made to improve the effectiveness of the system. For instance, initiatives have been taken to improve reporting levels.
A special Flight Crew Liaison Officer (FCLO) has been assigned to serve as focal point for the pilot reports, and relay reports –after de-identification– to the Safety and Risk Manager (SRM). Reporting procedures have been agreed with the Pilot's Commission. The responsibilities and tasks of the Safety and Risk Manager are formally laid down in the Operations Manual (part A) of the company. As result reporting levels have improved. Examples have been shown of an active response to pilot reports.

In the context of the introduction of a flight data monitoring system it has been established that such a system now is introduced.
Noteworthy is that an agreement has been signed between EasyJet management and the pilot's union in order to ensure that there is mutual understanding and trust concerning the processing of the flight data and the objectives of the program.
The flight data monitoring appears to be evolved to a quite mature process within the last three years, also due to synergy with EasyJet UK. The analysis of flight data is delegated to EasyJet UK. The flight data monitoring process appears to be well organised and integrated within the safety management system of the company.
A Flight Data Monitoring meeting is held monthly with the participation of the SRM, the FCLO, the Flight Operations Manager and the Training Manager. A representative of the pilot's union is also invited to participate. A statistical report is edited every month for the complete fleet. The flight data monitoring report presents the event rates and trends, together with a summary of events of special interest and is distributed to Flight Crew management. In particular cases the crew in question is addressed though the FCLO. For instance, this may lead to additional training. Statistics are further used as an aid in determining the content of recurrent training, and to validate existing training.

Examples have been provided showing that the FDM program in practice functions well and indeed leads to safety improvements. For instance, it was shown that at a particular airport rushed approaches occurred frequently. That means that an aircraft is not timely stabilized (according to the requirements of the company) during the approach to continue for landing. It should be noted that a "rushed approach" is a contributing factor in many accidents.
After corrective actions it was subsequently shown that the number of rushed approaches reduced to practically zero.

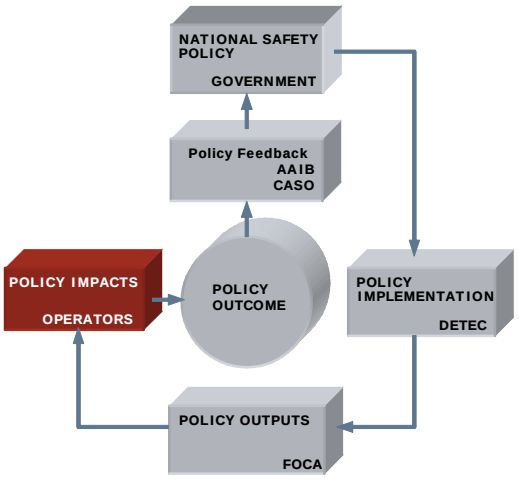
Experiences within EasyJet have proved that Flight Data Monitoring is of immense value for improving air safety, as was literally stated by EasyJet management.
The implementation of the Flight Data Monitoring program within EasyJet is considered to be state-of-the-art and could serve as an example for other similar airlines.

According to the information received from FOCA, Flight Data Monitoring is now in almost every company implemented. The introduction and operation of FDM has been one of the focal points of FOCA this year. Most airlines have it operational. For the smaller airlines it sometimes creates problems, due to particular types of aircraft used or due to the logistics of the process. Some of them have an exemption till the end of this year. Therefore, the implementation of recommendation 8-3 can be summarized as follows:

Recommendation	Implementation	Management support and sustainability remarks
Recommendation 8-3: Introduction of flight data monitoring programs	Largely fulfilled	Wide management support for FDM. Positive results from the introduction of FDM are visible.

9 The impact of the aviation safety policy – how *the airports* manage safety

9.1 Introduction



Each of the chapters 4 through 11 is about a single element of the public policy process as introduced in Chapter 3. To assist the reader in maintaining awareness of which part of the public policy process is addressed in the current chapter, the diagram shown to the right hand side of this text is provided. The dark red box indicates which element is being addressed.

This Chapter 9 is about Policy Impact at the Airports. The previous chapters (7 and 8) are about the same element of the public policy process as the current chapter. This element of the public policy process is split into three chapters for practical purposes (size).

The chapter recapitulates the evaluation of safety management at the airports of Geneva and Zurich performed in 2003, assesses the implementation of the recommendations made and presents the conclusions.

9.2 An evaluation of safety management at the Swiss airports in 2003

It was concluded in Ref. 1 that the airports of Geneva and Zurich were lacking in the availability of a formal safety management system, according to ICAO Annex 14 standards. As consequence both airports did not have a clearly specified safety policy and associated safety strategy.

Recommendation 9-1: Specification of airport safety policy

It is recommended that major airports within Switzerland specify a clear safety policy that describes the airport's safety objectives, and the vision and strategy of executive management to achieve those objectives.

Safety management at both airports was primarily embedded within the operational departments. There was no formal safety manager co-ordinating and monitoring the various departments with respect to safety issues and potential safety trends. Therefore, management of safety at both airports had a somewhat ad-hoc character.

Nevertheless, specific examples showed that, in general, a positive safety culture existed, and that sufficient expertise was available to identify safety issues and take corrective safety actions if necessary.
However, it was indicated that a formal approach to safety management was urgently needed to define clearly management's accountability and commitment for safety and to enable active control of safety performance at the airport in a structured way.

Recommendation 9-2: Introduction of airport safety management system
It is recommended that the airports take an active attitude towards the implementation of an airport safety management system and associated organisational changes. Airports should familiarise themselves with the appropriate processes and procedures of safety management.

9.3 The recommendations' states of implementation in 2006 and an evaluation

9.3.1 Zurich airport

Recommendation 9-1: Specification of airport safety policy
It is recommended that major airports within Switzerland specify a clear safety policy that describes the airport's safety objectives, and the vision and strategy of executive management to achieve those objectives.

An unofficial translation of the safety policy of Zurich airport Unique (in German, Section 5.2 of Flughafen Handbuch, Ref. 24) is included below:

Safety policy
(Principles and goals of the safety management)

1 Goals of the safety management of the companies active on Zurich airport

Adherence to the legal directives
We ensure that all relevant legal regulations and guidelines in the scope of operational safety are known and adhered to. Possible deviations are documented and the handling of these is specified by Unique with the supervisory authority.

Prevention of accidents and minimization of incidents
We want to prevent accidents and reduce the number of incidents in the operation to a justified degree.

Safety culture
We maintain and promote a conscious and open safety culture. To this purpose, an operation-wide system for reporting critical situations, conditions and occurrences is operated.

Continuous improvement
We see safety management as ongoing improvement process. By the definition of safety goals

and by the regular examination of our safety levels we contribute to this improvement. We set our priorities after the potential damage and the probability of occurrence of risks.

Employees and their abilities
The employees of the companies active on Zurich airport have the necessary knowledge, the necessary training and experience as well as the competences for a safe operation.

Safety is a quality criterion of the airport
We promote a high safety standard as quality criterion and thereby accomplish confidence and acceptance for the customers and consumers of the aerodrome. A safe operation is a basis for our economical success.

Commitment
The safety policy and the requirements of the safety management system are obligatory for all companies active at Zurich airport. The companies active at Zurich airport are responsible to communicate the current safety policy to the employees and to implement the measures resulting from it. By regular and systematic inspections and audits Unique examines the adherence to the requirements.

Regular examination of the safety policy
The safety officer of Unique is responsible for the annual examination of the safety policy in co-operation with the chief operation officer and he informs the companies active on airport Zurich airport.

2 Principles of the safety management at Unique
For the implementation of the safety policy, the following principles apply to Unique:
- The safeguarding and preservation of an orderly and safe operation is a business principle of Unique and a success factor for Zurich airport.
- In the daily operation, the principle "safety first" applies. In decision-making regarding safety relevant investments, where factually indicated and justifiable, the economical prevailing circumstances are to be considered.
- The chief operation officer carries the highest responsibility for the safety management.
- The implementation of the safety management is an executive function of the line.
- The safety officer supports and supervises as specialized position the responsible line positions in the operational implementation in accordance with the requirements of the safety management system. He is also responsible for the operation and development of the safety management system.
- By education and training the employees are empowered to observe their responsibility for safety in the daily work.
- An open and transparent safety culture is created and promoted, so that events and almost events can be learned from.

Zurich airport, 30 September 2006

Josef Felder, Chief Executive Officer
Rainer Hiltebrand, Chief Operation Officer

It is noted that the safety policy has been appropriately signed by the executive management.

Part of the vision and strategy to reach the goals of the safety policy is reflected in the policy's principles; Section 5 of Unique's Aerodrome Manual (Ref. 24) elaborates more of the means of

safety management to reach these goals. This will be addressed when dealing with Recommendation 9-2, below.
It is noted that the safety policy and SMS address the whole airport, i.e., not only Unique but also including third party organisations active on Zurich airport, such as ground handling companies.

Recommendation 9-2: Introduction of airport safety management system
It is recommended that the airports take an active attitude towards the implementation of an airport safety management system and associated organisational changes. Airports should familiarise themselves with the appropriate processes and procedures of safety management.

The high-level topic structure of Section 5 Safety Management System (SMS) of Ref. 24 is as follows (section headings unofficially translated from German):
- Goal and purpose of the SMS;
- Safety policy and principles;
- Safety organisation;
- The safety process;
- Safety audits;
- Communication;
- Document management;
- Education and training; and
- Integration of third party companies in the SMS.

Regarding the organisation of safety, a safety officer has been installed as indicated in the safety policy. The safety officer reports directly to the COO. Whereas in Air Navigation Services direct reporting to the CEO is recommended and often practiced, the arrangement at Unique seems to make sense since the COO is the responsible officer towards FOCA and since the large majority of matters addressed by the safety officer are in the scope of operations.
Unique participates in Runway Safety Team Zurich and Ramp Safety Team Zurich. An Airport Safety Committee will be set up.

Whereas the various aspects of safety management have been elaborated to some extent in the Aerodrome Manual, implementation of many of these aspects is still ongoing. By mid 2007, most aspects are planned to be fully implemented. An indication of the current status is:
- There is a safety policy with the goals and principles for safety management;
- Safety culture is generally considered good and continuously addressed;
- Unique has an overview of the main safety hazards, but not yet risk-based;
- Important parts of the safety organisation stand;

- Experience with safety assessments has been built up, but internal guidelines for risk-based approaches are to be produced;
- Occurrence data is believed to be reported reliably, but needs to be put in one system; and
- Auditing within Unique and third party companies needs to be set up.

In June 2006, FOCA has finally certified the Zurich aerodrome according to ICAO Annex 14 (Ref. 22) and Doc 9774 (Ref. 23). Although the airport of Zurich is the first one certified in Switzerland, this is still late according to the date of 27 November 2003 indicated in Annex 14. In particular, this holds for the safety management system, which should have been in operation as of 24 November 2005. Although the certification process has not been considered in any depth in this study, the impression is that it did not go smooth and that several auditing rounds with findings preceded the eventual certification.
It is noted that the ISO certification process has helped Unique to establish its ideas on developing their SMS.
After the certification, FOCA performed a follow-up audit regarding the SMS on 6 October 2006. The main gaps identified were the auditing and oversight towards third parties, to have one system for occurrence reporting and the position and resources of the safety officer. The latter issue has been dealt with and there is an action plan to resolve the others.

All in all, it appears that Unique has currently implemented a substantial part of Recommendations 9-1 “Specification of airport safety policy” and 9-2 “Introduction of airport safety management system” made in 2003. The implementation is not complete yet, which is notable in view of the dates set in ICAO Annex 14 regarding certification and having an SMS in operation.
However, it is clearly noted that Unique actively takes responsibility, and the efforts to implement a safety management system are considerable, staffed with expertise, committed to and supported by management.
On the basis of the positive safety culture and the essential safety management functions of identifying and correcting safety issues noted in Ref. 1, the active attitude and efforts exhibited therefore result in a situation where prolonged commitment and effort to further accomplishment, especially from Unique but also from FOCA, are expected to result in a sustainable and effective safety management system.

9.3.2 Geneva airport

Recommendation 9-1: Specification of airport safety policy
It is recommended that major airports within Switzerland specify a clear safety policy that describes the airport's safety objectives, and the vision and strategy of executive management to achieve those objectives.

Like at Zurich airport, the safety policy of Geneva International Airport is contained in Section 5 of the Aerodrome Manual (Ref. 25). Inferring from the headings of this section, the document appears to be written by the head of the safety office and approved by the CEO. An unofficial translation is included below:

Safety policy

Basis
The International Civil Aviation Organization (ICAO) recommends States to engage in a process of certification of the aerodromes in their territories according to the model of the Manual on Certification of Aerodromes, Doc 9774, AN/969 Edition 2001.

In Switzerland, the certification processes was engaged by the Federal Office for Civil Aviation in March 2003. For that, the office bases on the federal aviation law (LA) and on the ordinance for aeronautical infrastructure (OSIA).

Being the operator of the aerodrome, Geneva International Airport (AIG) has the responsibility for the safety, regularity and effectiveness of the operations on the platform. The certification of the aerodrome is an integral part of that responsibility

Objective
A high level of safety and a common safety culture are the foundations of successful and highly performing utilization of the platform of AIG, to the benefit of all. AIG aims at a high level of safety and a continuous improvement of this safety level to a risk level generally recognized as acceptable, to become a leader in aerodrome safety.

Strategy
The achievement of this objective depends on a total management of safety and a profound sense of engagement and responsibility of the whole of the personnel with the unconditional support of the members of the management. These two elements form integral parts of AIG's safety policy.

"Safety first" is the instruction at AIG, which creates the framework for a reliable and durable utilization of its platform and which is responsible for safety regarding the operation of the airport and capable in the subject of regulation and supervision. To that aim AIG provides itself with the means for implementation of its policy; it must be able to supervise and check the measures issued.

Means
- AIG applies the national and international standards as regards safety; as far as possible and justifiable, it exceeds them in order to develop and maintain the best practices and safety on its platform.
- AIG applies a modern safety management system (SMS), which contributes to the

improvement of the level of safety inter alia by objectives and proactive processes aiming for specific levels of safety at achieving, as well as managing and reducing the risks.
- The priorities are determined according to the probability of the incidents/accidents and the potential damages. A control loop process ensures the continuous improvement of safety.
- Each employee of AIG is held to contribute to the general effort to achieve the required safety level and objectives. An open communication system is installed for this purpose.
- By education demanding consequent means, AIG ensures the competence, knowledge and experience of its employees necessary for safe performance of their tasks and makes constant efforts to propagate its safety culture among them.
- As part of its SMS, AIG applies a non-punitive policy of safety reporting, which envisages immunity vis-a-vis disciplinary measures for the employees who announce gaps, dangers or events touching safety. The situations where disciplinary measures are considered (illicit acts, negligence) must be defined. The executive board of AIG encourages the application of this open policy which forms part of the culture of the company.
- The partner companies of AIG operating on its platform are held to adhere without reserve to the principles governing the safety policy and the SMS into force at AIG. They are by contract responsible to AIG to apply its rules and requirements.

AIG's safety policy is not unlike Unique's. AIG's safety policy breathes high ambitions regarding safety, but it seems to be somewhat more generic in its strategy to accomplish this. The rest of Section 5 of the Aerodrome Manual contains more information about the strategy, see below.

Recommendation 9-2: Introduction of airport safety management system
It is recommended that the airports take an active attitude towards the implementation of an airport safety management system and associated organisational changes. Airports should familiarise themselves with the appropriate processes and procedures of safety management.

Section 5 "Safety management system" of AIG's Aerodrome Manual (Ref. 25) specifies the principles, organisation and functioning of the safety management system at AIG. The high-level topic structure of the section is similar to that of Unique (section headings unofficially translated from French):
- Introduction;
- Safety policy;
- Safety organisation;
- Application and handling of the SMS processes;
- Safety audits;
- Communication;
- Document management;
- Education and training;
- Integration of third party companies into SMS;
- Implementation of the SMS; and
- Annex with the implementation plan.

Regarding safety organisation, a safety office consisting of two persons has been installed. The safety office is attached to the Technical and Operations Director as a staff unit. The office is in charge of the safety policy and it owns the SMS. The Technical and Operations Director is responsible for the SMS.
AIG participates in the runway safety committee for Geneva airport (with Skyguide, Swiss, handling agents, technical services – all the users of the airport) and the apron safety committee.

Section 5 of the AIG's Aerodrome Manual (Ref. 25) also contains a tentative implementation plan for the SMS; a summary is indicated below:

Component	**To be implemented in phase**
Safety management plan	The safety policy: 1 The other subcomponents: 2
Document management	2, 3 and 4
Monitoring safety	Identification of hazards and risk management:1 The other subcomponents: 2 and 3
Education	2, 3 and 4
Quality assurance	4
Urgent preparations	4

The components scheduled for phase 1 are to be implemented first.
AIG has three years for the implementation of the SMS after certification, which is expected to be finalized before the end of 2006.

Looking back at Recommendations 9-1 "Specification of airport safety policy" and 9-2 "Introduction of airport safety management system", it is noted that AIG has formulated a safety policy and has installed a safety office as focal point for the SMS and its implementation. AIG is expected to be certified before the end of 2006, but most of the implementation of the SMS is still ahead – AIG plans three years from certification for the latter. This is substantially behind the dates set in ICAO Annex 14 regarding certification and having an SMS in operation.
On the basis of the positive safety culture and the essential safety management functions of identifying and correcting safety issues noted in Ref. 1, this situation asks for intensified commitment and effort to further accomplishment, especially from AIG but also from FOCA. Although he has only recently entered AIG from another industry, the new CEO shows a warm heart towards and a quickly developing insight in safety management. He is encouraged to advance implementation and practice by clearly demonstrating top management's commitment to managing safety and a high safety culture.

9.4 Conclusion

9.4.1 Conclusion regarding the airport of Zurich

The airport of Zurich has formulated a safety policy and has organised safety, in particular by installing a safety office.

FOCA has recently certified the aerodrome of Zurich. Although this timing may not be atypical for comparable aerodromes, the airport Zurich cannot be said to be ahead in this respect – definitely the dates set by ICAO Annex 14 have been missed. The certification involves an aerodrome manual, which, inter alia, outlines the safety management system.

The actual implementation of a safety management system is well underway at Zurich, where responsibility has actively been taken, and where experience and expertise has been built up in various aspects of safety management. Full implementation of an SMS is planned for the end of 2007 in Zurich. Management actively supports implementation. All in all confidence that prolonged commitment and effort will yield a sustainable and effective safety management system is justified.

Noting that implementing a safety management system is primarily a responsibility and task of the airports themselves, FOCA could advance this process by making use of the expertise and experience that it has gained in implementing safety management in other kinds of air transport organisations, Air Navigation Services and airlines in particular.

Recommendation	Implementation	Management support and sustainability remarks *Suggestions for improvement*
Recommendation 9-1: Specification of airport safety policy	Fulfilled	The airport of Zurich shows clear management support.
Recommendation 9-2: Introduction of airport safety management system	Largely fulfilled	Although the initiation of this may have involved significant pressure from for instance FOCA, the airport of Zurich's management is serious and active about safety. *Against a background of a safety culture that seems positive, continued commitment and effort of management is expected to result in a sustainable and effective safety management system at the airport of Zurich at the end of 2007.*

9.4.2 Conclusion regarding the airport of Geneva

The airport of Geneva has formulated a safety policy and has organised safety, in particular by installing a safety office.

FOCA is expected to certify Geneva's aerodrome before the end of the year. Although this timing may not be atypical for comparable aerodromes, Geneva airport cannot be said to be ahead in this respect; definitely the dates set by ICAO Annex 14 have been missed. The certification involves an aerodrome manual, which, inter alia, outlines the safety management system.

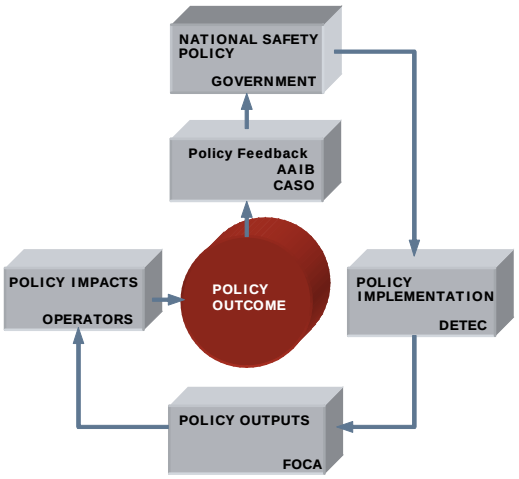
The airport of Geneva has begun the implementation of an SMS and plans to accomplish this in three years from certification. Most of the work is still ahead. This situation asks for intensified commitment and effort to further implementation of an SMS for the airport of Geneva. The new CEO is encouraged to advance implementation, practice and effectiveness of managing safety by showing top management's positive attitude, commitment and effort to safety management and safety culture.

Noting that implementing a safety management system is primarily a responsibility and task of the airports themselves, FOCA should advance this process by making use of the expertise and experience that it has gained in implementing safety management in other kinds of air transport organisations, Air Navigation Services and airlines in particular.

Recommendation	Implementation	Management support and sustainability remarks ***Suggestions for improvement***
Recommendation 9-1: Specification of airport safety policy	Fulfilled	The new CEO of the airport of Geneva shows a positive attitude towards safety. *The CEO is encouraged to promote safety further.*
Recommendation 9-2: Introduction of airport safety management system	Partially fulfilled	The airport of Geneva has planned three years for implementing an SMS from certification (expected before the end of 2006). *Intensified commitment and effort to further implementation of an SMS for the airport of Geneva is needed.*

10 The Policy outcomes – how safe is aviation in Switzerland

Each of the chapters 4 through 11 is about a single element of the public policy process as introduced in Chapter 3. To assist the reader in maintaining awareness of which part of the public policy process is addressed in the current chapter, the diagram shown to the right hand side of this text is provided. The dark red box indicates which element is being addressed.



This Chapter 10 is about Policy outcomes.

The previous chapters have described the progress in the development of aviation safety policies and the status of the implementation of the NLR Recommendations during the last three years. One might expect that these activities have had an impact on the actual level of aviation safety in Switzerland in this period (the policy outcome). However, the period during which the changed policies have been in effect has been too short to support any definitive conclusion in this regard.

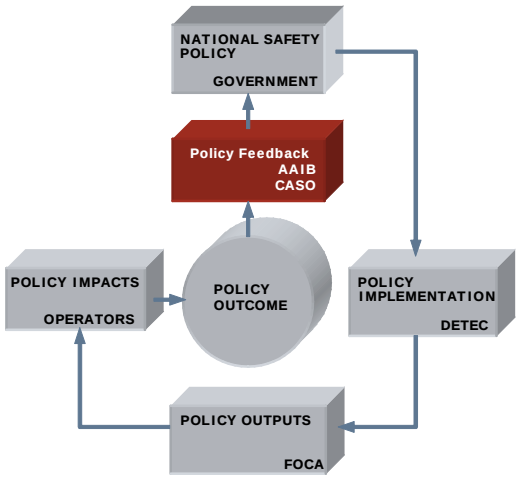
Well respecting the large statistical uncertainty of such small numbers of events, the accident and air proximity rate in Switzerland in the period 2003-2005 at least appear to indicate that the negative safety trend in Swiss aviation has not progressed during the last three years and that the safety level has more or less stabilized.

This finding would not yet be in line with the ambition of the new Swiss aviation safety policy (Chapter 4).

However, it is anticipated that it will take several years before all new measures and policies are fully effective and a reverse safety trend –the recovery from the myth of perfection towards excellence– can be clearly observed.

11 Feedback of the safety outcomes to the national policy – the role of AAIB, EFUK and FOCA

11.1 Introduction



Each of the chapters 4 through 11 is about a single element of the public policy process as introduced in Chapter 3. To assist the reader in maintaining awareness of which part of the public policy process is addressed in the current chapter, the diagram shown to the right hand side of this text is provided. The dark red box indicates which element is being addressed.

This Chapter 11 is about Feedback to the Policy Outcomes. First a short summary is given of the findings concerning this element of the policy cycle in the original NLR report in 2003. This summary addresses those issues that are relevant to understand the background of main recommendation in this area, in particular:

- Recommendation 11-1: Amendment of the ordinance on accident investigation;
- Recommendation 11-2: Guidelines for response to AAIB recommendations;
- Recommendation 11-3: Re-organize the AAIB to incorporate a Board;
- Recommendation 11-4: Discontinuation of EFUK;
- Recommendation 11-5: Voluntary occurrence reporting

The main focus is on the functioning of the key organization in the safety feedback process, viz. the Swiss Aircraft Accidents Investigation Bureau (AAIB).

Subsequently the main developments since 2003 to implement the recommendations will be described, as well as the effectiveness of the chosen implementation to strengthen the process of safety outcome feedback into the national safety policy.

11.2 Observations concerning the safety feedback into the aviation policy in 2003

The original NLR Report provided several observations concerning the Swiss AAIB and the role it played in the safety feedback process.

In general the investigative capabilities of the AAIB were judged to be good or even excellent. Summarizing it was concluded that:

- Quality of AAIB investigations is good;
- AAIB is well staffed, with investigators with proper qualifications;
- The network of AAIB, with respect to domain experts and other investigation bureaus, is well developed;

- Facilities of the AAIB are state-of-the-art;
- Technical and operational expertise of the AAIB is well recognized and accepted within the Swiss air transport sector and government.

However, it was also found that, although the accident investigations were of good quality, the feedback of the resulting safety information was negatively affected by several factors, i.e.:

- Safety recommendations and of the AAIB and their implementation are subject to many disputes;
- Friction does exist in the interface between the AAIB, the aviation sector and, in particular, the regulator;
- The authority of the AAIB is negatively affected by the applied communication strategies;
- Institutional obstacles are impeding the efficient and effective feedback of safety information into the policy process.

This led to identifying five areas of improvement to strengthen the feedback process:

1. Development of balanced safety recommendations;
2. Strengthening of accountabilities for the implementation of safety recommendations;
3. Improvement of relationships between AAIB and the aviation sector;
4. Removal of institutional obstacles;
5. Expansion of pro-active safety efforts.

Based on these areas of improvement five recommendations had been defined.
For sake of completeness, these recommendations are literally repeated hereafter (see the blue frames).

The first two recommendations (11-1 & 11-2) were focused on the first two areas of improvement. They were intended to help improve the implementation of the AAIB safety recommendations by improving the formulation of the recommendations and by changing the hierarchy in the responsibility for implementation. It was recommended that AAIB would formally report to the Head of DETEC, who would be accountable for the implementation. Furthermore, in order to promote non-regulatory solutions to safety improvement, it was also recommended that AAIB would address recommendations to the most appropriate agency (directly to airlines, service providers, airports, etc.) in stead of only to FOCA. Hand in hand, it was also recommended that addressed parties would inform the Head of DETEC directly concerning the associated actions, not awaiting possible regulatory actions of FOCA.
As an additional measure, it was deemed of importance that the assessment of the response of addressed parties would be fully transparent. For this reason it was recommended that BFU

would set-up guidelines for the assessment and classification of the response to AAIB recommendations.

Recommendation 11-1: Amendment of the ordinance on accident investigation

It is recommended to DETEC to prepare an amendment to the ordinance on accident investigation to the following effect:

- that the AAIB formally reports to the minister of Transport instead of to FOCA;
- that AAIB recommendations are addressed to the most appropriate agency instead of exclusively to FOCA;
- that an obligation is placed upon the agency addressed in a AAIB recommendation to:
  - take the recommendation into consideration and, where appropriate, to act upon it;
  - send to the Minister of Transport a message containing details of the measures taken, or an explanation as to why the recommendation is not implemented;
- that article 34 - 3 of the ordinance, regarding the obligation upon AAIB to maintain and make public a list of recommendations and their implementation status, is extended to be the applicable to all recipients of a AAIB recommendations (instead of only FOCA) and to update the list on a regular basis.

Recommendation 11-2: Guidelines for response to AAIB recommendations

It is recommended to the AAIB to develop and make public the guideline used by AAIB to assess and classify the response to AAIB recommendations.

The next recommendation (11-3) was intended to improve the relationship between AAIB and the aviation sector (improvement area 3), to ensure an appropriate review process of AAIB investigations and reports while preserving the investigative competence and independence of AAIB and to put in place appropriate checks and balances in the formulation of safety recommendations.

The following recommendation (11-4) was concerned with the removal of an institutional obstacle (improvement area 4). This concerned the discontinuation of the Eidgenössische Flugunfallkommission (EFUK). EFUK embodies a process of recourse with respect to AAIB investigations that enables persons or organizations to prevent the possibility that their interests are unduly damaged due to potential deficiencies in AAIB investigations. Such recourse processes are an inherent part of Swiss legislation. However, this particular process -in relation to accident investigation- was in general judged not to be in the interest of safety, and was found

to be not in line with the requirements of ICAO Annex 13. Therefore, it was regarded to be necessary to discontinue the recourse process through EFUK.

Recommendation 11-3: Re-organise AAIB to incorporate an Aviation Accident Investigation Board

It is recommended to re-organise the AAIB to incorporate an Aviation Accident Investigation Board with the following tasks:

- to review and approve AAIB accident investigation reports;
- to organise and chair a public hearing regarding the draft final report;
- to review and approve other AAIB safety products;
- to maintain the necessary relationships with the Minister.

This Board shall be established such that:

- It is small in size;
- Its members are suitably qualified and independent;
- the chairman acts as the spokesperson for AAIB.

This Board and its legal basis shall be established such that these do not prevent a later integration of the new AAIB into a larger independent Transport Accident Investigation Authority.

Recommendation 11-4: Discontinuation of EFUK

It is recommended to discontinue the recourse process through EFUK and to change the associated legislation accordingly.

The fifth and final recommendation in this section was aimed at the expansion of pro-active safety efforts (improvement area 5) by means of enabling a mechanism for voluntary and non-punitive reporting of safety relevant occurrences. Within the aviation sector a universally shared opinion existed that pro-active safety efforts are extremely important to improve safety and avoid future occurrences, but that these efforts are impeded by the present legislation that in principle could invoke judicial actions to anyone who reported a particular occurrence. In order to stimulate voluntary reporting it was therefore deemed necessary to adapt the Swiss legislation. This has been laid down in Recommendation 11-5.

Recommendation 11-5: Voluntary occurrence reporting

It is recommended to DETEC to propose appropriate changes to the SWISS legislation in order to enable a mechanism for voluntary and non-punitive reporting of safety relevant occurrences.

11.3 Developments concerning the safety feedback into the aviation policy

11.3.1 From safety recommendation to safety actions

The main change of the process concerning the implementation of AAIB safety recommendations has taken place at the level of DETEC, by establishing the COSAR process (see chapter 5.3.4).
At the level of the AAIB the changes have been limited.
Formally the required change of the ordinance on accident investigation (Ref. 26, *Verordnung über die Untersuchung von Flugunfällen und schweren Vorfällen, VFU*), as addressed in NLR Recommendation 11-1 has not yet been effectuated. The last change of the ordinance (VFU) occurred on October 22, 2003. Although this was after the publication of the NLR report, the changes did not yet reflect the recommendations of the report. Article 19 of the VFU was modified, but only to include FOCA as receiver of the accident reports, and not yet DETEC itself. Other changes at that time in the ordinance comprised the extension of the period for response of FOCA to AAIB reports from three to six months (Art. 32) and providing the AAIB with the possibility to publish draft investigation reports (Art. 34).

Nevertheless, as result of the SAFIR project an inventory has been made of all changes that could be introduced to the ordinance on accident investigation (VFU) without changes of the Swiss aviation law (*Luftfahrt Gesetz, LFG*), see Ref. 27 – *SAFIR 2 Zwischen und gleichzeitig Schlussbericht betreffend Phase 1 (Konzeptionen)*. Amongst others this includes the change of Article 19 of the VFU to distribute the AAIB investigation report to DETEC as a formal report to the Head of DETEC. Because such change to the ordinance does not require treatment by the Swiss parliament, in principle it can be mechanized relatively quickly, as opposed to a change of the aviation law itself. It is known that a number of changes to aviation ordinances currently are in progress. However, because the detailed changes are as yet not publicly available, it can not be determined whether the proposed changes are in agreement with the NLR Recommendation 11-1 and the inventory of Ref. 27.

From the interviews with the AAIB and DETEC it is however understood that some internal procedures have been adapted in line with NLR Recommendation 11-1 without this being formally supported by the current version of the ordinance (VFU). So, the AAIB is now

formally reporting to the Head of DETEC, and as such sends all investigation reports to DETEC.
It should however be noted that other elements of NLR Recommendation 11-1 are not as clearly addressed by a change in internal procedures.
As far as could be established all AAIB recommendations are still exclusively addressed towards FOCA instead of to the most appropriate agency. It is not clear whether this was a deliberate action of AAIB, in disagreement with Recommendation 1-11 (second bullet), or that in all cases the FOCA was indeed the most appropriate agency to be addressed. Some examples do suggest however that the former is the case. For instance the *AAIB report concerning the total failure of the air radar picture presentation* (Report u1187, Ref. 28) specifies the following safety recommendation (No. 320):

"The FOCA should arrange for all technical incidents and failures to be treated in accordance with uniform and defined process and systematically documented in a technical logbook. In particular the description of the incident, the back-up data, the causal analysis and the measures taken must form part of such documentation"

It is believed that it would have been more effective to address such recommendation directly to skyguide. In that case skyguide would have been directly responsible and accountable for the implementation of this recommendation. It is also unclear how FOCA could arrange for the implementation other than in an indirect and supervisory role.
Therefore, it is concluded that in essence (bullet 2 of) NLR Recommendation 11-1 is not being followed. As a consequence also the third part of NLR Recommendation 11-1 can in practice not be effectuated, because FOCA appears to be in all cases still the addressed party, and therefore no other parties could have had a formal obligation to report the status of implementation to the Minister. In similar fashion also the fourth part of the recommendation can not be satisfied, even not in an informal way.
Overall it is concluded that in a formal way NLR Recommendation 11-1 is regarded as not been implemented, because the required changes to the VFU have not yet materialized. In absence of the detailed text concerning a possible future change of the ordinance it can not be established whether this situation will be solved in the near future.
In an informal way the NLR Recommendation 11-1 is only followed for a minor part. The changed working procedures within the AAIB only partly reflect the intentions of NLR Recommendation 11-1. As such it is believed that an opportunity for a more direct and effective implementation of AAIB recommendations currently is being missed.

A second issue to be addressed here is NLR Recommendation 11-2. This recommendation pertains to the publication of AAIB guidelines to assess and classify the response to AAIB

recommendations. As far as could be established these guidelines have not been publicized by the AAIB, and as such NLR Recommendation 11-2 is currently formally not satisfied.
However, NLR Recommendation 11-2 should not be regarded in total isolation. It can not be assessed without taking into account the current process for implementation of safety recommendations, as embodied by the COSAR process. As discussed in Chapter 5.3.4 the COSAR process translates the AAIB safety recommendations to so-called Safety Project Directives (SPD). These SPDs are instructions to implement safety actions based on, but not equal to, the AAIB recommendations. SPDs may comprise instructions stretching beyond the original recommendations on which they were based, or combine a cluster of recommendations to a single directive. The COSAR process may also lead to an AAIB safety recommendation not being followed at all. Due to this process, addressed parties do not respond directly to an AAIB recommendation but to an instruction defined by the SPD. For this reason the response of addressed parties is not directly coupled to an AAIB safety recommendation anymore. As a result the AAIB can only establish the link between the original safety recommendation and the associated safety action(s) through the status reports of the CASO. Consequently, it is difficult for the AAIB to define a public guideline to assess the response to a safety recommendation, as this response is in fact directed to satisfy the given SPD, instead of the AAIB recommendation itself.
Therefore it is understandable that so far no action has been undertaken by the AAIB to follow the NLR recommendation 11-2. In light of the present organization it would possibly make more sense to re-direct NLR Recommendation 11-2 to DETEC, or more specifically to the CASO, as accountable manager. The CASO would be in the best position to determine criteria to assess whether a certain safety action would be sufficient or acceptable to comply with a given SPD, and how this action would relate to the intention of the original recommendation.

11.3.2 Reorganisation of AAIB

An important observation of the original NLR study was that the process of conversion of safety recommendations into effective safety measures was not functioning well at the time.
It was concluded that this was partly caused by the internal organisation of the AAIB. While the investigative competence of the AAIB was considered excellent, it was observed that internal processes could be improved in order to ensure that the most effective translation of safety findings into practical safety recommendations would be realized.
Also it was found that in general the communication and relationship between AAIB and the aviation sector should be improved. A potential solution to these issues was put forward in NLR Recommendation 11-3 and concerned a reorganization of the AAIB to incorporate an investigation board, consisting of suitably qualified and independent members. This board would provide a mechanism to improve internal quality control by reviewing the investigation reports, by consulting sector parties through public hearings, and by evaluating safety

recommendations in relation to their practical implementation. Also the chairman of the board was regarded to be in a better position to maintain the relationship with the Minister and aviation sector parties at the appropriate hierarchical level.
Clearly, such a substantial change to the organization of the AAIB requires a revision of the Swiss aviation legislation (*LFG*). However, it has been found that this revision of the LFG has not yet materialized. It should be noted that lawmaking is in general very time consuming, and therefore it is perhaps unrealistic to expect that the required change of the LFG could have been established within the timeframe since the publication of the original NLR report. Current planning of the legislation process shows that a revision of the LFG has been initiated in the 3rd quarter of 2006. This revision comprises the proposed reorganization of the AAIB in addition to a number of other adaptations in the area of aviation political principles, financial issues and further introduction of EU-law. The first step of this process concerns the preparation of a proposal for the Federal Council. This first step is aimed to be completed in the 4th quarter of 2006. Because of the fact that this lawmaking process is now in its initial stage, no information is as yet available on the actual proposed changes.

Based on most recent information from Ref. 29 (*Stand der Umsetzung des Projekts SAFIR, Sechster Zwischenbericht)* it is clear that the exact organizational form of the AAIB is still under discussion. This includes also the potential initiative to merge the AAIB with the Swiss agency for investigating railway and shipping accidents (UUS). From the provided information, it appears further that the proposed organizational set-up is such that it would comprise two separate entities, viz.:

1. the investigation bureau, that performs the investigations and other operational activities
2. the investigation board, that assumes the strategic tasks and the quality control

Such a set-up would be in line with NLR Recommendation 11-3. It is however unclear to what extent the final adaptation of the LFG concerning the reorganization of the AAIB will reflect this set-up. The final ratification of the changes to the LFG will not be accomplished before the 3rd quarter of 2008. Therefore, formal conclusions can not be drawn before that time. At least until then it has therefore to be concluded that NLR Recommendation 11-3 is not yet implemented.

Apart from the formal implementation of NLR Recommendation 11-3 it has been noted that the AAIB has taken some internal measures to address the concerns that led to the recommendation. First of all the AAIB has laid down on paper the detailed administrative procedure for an investigation (Ref.30 *Administrativ-Verfahren einer Untersuchung, d.d 27.04.2006*). The document defines 19 steps, with a detailed description of activities associated with each step and an assignment of responsibilities. In terms of internal quality control it is clearly beneficial to

have such a document. On the other hand it should be remarked that the document itself, as a clear basis for conduct of an investigation, lacks the standard document control features that are required for quality control. For instance, it is not clear who is responsible for preparation of the document, who has reviewed it, who has approved it and what is the version and status of the document. For such an important document it would appear that these quality control features are an indispensable requirement.

When focusing on the content of the described investigation procedure it is noted that internal quality control is specifically addressed.
One of the measures is that accident investigations are conducted by at least two investigators, whereas in the past investigations could be performed by a single investigator.
Another measure is that within 2 to 3 weeks after an accident a coordination meeting is held. Apart from two involved investigators and the head of the AAIB, also a committee of experts (legal, medical, meteo and others if required) participates in this meeting. The purpose of the meeting is primarily to provide support and directions to conduct the investigation. The committee is called a board by the AAIB. However, it should be noted that this committee in no way represent the functions of the board, as mentioned in NLR Recommendation 11-3. Therefore, this committee should not be regarded as an informal implementation of the recommendation.
A further quality measure to be mentioned is that draft investigation reports are reviewed and corrected during an internal quality control meeting before being distributed. As understood from the investigation procedure (Ref.30) no independent outside experts participate in this internal “quality control meeting”. The meeting is therefore regarded as pure internal quality control. Findings and resulting recommendations are not broadly reviewed by independent experts. This means that practical consequences of specific recommendations (possibly extending beyond the confines of an isolated case) potentially might not be fully addressed.

Based on the abovementioned observations it is concluded that the internal quality control initiatives taken by the AAIB are in general commendable, and contribute to better quality control of the investigation process. However, the initiatives are not sufficiently far reaching to be considered an adequate implementation of NLR Recommendation 11-3. In particular the possibility to engage external (independent) experts in the review of the draft investigation report and of the associated safety recommendations, and the possibility to conduct public hearings, are missing elements in the current AAIB investigation procedure.

11.3.3 Discontinuation of EFUK

The original NLR report concluded that the Eidgenössische Flugunfallkommission (EFUK) was an institutional obstacle in the way of the safety information feedback process. The recourse process enabled by EFUK was seen –from the perspective of aviation safety– as a possibility to unduly delay the publication of formal investigation results and the introduction of required safety initiatives. It was observed that EFUK was instituted to serve the interests of involved parties instead of safety. As such the institution was considered in conflict with ICAO Annex 13. For this reason NLR Recommendation 11-4 proposed to discontinue the recourse process through EFUK.
Because recourse processes are an inherent part of the Swiss legislative framework, it is clear that this recommendation requires a number of changes to the Swiss aviation law.
As already discussed in the previous chapter the Swiss aviation law (LFG) has not been changed since the publication of the NLR report.
For this reason it has to be concluded that NLR Recommendation 11-4 has not yet been formally implemented. EFUK still exists and functions unaffected.

However, as also mentioned earlier the process to modify the LFG has been initiated and is in progress. It is understood that the abolishment of EFUK is one of the proposed changes of the LFG. Because the detailed text of the proposed legislative change is not yet public, it is not possible to assess whether the final change in the LFG is fully in agreement with NLR recommendation 11-4.

The final report on phase 1 of the SAFIR project (Ref.27) reflects that the intention is to replace the EFUK with a recourse committee at the level of DETEC (REKO-UVEK). The REKO-UVEK would get the authority to take the final decision concerning objections against investigative actions and deficiencies in the management of investigations.
It is unknown whether such mechanization can be embedded within the Swiss legislative structure. It is observed that this would be a possible mechanism to discontinue EFUK and to place the decisive authority at the most appropriate place, viz. the accountable Ministry. It is anticipated that recourse processes can be handled more efficiently and in shorter timeframe in this way. Due the presence of CASO at DETEC, also the required aviation expertise is available to support the recourse process.

11.3.4 Voluntary Occurrence Reporting

The original NLR report observed that there was a clear need to stimulate pro-active safety efforts by means of enabling a mechanism for voluntary and non-punitive reporting of safety relevant occurrences. It was also found that present legislation formed an obstacle in this respect due to possible legal repercussions (liability).

Therefore NLR Recommendation 11-5 was formulated to change Swiss legislation such that this obstacle would be removed.
This recommendation is currently in an advanced stage of implementation.
The revision of the legal basis (art. 20 of the LFG) was approved by the Swiss Parliament in December 2005. The Federal Council was commissioned to base the occurrence reporting system on the principles of the EU Directive 2003/42/EC. The associated draft to revise the ordinance (art. 77 – 79c LFV) has been sent to the industry for consultation and the industry responses are currently being analyzed.
Key aspects of the draft are the applicability and the processing of the reports.
The ordinance applies to all occurrences that endangered or –if not corrected– could have endangered an aircraft, occupants or any other person.
It is not applicable to accidents or serious incidents.
The processing of the reports would be a responsibility of FOCA. For this purpose an independent body (regarding organization and staff) should be instituted within FOCA. Through this body FOCA will guarantee strictly confidential treatment of reports. All reports will be de-identified and stored data will be only accessible to the staff of the reporting office.
The ordinance will ensure that reporters are protected against legal proceedings if:

- the occurrence does not involve gross negligence or intention
- the occurrence is only known by FOCA through the occurrence report
- the occurrence has been reported by:
    - the originator of the occurrence
    - any other person (apart from FOCA inspectors), if the originator reports the occurrence as well within 72 hours
    - a group of involved persons, if all members of the group are known and each of them agrees with the report

Once the proposed change to the ordinance comes into effect, an impediment for unrestricted occurrence reporting still might be the specific definition of “gross negligence”. The notion of “gross negligence” has not been further elaborated in a legal sense within the draft. This may leave room for interpretation, and too strict interpretation might lead to reluctance to report. Although it is noted that the European directive 2003/42/EC formulates “gross negligence” in a similar way (art. 8.3), it is highlighted here that the ambition expressed in the Swiss Aviation Policy with regard to the safety performance of Swiss aviation being among the best. This demands that the provisions are put in place to achieve that ambitions are above average and in accordance with best practice. In that respect, the proposed implementation of voluntary non-punitive reporting could be more in accordance with the Danish example, in which, among others, the notion of gross negligence is not used and only substance abuse is a reason to lift the non-punitive clause.

Another objection against the current draft revision of the ordinance is that the reporting office is formally a part of FOCA. Although the draft indicates that the reporting office will be organized as much as possible as an independent entity within FOCA, it has been noted during several interviews that operational aviation parties are not satisfied with this organizational set-up, and would prefer the reporting office to be fully separated from FOCA. Because the draft ordinance is currently in the industry consultation phase the industry has the opportunity to express these concerns directly to the lawmakers. At the present time it is however unknown what effect the consultation may have on the eventual ordinance.

Based on stated characteristics of the draft ordinance and abovementioned considerations it is concluded that the proposed ordinance is only partially in line with intentions of NLR Recommendation 11-5.

11.4 Acceptance of the safety feedback into the aviation policy

From the interviews with aviation sector parties a general perception was recorded that the process of safety feedback –from AAIB investigation results to safety initiatives– has considerably improved during the last years. This has been also addressed in chapter 5.4, where it was noted that for an important part this was related to the introduction of the consultation process (COSAR), as instituted by DETEC under responsibility of the CASO.
But also the functioning of the AAIB itself is in general more highly appreciated than three years ago. A few typical remarks, recorded during the recent sector interviews are: "*The quality of the reports has improved, BFU has adopted human factors thinking"* and *"Communication and interfacing with the press is much better"*.

The main criticism concerning the current safety feedback process has been put forward by the AAIB itself. Due to the COSAR process the AAIB feels that is less able to connect the response of FOCA to specific safety recommendations as worded in the AAIB investigation reports. The AAIB has a legal obligation (cf. VFU art. 34-3) to yearly publish a summary of AAIB safety recommendations and the associated standpoints of the FOCA. AAIB feels that this obligation is difficult to fulfill in the present set-up.
The CASO provides messages to the AAIB concerning implementation decisions of CASO with respect to the AAIB safety recommendations (see for instance Ref.31 *–Bericht über die Umsetzungsentscheide des CASO in Sachen der Sicherheitsempfehlungen des BFU*). However, these messages are not to be considered as equivalent to the required information (cf. VFU art. 34-3) concerning the viewpoints of FOCA. In strict legal sense this reporting practice is however in agreement with Swiss legislation because DETEC is a higher authority than FOCA, and therefore may take-over FOCA's reporting responsibility. This has been confirmed by a formal Ministerial decision.

According to the CASO the required information is provided to the AAIB in the Appendix A of each Safety Project Directive, containing text for publication issues. This appendix should enable the AAIB to report the yearly status message, in agreement with VFU art. 34-3. From inspection of a number of SPDs it is observed that Appendix A of the SPD indeed contains useful information concerning the safety directions in response to AAIB safety recommendations.
It should be noted however that due to the present set-up the standpoints of FOCA appear to be less relevant. With respect to the implementation of AAIB safety recommendations CASO is the highest authority, and fully responsible for content and schedule of the implementation directives. In fact, due to the authority of CASO, FOCA is forced to follow the instructions contained in the SPD. Of course the FOCA is involved in the consultation process leading to the SPD, and therefore standpoints of the FOCA are incorporated into the SPD. However, once an SPD has been formally issued it should be regarded as a direct instruction to FOCA from which it can not deviate. It is the responsibility of CASO to ensure that the implementation schedule is adhered to and final implementation of the SPD is established.
Therefore, it has to be concluded that, in formal sense, AAIB is correct in their view that it is no longer possible to publish yearly the standpoints of the FOCA in response to AAIB safety recommendations. However, due to the present organizational process concerning the implementation of AAIB safety recommendations the explicit standpoints of FOCA have become irrelevant. In terms of actions taken, the descriptions contained within the Safety Project Directives should be considered equal to the standpoint of the FOCA, as the SPDs enforce the required actions of the FOCA.
Therefore, in principle the AAIB can fulfill its yearly reporting requirement by using the text of the SPDs. However, in order to clearly reflect the current process, it should be considered to adapt the ordinance VFU art. 34-3 accordingly.

11.5 Conclusions

Based on the information provided in the present chapter the following conclusions are drawn with respect to the implementation of NLR Recommendations 11-1 through 11-5.

Recommendation 11-1: Amendment of the ordinance on accident investigation

It is concluded that this recommendation has not been implemented. The ordinance has not yet been amended in the required sense, but the amendment process is in progress. Basically, the only part of the recommendation that has been informally implemented is that AAIB sends investigation reports to DETEC.

Recommendation 11-2: Guidelines for response to AAIB recommendations

It is concluded that this recommendation has not been implemented. However, it was found that due to the new process of translating AAIB recommendations into Safety Project Directives the recommendation has made this recommendation obsolete

Recommendation 11-3: Re-organise AAIB to incorporate an Aviation Accident Investigation Board

It is concluded that this recommendation has not yet been implemented. A change of the Swiss aviation law has recently been initiated that eventually will enable re-organisation of the AAIB. Indications are present that in term the re-organisation of the AAIB will be in line with the recommendation, but any certainty in this matter could not be provided.

Recommendation 11-4: Discontinuation of EFUK

It is concluded that this recommendation has not yet been implemented. A change of the Swiss aviation law has recently been initiated that eventually will enable the abolishment of EFUK. Indications are present that discontinuation of EFUK will be achieved by the change in law, and that a new recourse process will be mechanised through DETEC (REKO-UVEK). This is considered to be in line with the intentions of the recommendation.

Recommendation 11-5: Voluntary occurrence reporting

It is concluded that this recommendation has been only partially implemented. The revision of the legal basis has been approved by the Swiss Parliament. The details of the occurrence reporting process and associated institutional issues are elaborated in a legal ordinance. This ordinance is currently in an industry consultation phase and nears completion. The level ambition expressed in the ordinance is however considered to be not in line with national aviation safety policy.

Summarizing the states of implementation of the recommendations concerning the safety outcomes feedback, complemented by miscellaneous observations or remarks regarding management support and sustainability, yields the following picture:

Recommendation	Implementation	Management support and sustainability remarks *Suggestions for further improvements*
Recommendation 11-1: Amendment of the ordinance on accident investigation	Not yet fulfilled	Amendment in progress. Management support is provided at Governmental and Ministerial level, less within the AAIB. *It is suggested that AAIB procedures are adapted to be in line with this recommendation.*
Recommendation 11-2: Guidelines for response to AAIB recommendations	Not fulfilled	Recommendation is not supported by management. Recommendation is considered obsolete due to the changes to the procedure for processing AAIB safety recommendations. *It is suggested re-direct this recommendation to the CASO as the addressed party.*
Recommendation 11-3: Re-organise AAIB to incorporate an Aviation Accident Investigation Board	Not yet fulfilled	Required modification of Swiss aviation law is in progress. Management support is provided at Governmental and Ministerial level, less within the AAIB. *It is suggested to ensure that the proposed changes to the Swiss aviation law (LFG) are in line with recommendation 11-3.*
Recommendation 11-4: Discontinuation of EFUK	Not fulfilled	Required modification of Swiss aviation law is in progress. Management support is provided at all levels. *It is suggested to ensure that the proposed changes to the Swiss aviation law (LFG) lead to discontinuation of EFUK, and that recourse processes are avoided.*

Recommendation	Implementation	Management support and sustainability remarks ***Suggestions for further improvements***
Recommendation 11-5: Voluntary occurrence reporting	Partially fulfilled	Ambition level is not fully in line with national aviation safety policy. General management support at all levels (DETEC and stakeholders). Sustainability depends on implementation details, yet to be defined.
		It is suggested to re-consider the notion of "gross negligence" in the draft text of the ordinance. In light of the high ambition level of Switzerland the voluntary non-punitive reporting clause should be more in line with the Danish example, in which , among others, the notion of gross negligence is not used and only substance abuse is a reason to lift the non-punitive clause.

12 The present State of Safety Management in Swiss Aviation

In the previous chapters the developments of the various elements of the public policy process around aviation safety management have been reviewed. In this chapter, the actions of the Federal Government are discussed that have driven these developments in the last three years. These activities, grouped within the national aviation safety plan, were aimed to improve the functioning of each of the elements of the public policy process and to enable the required improvements in aviation safety management in Switzerland.

12.1 Observations concerning the state of aviation safety management in Switzerland in 2003

The original NLR study concluded that the safety performance of Swiss aviation did not meet the implicit safety objectives. It was made clear that expectation levels of the general public as well as in the aviation sector itself concerning aviation safety in Switzerland were high.
The study observed that a large discrepancy existed between actual performance and desired performance, and therefore that positive action was required to improve the safety performance of Swiss aviation.
It was specifically proposed to initiate a concerted action involving all actors within Swiss aviation to strengthen aviation safety management at all levels. This was reflected in NLR Recommendation 12-1, concerning the development of a National Safety Action Plan, and in Recommendation 12-2 to ensure that all main actors within Swiss aviation would formally commit the this plan.
For completeness these recommendations are repeated literally below.

Recommendation 12-1: Development of National Aviation Safety Action Plan

It is recommended to the government to develop a National Aviation Safety Action Plan with specific objectives and improvement measures for each of the elements of the public policy process for safety. The aspiration level for aviation safety in Switzerland should be set such that it does justice to the high level of expectation of the public and the aviation industry. This level should be stated in quantitative terms and it should measurable and achievable.

Recommendation 12-2: Assurance of commitment for the National Aviation Safety Action Plan

It is recommended to the government to ensure to that all main actors in Swiss aviation formally commit to a shared responsibility and mutual accountability for conducting the National Aviation Safety Action Plan under the leadership of the government**.**

12.2 Developments concerning the National Aviation Safety Action Plan

Soon after the publication of the NLR study report [1] on July 2nd, 2003, a workshop was organized by FOCA. This workshop was held on August 14-15th in Macolin and was specifically directed to the subject of aviation safety in Switzerland. More specifically the workshop was intended to discuss the findings of the NLR study with all aviation stakeholders. To this end all parties addressed by the NLR study were invited. All these parties, represented by their highest management level, did indeed participated in the workshop.

As a strong sign of commitment to aviation safety in Switzerland the workshop was opened by the Head of DETEC, Mr. Leuenberger himself. In his opening speech he strongly stressed the absolute prevalence of safety as an objective of the aviation industry, and called upon all participants to take up their responsibilities in order to regain and maintain the outstanding level of safety which once characterised the Swiss aviation sector. He also endorsed the findings of the NLR study, and clearly expressed to all stakeholders that they should commit to a shared responsibility to implement the recommendations.

Also the Minister announced that a national aviation safety action plan would be set-up by a special DETEC safety delegate. This safety delegate was directly introduced during the workshop. The workshop provided subsequently a platform for the safety delegate to share his ideas for the set-up of the safety plan. The workshop required also active participation of the stakeholders. This provided an opportunity to get initial buy-in from the sector parties in the safety plan as presented.

During the workshop it was understood from several of the involved sector parties that the strong personal involvement of the Head of DETEC in the workshop, and the demonstrated commitment to enhance aviation safety, was experienced as extraordinary and was considered a strong motivation for engagement in the safety plan.

As such, this can be considered as an important step in the implementation of NLR Recommendation 12-2.

The National Aviation Safety Plan has taken shape in the form of the so-called SAFIR project ("SAfety FIRst"). This plan has been further developed by the DETEC safety delegate that has been specially assigned for this task.
It has been observed that the SAFIR project has been started off very energetically. Within a period of months after the publication of the NLR report the project was organized, clear objectives were formulated, and first actions to implement the recommendations were initiated. A working group was established to newly formulate the national safety policy, and to initiate the reorganization of FOCA. Clear actions were also taken towards Skyguide both through involvement of the Skyguide board and formulation of strategic goals for Skyguide and through involvement of the highest management level within Skyguide. By means of a publication in the Skyguide safety bulletin (issue 4, December 2003) the DETEC safety delegate presented the plan company wide within Skyguide.

The implementation of the National Aviation Safety Action Plan is monitored by a high level steering group that has been instituted by DETEC. This steering group is headed by the Secretary General. Members of the steering group are furthermore the CASO, the SG's assistant, the director of FOCA, the president of the board of Skyguide, and an outside advisor. The steering group meets quarterly and provides progress reports twice a year to the general investigation commission *("Geschäftsprüfungskommission")* of the Swiss parliament.
The institution of this steering group, headed by the SG himself, is regarded as evidence of the high level of commitment of DETEC, FOCA and Skyguide for the safety action plan and its implementation.

The concept phase of SAFIR was ended in April 2004, with the publication of the 2nd intermediate and final report [27]. With this publication the development of the national safety plan was concluded, and the SAFIR project progressed – under responsibility of the GS-UVEK – into the next phase that basically is concerned with the practical implementation of the recommendations. Without scrutinizing all details of the SAFIR project it is concluded that this project is a clear implementation of NLR recommendation 12-1.

12.3 Acceptance of the National Aviation Safety Action Plan

From all interviews conducted with the aviation sector parties in Switzerland the impression is gained that the Swiss national aviation safety plan, as embodied within the SAFIR project, is widely supported. At highest management level there is unanimous support and commitment for the plan. The scope of the present investigation did not allow for a detailed analysis of the acceptance of the safety plan and its consequences at lower management and operational levels. Evidently, it is the task of higher management to ensure that commitment for the plan is also achieved at those levels. Clear signs are observed that in general higher management is active in

this respect by means of adopting clear safety policies, organizing safety workshops, and other safety culture enhancing measures.
Clearly, the effect of these measures is not directly measurable. However there is a widely shared feeling that substantial improvements have been made in the last three years. Safety management processes are now taken much more serious within the aviation sector parties than three years ago. Safety management is accepted as an inherent part of the organizations. Allocated resources to safety management have increased substantially (in particular at Skyguide, airports and FOCA), and responsibility and accountability for safety management has been better organized.

It can not be concluded as yet that due to these actions all structural problems are solved. Changing a safety culture is a process that may take several years, and will require continuous attention. However, in general a positive attitude and a strong and unceasing commitment for the safety plan has been observed.
Based on these observations it is concluded that NLR Recommendation 12-2 has been satisfied.

12.4 Conclusion

Summarizing the states of implementation of the recommendations towards the Swiss Federal Government concerning the national aviation safety action plan, complemented by miscellaneous observations or remarks regarding management support and sustainability, yields the following picture:

Recommendation	Implementation	Management support and sustainability remarks
Recommendation 12-1: Development of a National Aviation Safety Action Plan	Fulfilled	Wide management support within Government and sector parties. Sustainability of the plan depends on the level of continued support of the Government for safety improving initiatives, at all levels.
Recommendation 12-2: Assurance of commitment for the National Aviation Safety Action Plan	Fulfilled	Management support for the assurance of commitment to the national safety plan has been demonstrated at the highest governmental level.

13 Overview of the implementation status of all the recommendations given

An overview of the implementation status of all the recommendations is given in table 13.1. The following terminology is used:

- Not fulfilled: no elements of the recommendation are fulfilled;
- Partially fulfilled: substantial elements of the recommendation are not (yet) fulfilled;
- Largely fulfilled: most elements of the recommendation are fulfilled;
- Fulfilled: all elements of the recommendation are fulfilled.

Recommendation	**Implementation**	**Management support and sustainability remarks** ***Suggestions for further improvements***
Recommendation 4-1: Development of a national aviation safety policy	Fulfilled	Clear management support, and strong commitment within DETEC, Aviation Authorities and Sector parties.
Recommendation 5-1: Appointment of dedicated aviation responsible	Largely fulfilled	CASO function is an operational success and should be continued. General management support exists within DETEC for CASO, but function is not fully embedded within department. Sustainability of CASO function is not fully ensured. Current task-load of CASO exceeds the available resources. COSAR process might be reviewed after reorganisation of the AAIB.
Recommendation 6-1: Separation of safety regulation and aviation policy within FOCA	Fulfilled	The new defined corporate structure and business model has the full support of the (top) management. The implementation led to changes in the position of the employees on the work floor. A danger of frustration exists. *For future sustainability, attention should be paid to broad acceptance and management style used.*

Recommendation	Implementation	Management support and sustainability remarks ***Suggestions for further improvements***
Recommendation 6-2: Formulation of a FOCA safety policy	Largely fulfilled	Full management support for the primacy of safety and the ambitions formulated. Sustainable.
Recommendation 6-3: Development of a safety performance data monitoring process	Largely fulfilled	Top-down support is there, however, the involvement of the employees on the working floor is equally important as well.
Recommendation 6-4: Development of a formal process for threat identification		*An instrument could be the improvement of feedback towards the working floor level.*
Recommendation 6-5: Initiation of surveillance regime for oversight of Skyguide	Largely fulfilled	The improved oversight of Skyguide has full management support. It is in correspondence with the new FOCA Safety Policy.
Recommendation 6-6: Reviewing staffing level related to evaluation of ATM safety cases		*Attention should be paid to the staffing level and to the regulatory part of the work of FOCA.*
Recommendation 6-7: Strengthening the surveillance regime over the airline operators	Largely fulfilled	Full management support, staffing level still a bottleneck despite the already significant increase. *Further increase of staffing level; separation between Certification and Surveillance (rotary-wing).*
Recommendation 7-1: Strengthening of safety management expertise and staff	Largely fulfilled	Clear management support *Actual acceptance and usage need to be improved.*

Recommendation	Implementation	Management support and sustainability remarks ***Suggestions for further improvements***
Recommendation 7-2: Reduction of shortage of Air Traffic Controllers at increased pace	Not fulfilled	Due to Skyguide's efforts, the shortage has not deteriorated. Recognition of the problem and new initiatives from the new head of Operations.
Recommendation 7-3: Licensing of Air Traffic Control technical personnel	Partially fulfilled	Skyguide has submitted means to demonstrate proper qualification of technical personnel in compliance with ESARR 5 to FOCA for certification in the single European sky. Checking is in progress For the longer term, FOCA has chosen for development of a licensing scheme, although Skyguide's management at least initially did not support this approach.
Recommendation 7-4: Enable confidential incident reporting	Largely fulfilled	Skyguide has actively contributed to adaptation of the Swiss legal framework and has internally arranged reporting that is to some extent confidential and non-punitive. This would not have succeeded without management support. *General acceptance and practice of reporting needs to be improved further for sustainability. Suitable adaptations to the legislative framework are similarly necessary.*

Recommendation	Implementation	Management support and sustainability remarks *Suggestions for further improvements*
Recommendation 7-5: Definition and maintenance of a risk portfolio	Partially fulfilled	Skyguide uses the risk portfolio to manage safety risks on a regular basis by the highest management. Only a very premature risk portfolio exists however: the input is only of occurrence type, interpretation difficult and not all necessary sources are used. Sustainability is a question mark since the effectiveness of the present portfolio is limited. *Skyguide is suggested to reconsider the scope of the risk portfolio as developed to make it into an effective tool to manage the most important safety risks and threats.*
Recommendation 7-6: Strengthening of risk management expertise and staff	Largely fulfilled	Demonstrable safety needs to be first priority. Continuing development of expertise needed. Clear management support, but acceptance and actual usage in the operational practices need to be improved for sustainability. *Skyguide is suggested to keep a close finger on the pulse regarding quality of assessments by applying independent critical review, and to keep on developing expertise. Quality and effectiveness of the risk assessment and mitigating process is vital for continued application and acceptance.*
Recommendation 7-7: Review staffing level for internal incident investigation	Fulfilled	Clear management support. General acceptance and usage needs to be improved for sustainability.

Recommendation	Implementation	Management support and sustainability remarks *Suggestions for further improvements*
Recommendation 8-1: Re-formulation of SWISS' safety policy	Largely fulfilled	Clear management support of the policy
Recommendation 8-2: Continuation of the SWISS Safety Advisory Board	Discontinued. No need for substitution.	
Recommendation 8-3: Introduction of flight data monitoring programs	Largely fulfilled	Wide management support for FDM. Positive results from the introduction of FDM are visible.
Recommendation 9-1: Specification of airport safety policy – **Zurich**	Fulfilled	The airport of Zurich shows clear management support.
Recommendation 9-1: Specification of airport safety policy – **Geneva**	Fulfilled	The new CEO of the airport of Geneva shows a positive attitude towards safety.
Recommendation 9-2: Introduction of airport safety management system – **Zurich**	Largely fulfilled	Although the initiation of this may have involved significant pressure from for instance FOCA, the airport of Zurich's management is serious and active about safety. *Against a background of a safety culture that seems positive, continued commitment and effort of management is expected to result in a sustainable and effective safety management system at the airport of Zurich at the end of 2007.* *The CEO is encouraged to promote safety further.*

Recommendation	Implementation	Management support and sustainability remarks ***Suggestions for further improvements***
Recommendation 9-2: Introduction of airport safety management system – **Geneva**	Partially fulfilled	The airport of Geneva has planned three years for implementing an SMS from certification (expected before the end of 2006). *Intensified commitment and effort to further implementation of an SMS for the airport of Geneva is needed.*
Recommendation 11-1: Amendment of the ordinance on accident investigation	Not yet fulfilled	Amendment in progress. Management support is provided at Governmental and Ministerial level, less within the AAIB. *It is suggested that AAIB procedures are adapted to be in line with this recommendation.*
Recommendation 11-2: Guidelines for response to AAIB recommendations	Not fulfilled	Recommendation is not supported by management. Recommendation is considered obsolete due to the changes to the procedure for processing AAIB safety recommendations. *It is suggested re-direct this recommendation to the CASO as the addressed party.*
Recommendation 11-3: Re-organise AAIB to incorporate an Aviation Accident Investigation Board	Not yet fulfilled	Required modification of Swiss aviation law is in progress. Management support is provided at Governmental and Ministerial level, less within the AAIB. *It is suggested to ensure that the proposed changes to the Swiss aviation law (LFG) are in line with recommendation 11-3.*

Recommendation	Implementation	Management support and sustainability remarks ***Suggestions for further improvements***
Recommendation 11-4: Discontinuation of EFUK	Not fulfilled	Required modification of Swiss aviation law is in progress. Management support is provided at all levels. *It is suggested to ensure that the proposed changes to the Swiss aviation law (LFG) lead to discontinuation of EFUK, and that recourse processes are avoided.*
Recommendation 11-5: Voluntary occurrence reporting	Partially fulfilled	Ambition level is not fully in line with national aviation safety policy. General management support at all levels (DETEC and stakeholders). Sustainability depends on implementation details, yet to be defined. *It is suggested to re-consider the notion of "gross negligence" in the draft text of the ordinance. In light of the high ambition level of Switzerland the voluntary non-punitive reporting clause should be more in line with the Danish example, in which , among others, the notion of gross negligence is not used and only substance abuse is a reason to lift the non-punitive clause.*
Recommendation 12-1: Development of a National Aviation Safety Action Plan	Fully implemented	Wide management support within Government and sector parties. Sustainability of the plan depends on the level of continued support of the Government for safety improving initiatives, at all levels.
Recommendation 12-2: Assurance of commitment for the National Aviation Safety Action Plan	Fully implemented	Management support for the assurance of commitment to the national safety plan has been demonstrated at the highest governmental level.

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Appendix A List of recommendations

All recommendations as provided in the original report are repeated here, for the convenience of the reader. The recommendations have been numbered according to the chapter where they have been formulated, in sequence of occurrence.

Recommendation 4-1: Development of a national aviation safety policy
It is recommended to the Swiss government to develop a national aviation safety policy, and to ensure that this policy is adopted for implementation under the responsibility of the Minister of Transport

Recommendation 5-1: Appointment of dedicated aviation responsible
It is recommended to DETEC to establish a new full-time position within DETEC

- to strengthen the ability of DETEC to give guidance to FOCA;
- to monitor the performance of FOCA on a regular basis;
- to act on behalf of the Swiss government in state level aviation policy matters; and
- to act as the delegated accountable manager of the Minister of Transport with regard to the implementation of the recommendations of AAIB.

Recommendation 6-1: Separation of safety regulation and aviation policy within FOCA
It is recommended to change the organisation of FOCA into a separate unit for Safety Regulation and a separate unit for Aviation. Each unit should report to its own Director of Safety Regulation resp. Director of Aviation, with both directors reporting to a Director of FOCA.

Recommendation 6-2: Formulation of a FOCA safety policy
It is recommended to formulate a safety policy that meets all requirements to make it the main pillar under FOCA's safety management as a matter of urgency. This FOCA safety policy must be formally approved by DETEC.

Recommendation 6-3: Development of a safety performance data monitoring process.
It is recommended for FOCA to:

- work with AAIB to ensure that AAIB does prepare and publish appropriate analyses of accident and incident data such that the AAIB analyses (also) meet the needs of FOCA, and

- to develop as a matter of urgency, a safety performance data monitoring process for FOCA, at least to include the data from the FOCA surveillance activity.

Recommendation 6-4: Development of a formal process for threat identification

It is recommended that FOCA develop a formal process to identify threats, to develop a risk assessment process, and to build and maintain a risk portfolio.

Recommendation 6-5: Initiation of surveillance regime for oversight of Skyguide

It is recommended to FOCA to implement as a matter of urgency, a short term surveillance regime, based on the new philosophy, to ensure that actual oversight of Skyguide commences with immediate effect.

Recommendation 6-6: Review staffing level related to evaluation of ATM safety cases

It is recommended to FOCA to conduct a critical analysis of the staffing levels at FOCA needed to face the tasks ahead with regard to Skyguide oversight and the need to approve safety cases. If this analysis reveals the need for additional resources and capabilities, it is imperative that these resources are made available.

Recommendation 6-7: Strengthening the surveillance regime over the airline operators

It is recommended to FOCA to:

- sharply increase the surveillance of the operators;
- conduct audits and inspection when awarding or renewing AOC licenses, regardless of whether JAR-Ops could be interpreted such that inspections are not required;
- analyse the findings of audits across the surveillance activity with the purpose of finding root-causes and identifying adverse trends;
- take findings of previous audits into account in subsequent audits and verify implementation;
- ensure that audit findings are brought to the attention of the certification inspectors;
- review the new audit program for its feasibility and adapt it as needed, regardless of JAR or ICAO recommended audit intervals;
- perform a first risk assessment and use the results to focus the audit program in accordance with the findings.

Recommendation 7-1: Strengthening of safety management expertise and staff
Skyguide is recommended to increase level of expertise and staffing within it's safety management department, and assure adequate support by operational departments for the timely introduction of an ESARR compliant safety management system.

Recommendation 7-2: Reduction of shortage of Air Traffic Controllers at increased pace.
Skyguide is recommended to reduce the shortage of functional Air Traffic Controllers at increased pace. To this end the possibilities to increase the throughput of the training curriculum shall be investigated, especially in the area of on the job training.

Recommendation 7-3: Licensing of Air Traffic Control technical personnel
Skyguide is recommended to investigate the practicalities and potential effectiveness of a licensing program for Technical Personnel. The eventual set-up of such a program shall be in agreement with Eurocontrol ESARR5 requirements for Technical Personnel.

Recommendation 7-4: Enable confidential incident reporting
Skyguide is recommended to work with FOCA and DETEC, on the establishment of proper adaptations to current Swiss legislation in order to enable confidential incident reporting, with adequate safeguards for protection against judicial prosecution, and in accordance with ICAO Annex 13 [para. 5.4.1, and 8.1-8.3].

Recommendation 7-5: definition and maintenance of a risk portfolio
Skyguide is recommended to define and maintain a risk portfolio that provides an inventory of all identified threats to Skyguide's operations and means to prioritise most severe risks in a structured way.

Recommendation 7-6: strengthening of risk management expertise and staff
Skyguide is recommended to increase level of expertise and staffing within it's Risk Management department, and to assign high priority to support of operational and technical departments in the process of performing safety cases.

Recommendation 7-7: Review staffing level for internal incident investigation
Skyguide is recommended to ensure that internal incident investigation processes are not hampered by lack of qualified personnel or other resources.

Recommendation 8-1: Re-formulation of SWISS' safety policy

It is recommended to SWISS to re-formulate the current safety policy of SWISS in order to clearly reflect the strategy and intentions of the executive management, and to serve as a clear guideline for the entire company.

Recommendation 8-2: Continuation of the SWISS Safety Advisory Board

It is recommended to SWISS to allow the SSAB to continue it's work for the foreseeable future in order to highlight latent safety threats and ensure that appropriate safety standards and procedures are implemented throughout the company.

Recommendation 8-3: Introduction of flight data monitoring programs

It is recommended to FOCA to take appropriate actions to ensure the introduction of flight data monitoring programs at all Swiss AOC-holders, in accordance with ICAO (Annex 6, Part I, par. 3.2.2) requirements.

Recommendation 9-1: Specification of airport safety policy

It is recommended that major airports within Switzerland specify a clear safety policy that describes the airport's safety objectives, and the vision and strategy of executive management to achieve those objectives.

Recommendation 9-2: Introduction of airport safety management system

It is recommended that the airports take an active attitude towards the implementation of an airport safety management system and associated organisational changes. Airports should familiarise themselves with the appropriate processes and procedures of safety management.

Recommendation 11-1: Amendment of the ordinance on accident investigation

It is recommended to DETEC to prepare an amendment to the ordinance on accident investigation to the following effect:

- that the AAIB formally reports to the minister of Transport instead of to FOCA;
- that AAIB recommendations are addressed to the most appropriate agency instead of exclusively to FOCA;
- that an obligation is placed upon the agency addressed in a AAIB recommendation to:
  - take the recommendation into consideration and, where appropriate, to act upon it;

- send to the Minister of Transport a message containing details of the measures taken, or an explanation as to why the recommendation is not implemented;

- that article 34 - 3 of the ordinance, regarding the obligation upon AAIB to maintain and make public a list of recommendations and their implementation status, is extended to be the applicable to all recipients of a AAIB recommendations (instead of only FOCA) and to update the list on a regular basis.

Recommendation 11-2: Guidelines for response to AAIB recommendations

It is recommended to the AAIB to develop and make public the guideline used by AAIB to assess and classify the response to AAIB recommendations.

Recommendation 11-3: Re-organise AAIB to incorporate an Aviation Accident Investigation Board

It is recommended to re-organise the AAIB to incorporate an Aviation Accident Investigation Board with the following tasks:

- to review and approve AAIB accident investigation reports;
- to organise and chair a public hearing regarding the draft final report;
- to review and approve other AAIB safety products;
- to maintain the necessary relationships with the Minister.

This Board shall be established such that:

- it is small in size;
- its members are suitably qualified and independent;
- the chairman acts as the spokesperson for AAIB.

This Board and its legal basis shall be established such that these do not prevent a later integration of the new AAIB into a larger independent Transport Accident Inverstigation Authority.

Recommendation 11-4: Discontinuation of EFUK

It is recommended to discontinue the recourse process through EFUK and to change the associated legislation accordingly.

Recommendation 11-5: Voluntary occurrence reporting

It is recommended to DETEC to propose appropriate changes to the SWISS legislation in order to enable a mechanism for voluntary and non-punitive reporting of safety relevant occurrences.

Recommendation 12-1: Development of National Aviation Safety Action Plan

It is recommended to the government to develop a National Aviation Safety Action Plan with specific objectives and improvement measures for each of the elements of the public policy process for safety. The aspiration level for aviation safety in Switzerland should be set such that it does justice to the expectation of the public and the aviation industry. This level should be stated in quantitative terms and it should measurable and achievable.

Recommendation 12-2: Assurance of commitment for the National Aviation Action Safety Plan

It is recommended to the government to ensure to that all main actors in Swiss aviation formally commit to a shared responsibility and mutual accountability for conducting the National Aviation Safety Action Plan under the leadership of the government**.**

Appendix B List of interviews conducted

Nr.	Organisation	Name	Position	Interview Team
1	DETEC	Mr. A. Muggli; Mr. S. Maurer	CASO; Deputy CASO	Mr. U.G. Dees, Mr. H.H. de Jong
2	DETEC	Mr. Werder; Mr. A. Schrade	Secretary-General; Deputy Secretary-General	Mr. U.G. Dees, Mr. H.H. de Jong
3	AAIB	Mr. J. Overney; Mr. D. Zwick	Head AAIB; Investigator	Mr. U.G. Dees, Mr. H.H. de Jong
4	Swiss Air Force	Mr. I. Logan	Chief ATM regulation	Mr. U.G. Dees, Mr. H.H. de Jong
5	Aeropers	Mr. Ch. Flügel	President	Mr. U.G. Dees, Mr. H.H. de Jong
6	SATTA	Mr. S. Böller; Mr. H. Wipf	President; Former President	Mr. U.G. Dees, Mr. H.H. de Jong
7	EPFL	Mr. M. Finger	Professor	Mr. U.G. Dees, Mr. P.J. van der Geest
8	IFATCA; Skycontrol	Mr. M. Baumgartner; Mr. Ch. Gilgen	President & CEO; EB Member	Mr. U.G. Dees, Mr. P.J. van der Geest
9	FOCA	Mr. R. Cron Mr. M. Suhr	Director-General Head Corporate Services and deputy Director-General	Mr. U.G. Dees, Mr. P.J. van der Geest
10	FOCA	Mr. W. Bösch Mr. M. Suhr	Vice-Director, Head of Safety Division – Flight Operations Head Corporate Services and deputy Director-General	Mr. U.G. Dees, Mr. P.J. van der Geest
11	FOCA	Mr. M. Zuckschwerdt Mr. M. Suhr	Director, Head of Aviation Policy and Strategy Division Head Corporate Services and deputy Director-General	Mr. U.G. Dees, Mr. P.J. van der Geest
12	FOCA	Mr. R. Hunninghaus Mr. M. Suhr	Head of Safety Risk Management Head Corporate Services and deputy Director-General	Mr. U.G. Dees, Mr. P.J. van der Geest
13	Aeroport Int. de Genève	Mr. R. Deillon; Mr. R. Wüthrich	General Director; Technical and Operations Director	Mr. U.G. Dees, Mr. H.H. de Jong

Nr.	Organisation	Name	Position	Interview Team
14	SWISS Int. Air Lines	Mr. M. Brennwald; Mr. P. Ernst	COO; VP Safety	Mr. U.G. Dees, Mr. H.H. de Jong
15	Hodler & Emmenegger	Mr. G. Emmenegger	President Verwaltungsrat Skyguide	Mr. U.G. Dees, Mr. H.H. de Jong
16	Skyguide	Mr. J. Schmid; Mr. M. Probst	Head Safety Management; Head Corporate Management Systems	Mr. P.J. van der Geest and Mr. M.A. Piers
17	Skyguide	Mr. A. Schneider	Head Operational and Continuation Training	Mr. P.J. van der Geest and Mr. M.A. Piers
18	Skyguide	Mr. S. Barraz	Manager Systems Safety Management	Mr. P.J. van der Geest and Mr. M.A. Piers
19	Skyguide	Mr. A. Rossier	President and CEO	Mr. P.J. van der Geest and Mr. M.A. Piers
20	Skyguide	Mr. U. Ryf	Director of Operations	Mr. P.J. van der Geest and Mr. M.A. Piers
21	EasyJet	Mr. J. Thévenaz; Mr. Ph. Pilloud; Mrs. F. Corcelle; Mr. S. Campana;	President and CEO; Safety Manager; Quality Assurance Manager; Manager Flight Data Monitoring;	Mr. P.J. van der Geest and Mr. M.A. Piers
22	FOCA	Mr. G. Boller Mr. M. Suhr	Inspector Section Surveillance Flight Operations Head Corporate Services and deputy Director-General	Mr. P.J. van der Geest
23	FOCA	Mr. E. Kuster Mr. M. Suhr	Deputy Head Section Surveillance Flight Operations Head Corporate Services and deputy Director-General	Mr. P.J. van der Geest
24	FOCA	Mr. R. Aebersold Mr. M. Suhr	Head Section Air Navigation Services Head Corporate Services and deputy Director-General	Mr. P.J. van der Geest
25	FOCA	Mr. R. Cron Mr. M. Suhr	Director-General Head Corporate Services and deputy Director-General	Mr. P.J. van der Geest

Nr.	Organisation	Name	Position	Interview Team
26	Unique Airport Zurich	Mr. R. Hiltebrand; Mr. M. Schmidli; Mr. D. Bircher	Chief Operating Officer (COO); Head of Planning & Engineering; Safety Manager	Mr. U.G. Dees, Mr. H.H. de Jong
27	Vereinigung SWISS PILOTS	Mr. Th. Issler	President	Mr. U.G. Dees