Aviation safety management in Switzerland
Recovering from the myth of perfection
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Aviation safety management in Switzerland
Recovering from the myth of perfection

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Summary

Over the last five years the Swiss aviation sector has been struck by a number of severe aviation accidents. The tragic sequence of accidents started with the crash of a SwissAir MD-11, in 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 Üeberlingen (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.

These events have led to the perception that there might be structural causes, leading to an overall adverse safety trend in the Swiss air transportation system.

In response, the Swiss Confederation, represented by the "Department for Environment, Traffic, Energy and Communication" (DETEC), has commissioned NLR to conduct an extensive evaluation of the safety of air transport in Switzerland. The main objective of this investigation is to show, in particular, whether the current structures for ensuring aviation safety within Switzerland are appropriate (i.e. effective and efficient). In accordance with this objective the investigation follows a safety management approach, because aviation safety can only be ensured if it is managed properly.

At the national level the management of aviation safety has been defined as subject of a public policy process with clearly defined functions; viz. policy setting, policy implementation, policy output, policy impact, policy outcomes and feedback.

At corporate level safety management has been addressed along the lines of a general safety management framework, focusing on key elements; safety policy definition, safety monitoring, threat identification, risk assessment, decision-making and safety actions.

This structured approach allows a clear definition of the safety related roles and responsibilities of all actors within the Swiss air transportation sector and facilitates the identification of functions that might not be properly performed to achieve an effective process of ensuring an adequate level of aviation safety.

The parties addressed in this study are DETEC, the Federal Office of Civil Aviation (FOCA), the Aviation Accident Investigation Bureau (AAIB), Skyguide, selected airlines (SWISS and easyJet) and major airports (Zurich and Geneva).

A large number of interviews has been held with persons accountable for safety or fulfilling essential safety management functions in these organisations.
In addition interviews have been held with several persons representing unions of pilots, air traffic controllers, and air traffic control technicians.

From these interviews, and the documentation provided by the interviewees as well as from other sources, a detailed impression has been gained of the state of affairs concerning aviation safety management in Switzerland.

Furthermore a benchmark study has been performed in order to compare the situation in Switzerland in terms of resources and organisation with that in France, Germany and the Netherlands.

This report provides an in-depth assessment of aviation safety management in Switzerland. It describes in the first chapters the scope and context of the study. In a following chapter the study approach is explained in detail. Subsequently, each element of the public policy process is analysed in a dedicated chapter. Furthermore internal safety management at Skyguide, at the selected airlines and at major airports are addressed, each in a separate chapter.

Each chapter provides an assessment of whether specific safety management functions are adequately fulfilled or organised. Based on the findings a substantial number of recommendations have been formulated.

The main finding of the study is that in Switzerland a number of essential safety management processes and associated responsibilities has been institutionalised such that effective safety management is not achieved. The study has also established that public air transport remains extremely safe and Swiss aviation is no exception. For the Swiss traveller, there is no safer way than by air to reach destinations in Europe and further across the globe, regardless of whether national or foreign major airline service is used. Nevertheless, this study has found that the policy outcome, as reflected in the safety statistics of Swiss aviation over the last decade is unsatisfactory as the safety performance of Swiss aviation is declining whereas that of the comparable European states is improving. Where Switzerland was clearly ahead of these states in terms of safety before the nineties, this lead has been lost. To reverse the negative trend and to restore the exemplary safety performance of Swiss aviation measures are required. These measures concern the removal of institutional barriers, and the implementation of a number of organisational changes at the level of DETEC, FOCA and the AAIB. Moreover it is required to take a number of national and sector-wide safety initiatives.

Main recommendations in this respect are:

With respect to Swiss 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.
With respect to DETEC:
- to establish a new full-time position in 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.

With respect to FOCA:
- change the organisation of FOCA into a separate unit for Safety Regulation and a separate unit for Aviation. Both branches have their own director, with both of them reporting to a senior director of FOCA.

With respect to accident investigation:
- to discontinue the recourse process through the “Eidgenössische Flugunfallkommission” EFUK and adapt the law accordingly;
- to change the ordinance on accident Investigation such that 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, and that a legal obligation rests upon the agency addressed in a AAIB recommendation to take the recommendation into consideration, and to report back to the Minister of Transport;
- to establish, within AAIB, an Aircraft Accident Investigation Board. The tasks of this board are among others to review and approve accident investigation reports, to organise and chair a public hearing regarding the draft final report, to review and approve other AAIB safety products, and to maintain the necessary relationships with the Minister and the aviation sector.

This study has shown that the lingering sense of perfection of Swiss aviation safety is no longer warranted in view of the safety performance over recent years. The study has also established that many initiatives are being initiated in various orgnisations in Swiss aviation to improve safety management. For these reasons, this report carries the subtitle “recovering from the myth of perfection”. It is hoped that the many recommendations of this report will help to restore the safety of Swiss aviation to their previous exemplary levels. As safety performance is the cooperative product of the aviation sector and the government together, the effort to recover must be a shared responsibility.
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<td>ACAS</td>
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<td>Accident Investigation Buro (UK)</td>
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<td>Aeronautical Information Publication</td>
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<td>Air proximity</td>
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<td>ANC</td>
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<td>Bureau of Aviation Safety Investigations (Australia)</td>
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<td>Bureau Enquêtes-Accidents (France)</td>
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<td>Büro für Flugunfalluntersuchungen (Switzerland)</td>
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<td>Center of Competence</td>
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<td>CVR</td>
<td>Cockpit Voice Recorder</td>
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<td>Full Time Equivalent</td>
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<td>GAT</td>
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<td>GIA</td>
<td>Geneva International Airport</td>
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<td>ICAO</td>
<td>International Civil Aviation Organization</td>
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<td>IFR</td>
<td>Instrument Flight Rules</td>
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<td>Acronym</td>
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<td>JAA</td>
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<td>KFU</td>
<td>Koordinationsstelle für Flugunfall-untersuchungen und Unfallverhütung</td>
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<td>MSAW</td>
<td>Minimum Safe Altitude Warning</td>
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<td>STC</td>
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<td>Short Term Conflict Alert</td>
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<td>TCAS</td>
<td>Traffic Alert and Collision Avoidance System</td>
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<td>Verordnung über die Untersuchung von Flugunfällen und schweren Vorfällen</td>
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<td>Vice-President</td>
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1 Introduction

1.1 The study mandate

1.1.1 Study motive
In recent years the international air transport sector has been subject to many changes and developments. Many of those developments were associated with the international evolution of the air transport sector, as result of, amongst others, deregulation, increasing international competition, emergence of low-cost carriers, and formation of large international airline alliances. Also the air transport sector encountered around 2001, after many years of steady and obvious growth, a significant stagnation due to an economic down-turn, that was further aggravated by the events of September 11th, 2001.

In Switzerland these developments have had their unmistakable impact. Crossair emerged as a fast growing, low-cost, regional carrier. As from 1998 the number of aircraft employed by Crossair already surpassed the number of the flagcarrier Swissair, and in 2000 the number of flights of Crossair exceeded that of Swissair by more than 50%.
Also Switzerland witnessed the full privatisation of air traffic management services, and integration of civil and military air traffic services, in the foundation of Skyguide. Finally, one of the most visible and shocking symptoms of the changing aviation environment in Switzerland has been the bankruptcy of SwissAir, in 2002. This led to the formation of a new Swiss aviation company, SWISS, in which Crossair effectively took over Swissair's operations and fleet, with substantial financial aid of the Swiss confederation and a number of private investors.
All these developments are signals of fast and wide-ranging changes to the air transportation system in Switzerland.

The changes mentioned were accompanied by a number of tragic accidents, that raised questions (in the media and in government) concerning the safety of aviation safety within Switzerland.
The tragic sequence of events started with the crash of a SwissAir MD-11, in Halifax, in 1998. This was followed by two severe aircraft accidents with Crossair aircraft (a crash of a Saab 340 near Nassenwil on 10-1-2000, and a crash of an Avro 146 RJ 100 near Bassersdorf on 24-11-2001). Within the same time-frame the Swiss National Bureau of Accident Investigation (AAIB) reported various cases of near accidents and also suggested improvements in the
equipment used by the Swiss company Skyguide, which has responsibility for Air Traffic Control (ATC) services within Switzerland.

Finally, on July 1, 2002, two large civil aircraft crashed near Überlingen (Germany), after a mid-air collision in airspace, controlled by Skyguide. This chain of events has led the head of the Swiss Ministry of Environment, Traffic, Energy and Communication (DETEC) to order an evaluation of the safety of air transport in Switzerland by an agency, which is independent of the governmental administration and the Swiss aviation enterprises.

In this context "Die Schweizerische Eidgenossenschaft", represented by the DETEC, has contracted the National Aerospace Laboratory (NLR) of the Netherlands to conduct an investigation to review and analyse aviation safety in Switzerland, and more specifically the way safety is managed by the various parties within the air transportation system.

This study is indicated as the REACH study (Review and Evaluation of Aviation Safety management in Switzerland (CH)) in the remainder of the report.

1.1.2 The objectives
The objectives of the study have been defined in the study assignment as drawn up by the DETEC.

According to this assignment the main objective of the investigation is to show, in particular, whether the current structures for ensuring aviation safety within Switzerland are appropriate (i.e. effective and efficient) in the following respect:

a) allocation of assignments, competencies and means;

b) organisation;

c) assurance of professional skills in concerned organisations;

d) guarantee of the required co-operation between the various acting parties involved.

On a more detailed level the objective of the study is to investigate:
1. The relations between the supervising authority, ATC, airlines and airports;
2. The internal safety management of Skyguide;
3. The supervisory capability of the FOCA;
4. The functions of the DETEC, in terms of its supervisory role over FOCA, interests and relationships with Skyguide, and the relationship with the AAIB;
5. The accident investigating capability of the AAIB;
6. The comparison with neighbouring countries, in terms of available financial and human resources, and organisation of the FOCA and Skyguide.
1.2 The general set-up

1.2.1 Safety Management Approach
In order to be clear from the outset, the present study is not aimed to conduct a regular audit of the aviation system in Switzerland. An audit would be aimed to show to which extent organisations comply with the applicable rules and regulations. Although such regulatory compliance is a necessary condition to create a basis for the achievement of an acceptable level of safety, of itself it does not guarantee a high and consistent level of safety within the aviation system.

For this reason aviation safety in Switzerland will not be addressed from the perspective of "regulatory compliance", but from the perspective of "safety management" instead.

Safety management in the current context is defined as the management of activities to secure high standards of safety performance that meet, as a minimum, the provisions of the safety regulatory requirements. The philosophy behind the "safety management" approach is that if it can be established that safety is well managed it can be assumed that high safety standards are being achieved. However, if elements of the safety management process are not functioning properly, it can be assumed that safety is the outcome of a more or less uncontrolled process, and therefore acceptable safety levels are not guaranteed. Moreover focusing on the safety management processes within the air transport system will enable the identification of systemic weaknesses or shortcomings in a structured way that may lead to practical recommendations for improvement.

In the context of the present study safety management has been defined at national level, where it is considered to be the subject of public policy, and at corporate level, where it is a combination of internal safety related activities.

This approach that provides a framework to assess safety management at national as well as corporate level will be further elaborated in Chapter 3 of this report.

1.2.2 The report set-up
As the development of the aviation sector in Switzerland over the last decades is a shaping factor in today's the safety performance of Swiss aviation, Chapter 2 describes the major developments in the recent years to provide an historic perspective. This chapter also describes the international perspective, and the main caveats and background considerations.

In accordance with the previous paragraph, the current study has been organised around the way safety is being managed in aviation. Two levels of safety management are considered in this study. The first level concerns the way aviation safety is being achieved by the national air transport sector as a whole. In this study, the air transport sector includes the various government organisations. A public policy process is introduced in Chapter 3 as the way
aviation safety management is conducted at the national level. Each of the Chapters 4 through 11, constituting the main body of the report, is about one element of the public policy process. The second level of safety management concerns the way safety is being managed within individual organisations. To this end, a general framework has been defined, that specifies all the key-elements of modern safety management. The framework has been deduced from various documents from regulatory organisations (ICAO, JAA, Eurocontrol), as well as from other sources, to reflect best practices in safety management. The framework, which is described in Paragraph 3.2 of this report, is used as the structure along which the chapters on the Policy Output element (about FOCA) and the Policy Impact element (about the industry) of the public policy process are organised internally.

Chapter 12 provides an overall assessment of the 'health' of the various elements of safety management in Switzerland and offers some suggestions on how the identified deficiencies may be resolved.

Recommendations to improve specific elements of the safety management processes in Switzerland are provided throughout the report. For the convenience of the reader, all recommendations are also collected in Appendix A.

1.3 Caveats

During the REACH investigation many accounts of specific safety deficiencies within the Swiss air transportation system have been presented to the investigation team. Of course not all of these can be investigated to determine right from wrong, or to evaluate their potential safety impact. Also, many of these accounts have been provided under conditions of confidentiality or anonymity that makes it impossible to use this information in a public study. The approach taken by the REACH investigation towards this kind of information is to use it, as far as deemed relevant, within the general safety management framework. In the context of the study it was considered more relevant to identify whether potential safety shortcomings are recognised, acknowledged and dealt with appropriately within the system, than to investigate on a case by case base each particular safety deficiency that has been mentioned. Therefore the focus of the study is on the functioning of the safety management process. This will establish whether accountable managers are aware of potential deficiencies, such as have been put forward, and whether they have made well-considered decisions to address those issues, without going into detail of each particular case.

1.3.1 Focus on identification of potential deficiencies, not excellence

It is important to note that in evaluations like the REACH study, the scope and focus are usually such that things that work well are not receiving much attention, whereas possible deficiencies are closely examined. To the reader, depending on the findings of this review alone to fathom
the relevant processes for safety management in Swiss aviation, this can and will lead to a potentially unwarranted negative impression of the state of affairs. This cannot be prevented. After all, the main purpose of studies like this is to improve where improvements are necessary or desirable. The main purpose is not to provide confirmation on the processes that need no further attention. This is particularly true for the regulator. As is also identified by Reason (ref. 168), given the current trend of searching for increasingly more remote contributions to organisational accidents, it is inevitable that the regulator’s alleged deficiencies should be judged by those with full hindsight as making significant contributions to any major accident. The regulator’s position vis a vis the regulated organisations means that they are likely to attract blame from all directions. Standing as they do in the organisational borders of all hazardous technologies, their sphere of responsibility is bound to be implicated in a wide variety of contributing factors.

It should however be stressed that regulators, as they are located close to the boundaries of the regulated system, but are not part of it, are uniquely placed as one of the potentially most effective defences against organisational accidents. Therefore, concerns expressed in this evaluation regarding the role of the regulator should also be read as to indicate the vital importance of the involvement of the regulator in almost all processes conducted to ensure aviation safety.

1.3.2 Depth of study

The role of FOCA
Our task for this evaluation is to investigate how safety is taken care of in Swiss aviation, with particular emphasis on the role of the authority. In doing so, we have deliberately taken the perspective that is appropriate for a safety management philosophy according to the best practices in the industry. In that perspective, the safety regulator plays a role of vital importance. We have evaluated the role of FOCA, which is the regulatory authority, from that perspective. We have thus not evaluated the work of FOCA based on its current mandate, which is much broader than that of a safety regulator. Hence this evaluation does not, nor does it intend to, cover the full scope of FOCA’s work. As a consequence, FOCA may not always recognise their current organisation and all of their processes in this evaluation. Instead, this evaluation covers a specific subset of the tasks of FOCA that are of particular relevance to regulatory safety management, and indeed some tasks which are appropriate for a modern safety regulator but which are not yet conducted by FOCA. As opposed to a traditional evaluation, structured along the lines of the current FOCA processes, this selectively focussed approach is expected to be
efficient and effective in generating those findings and recommendations that guide the further development of FOCA towards a modern and state-of-the-art safety regulator.
2 Context of the REACH Investigation

2.1 The historical perspective

In order to understand the development of aviation safety within Switzerland, it is necessary to be aware of a number of developments and changes that have occurred to the Swiss air transportation system over recent years.

2.1.1 Growth of the aviation sector in Switzerland

The Swiss air transportation system has experienced steady and substantial growth over the last 20 years. On a world scale Swiss growth has been above average. However, on a European scale the growth of the Swiss air transportation sector has been more or less in line with the developments in member countries of the European Community.

Figure 2-1 illustrates this by comparing the development in the number scheduled flights to and from Swiss destinations with the developments on a global and a European scale.

![Average Annual Growth in Scheduled Flight Operations](image_url)

*Figure 2-1 Average Annual Growth in Scheduled Flight Operations*
As shown the growth of air traffic in Europe within the last decades has been substantial and clearly above the global average. The same trend is present for Switzerland. It can be expected that the underlying factors that stimulated air traffic growth in Switzerland and the EC countries are similar. One of the main underlying factors in this respect is the process of liberalisation that the air transport sector has gone through in Europe within the last decade.

The emergence of low-cost regional carriers, the formation of world-wide airline alliances and the reduction of direct government influence due to increasing privatization of sector parties are part of that development.

Switzerland has in some cases even assumed the role of frontrunner. In this respect the emergence of Crossair as one of Europe's first and fastest-growing low-cost regional carriers has to be mentioned, but also the privatisation and integration of civil and military air navigation service provision by the establishment of Skyguide.

2.1.2 The rise of Crossair and the fall of Swissair
Historically, the Swiss air transport sector has been characterised by one dominant operator – Swissair –, around which more or less everything else evolved. Before 1990 the very large majority of all commercial air transport activities in Switzerland was performed by Swissair. As a consequence Swissair also exerted a dominating influence on the way the major airports in Switzerland were operated as well as on the provision of air navigation services.

Due the national importance of Swissair and strong federal involvement in the company, the role of the government was primarily to promote aviation by protecting the interests of Swissair. In line with good Swiss tradition, Swissair's operations were of highest quality and safety standards, hardly requiring further regulatory safety oversight.

However, somewhere in the process of liberalization this situation has begun to change gradually. Most striking in this respect is the emergence of Crossair. Crossair was established in 1978 by a former Swissair pilot, Moritz Sutter. Despite reasonable success and fair growth, the size of Crossair's operations remained, until the early nineties, fairly small as compared to Swissair. The figures below show how Crossair developed in terms of number of aircraft and number of operations relative to Swissair.
Chapter 2 Context of the REACH investigation

As illustrated by figures 2-2 and 2-3, Crossair started to expand dramatically during the mid-nineties. The fleet of Crossair almost doubled within the three-year period from 1994 to 1996.
As of 1999 Crossair operated even more aircraft than Swissair and performed almost 50% more flights annually. This was achieved with around 3200 employees by Crossair, as compared to around 7300 employees at Swissair. This difference in the amount of personnel should at no account be interpreted as a sign of understaffing at Crossair or overstaffing at Swissair. In light of the different types of operation, as performed by both operators the staffing levels appear to be in line with international averages.

Nevertheless, from the mid-nineties Crossair's operations can by no means be regarded as insignificant as compared to Swissair.

It should be noted that as from 1992 Swissair owned a majority stake in Crossair. However, this does not imply that Crossair and Swissair operations were integrated and harmonized in terms of processes and procedures. Crossair retained very much the character of a low-cost regional operator, while Swissair remained the national flag carrier.

This situation lasted more or less until Swissair filed for bankruptcy in October 2001. Eventually this bankruptcy has led to Crossair taking over the aircraft and operations Swissair. To this end, and with substantial financial aid from private investors as well as the state and cantons, a new flag carrier was founded. From January 2002 the combined operations of Crossair and Swissair take place under the name SWISS International Airlines.

The described developments should be kept in mind as underlying factors for the observations that will be addressed later in this report, especially in regard to the regulatory oversight of the airlines.

2.1.3 Privatisation of air navigation service provision

Also the developments of the national Swiss Air Navigation Service provider must be put in a historical context, in order to better understand observations later in this report.

Important to note here is that after World War II air navigation services were provided by Radio Suisse. The costs of air navigation services were then borne by the Swiss Confederation and the airports. However, in the spirit of privatisation the commission to provide air navigation services was awarded in 1988 to Swisscontrol. In a gradual process of further release from state control Swisscontrol gained financial independence of the Swiss Confederation and became a joint stock company under Swiss law in 1996. Clearly, costs of air navigation services were no longer borne by the state, but were recovered from airlines to which services were provided. In 2001 the corporatisation of the Swiss air navigation services was completed by the establishment of Skyguide in which the military and civil air traffic management was merged. In this process, direct influence from the Swiss government, airlines and airports within the board from Skyguide has been, or will be, removed.
Yet, the Swiss Confederation remains the formal owner of Skyguide (99.85% share). In this role it is represented by the federal department of Environment, Transport, Energy and Communication (DETEC) and the federal department of Defense, Protection and Sport (DDPS).

The DDPS is still represented on the board of Skyguide, primarily to protect military interests in the integration process of civil and military air traffic control.

However, further control over Skyguide by the owners is mainly exercised by formulating strategic objectives that have to be fulfilled by Skyguide management.

A fundamental basis for Skyguide's operations is currently that it is charged to operate at neutral costs to the Swiss Confederation. This means that Skyguide has to recover its expenses from its customers. Clearly, in a situation of decreasing traffic volumes -as currently is the case- this objective is difficult to achieve, especially in light of the fact the tariffs for the provision of air navigation services are bound by international regulations. The ability of Skyguide to recover its costs is further hampered by a number of problems of institutional nature. Skyguide is obliged to provide some services that cannot be performed at neutral costs (e.g. air navigation services at smaller airfields), or for which they are not compensated at all (e.g. air navigation services within German airspace).

Also Skyguide experiences a structural inability to build up reserves during good years to compensate for losses in bad years (in spite of the fact that a fairly recent change of law (May 2001) formally enables the build-up of such reserves).

This means that Skyguide has become increasingly sensitive to financial pressures.

In summary it is observed that the organisation of air navigation service provision in Switzerland has undergone a major transformation: it has changed from a pure governmentally financed and controlled organisation into a corporatised company with its own responsibility for financial performance.

It is evident that such a change requires new concepts and strategies for governmental control and safety oversight.

Again, this should be kept in mind as context information for the observations that will be addressed later in this report, especially with regard to the regulatory oversight of Skyguide.

2.2 The international perspective
As Reason observed (ref. 168 & 169), generally speaking, societies put economy and production before protection. This is particularly true if the industry involved has for many years not suffered a major accident. As there are little political benefits to be gained from bringing about a non-event (no accident), stronger safeguards are created in the aftermath of
disasters, not before them. Therefore, the fact that this evaluation is conducted in the aftermath of a string of accidents is not unusual and places Switzerland in the ranks of many other states that have undergone a similar crisis. A well known example outside of aviation is the Seveso disaster in 1976, where kilogramme quantities of dioxin, lethal to man even in microgramme doses, were released from a chemical reactor and widely dispersed that led to the current EU legislation on the control of major-accident hazards involving dangerous substances, the so-called Seveso(-II) Directive\(^1\). Another well known non-aviation example is the Piper Alpha off-shore disaster. On July 6, 1988, 167 lives perished on the Piper Alpha Platform, located in the icy North Sea. The worst offshore oil accident in history, the Piper Alpha disaster quickly revolutionized the offshore oil industry and the government’s role in safety oversight. The subsequent Lord Cullen inquiry led to a re-design of the UK institutional arrangements and legislation involving the formation of the Health and Safety Executive, the conversion to goal setting regulations and the introduction of Safety Cases.

In aviation too, accidents have led to the major changes in the institutional and legislative arrangements for aviation safety around the world. In particular, the regulatory authorities and accident investigation agencies have been subject to these changes. Such revolutions after accidents instead of gradual evolutions over time, can largely be explained by the excellent safety record of aviation, resulting in no perceived need for change. Another reason is the fact that national institutional and legal arrangements for aviation must be in accordance with international rules that are by their very nature rather static. National influence to change these international rules is very limited. Switzerland is therefore not alone and there is a lot to be learned from the crises elsewhere.

The following foreign aviation accidents serve as good examples of how crises led to change that would otherwise have been unlikely:

**Monarch**  The Piper PA31 Chieftain VH-NDU operated by Monarch Airlines crashed while on approach to Young airport - New South Wales, Australia on 11 June 1993. The investigation found that the circumstances of the accident were consistent with controlled flight into terrain. A range of contributing factors was identified, relating to the management of the airline by the company, and the regulation and licensing of its operations by the Civil Aviation Authority.

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\(^1\) COUNCIL DIRECTIVE 96/82/EC of 9 December 1996 on the control of major-accident hazards involving dangerous substances
Seaview  The Rockwell Commander VH-SVQ operated by Seaview Air Pty Ltd, crashed while en route to Lord Howe Island - New South Wales, Australia on 2 October 1994. The factors that directly related to the loss of the aircraft could not be determined. However, a number of factors relating to the operation this flight, the operation of the company and the oversight of that operation by the regulator were identified.

The Monarch and Seaview accidents in combination with other events eventually led to radical changes in the organisation and roles of the Civil Aviation Authority and the Accident Investigation Bureau of Australia.

Dryden  On 10 March 1989, Air Ontario flight 1363, a Fokker F-28 Mk1000, crashed shortly after take-off from the Dryden Municipal airport in Canada. The normal accident investigation by what was then the Canadian Aviation Safety Board ensued but was suspended after a few weeks and transferred to a Commission of Inquiry. The very exhaustive inquiry focussed particularly the wider role of the aviation system, including that of the government, in the causation of the accident. The findings of the inquiry led to important changes in the Canadian regulatory regime.

Bijlmer  On 4 October 1992 a Boeing 747 operated by El-Al airlines of Israel crashed into an apartment building in the suburbs of Amsterdam shortly after take-off from Amsterdam Schiphol Airport. The crew and about 40 people on the ground were killed. The ensuing investigation and later inquiry, along with other factors led to a split up of the policy part and the safety regulation part of the Dutch Civil Aviation Authority into separate organisations, the setting up of an independent Safety Advisory Committee, and eventually, changes to the aviation legislation.

Value Jet  On 11 May 1996, a DC-9-32 operated by ValuJet airlines crashed after an in-flight fire in the Everglades near Miami - Florida, USA. The subsequent investigation by the National Transportation Safety Board revealed a significant role of the oversight and enforcement regime as conducted by the Federal Aviation Authorities. It led to a government review, the so-called 90 day review, that made important recommendations with regard to the difficulties faced by authorities and led to the ATOS study, intended to strengthen the ability of the FAA to maintain an effective oversight regime within the ever present constraints in staffing levels.
These accidents have all been investigated thoroughly, and in some cases, public inquiries ensued to help understand the wider implications and causal backgrounds, particularly from the organisational point of view. The reports on these accidents have been studied in the course of the REACH project because many of the lessons learned there are also applicable in the Swiss context.

It is important to note that in hindsight, these crises have all resulted in important improvements to the national aviation systems, particularly in the area of regulation and oversight.

We will refer to these cases in more detail in chapters 5, 6, 11 and 12.
3 The study approach – the process of achieving aviation safety

Excellent mobility is a vital element of modern society. It is therefore no surprise that governments place high demands on the performance of their national public transport systems. One of the key performance parameters of a well functioning public transport system is its safety. Unless very high safety levels are ensured, travellers will be reluctant to use the system to its capacity. This is particularly true in Switzerland, where society is accustomed to – and demands – excellent safety performance, well beyond average industry levels.

But safety does not just happen. Achieving excellent safety levels requires a concerted international and national effort by many actors. At the national level, safety is the co-operative product of a fairly large array of government and industry actors. Since no single institutional entity is in charge of all these actors, the achievement of safe air transport cannot be managed as a singular process by one organisation. Instead, air transport safety must be achieved through an effective and efficient public policy. While such a public policy is led by the government in view of its responsibility to provide conditions for a well functioning society, it involves public and private actors alike.

Obviously, public policy is not unique to air transport safety, as many other conditions to a well functioning modern society must be met through the combined efforts of public and private actors. And although the subject of the policies may differ widely, the basic elements of the public policy are always the same:

1. Setting the public policy (objectives)
2. The implementation of such a public policy (legislation, institutions)
3. The outputs of the policy (regulation)
4. The impacts of these outputs on the relevant operators (safety behaviour)
5. The policy outcomes (aviation safety levels)
6. Feedback of the outcomes to the policy (accident & incident investigation)

Ideally, the policy outcomes should correspond to the policy objectives, all intermediate steps being necessary steps for achieving such public policy objectives. These subsequent steps form a chain of processes, which of course is only as strong as its weakest link. Our analysis will evaluate each of these steps to identify the strengths and weaknesses of the Swiss system, and also spot potential barriers the effective and efficient achievement of the policy objective, being safe air transport.
The main factual body of the report is organised along these 6 steps of the public policy process. Whereas safety management at the national level involves many actors carrying a shared responsibility for air transport safety as a whole through a public policy process, a number of the individual actors are solely responsible for their own specific safety relevant activities. For the investigation of how safety is assured in these individual organisations we will use a dedicated safety management model. It is important to keep this distinction in mind when reading this report. In summary: a public policy process at the national level, and a safety management model in individual organisations.

Further details on the public policy process elements are provided in paragraph 3.1.

Further details on the safety management model are provided in paragraph 3.2.

3.1 Aviation Safety as a National Public Policy objective
As was stated in the introduction, the basic elements of the public policy process are:

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

The paragraphs below offer an explanation of what is meant by of these steps and how the generic public policy elements can be attributed to the different actors involved in achieving safe air transport in Switzerland.
Policy Setting

In setting the policy the government does express 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. 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. This element is represented as box 1 in figure 3-1.
Policy implementation
In order to carry out the policy, the necessary obligations and powers must be attributed and organisations, resources and expertise must be established to do the work. Appropriate legal and institutional arrangements must thus be put in place as the means to implement the policy. Also, the translation of the national policy in guidance and control of the department (DETEC) towards the regulator is part of this element of the public policy process. This element is represented as link 2, box B and link 3 in figure 3-1.

Policy outputs
Armed with the necessary resources and powers, the civil aviation authority FOCA uses the legal framework (and furthermore 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. This element is represented as box C and link 3 and 4 in figure 3-1.

Policy impact
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. This element of the public policy process is represented as Box D in figure 3-1.

Policy outcome
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. This element of the public policy process is represented as box E in figure 3-1.

Policy Feedback
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 is aware of whether its 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 mainly provided by the accident investigation authorities AAIB and EFUK. In view of the excellent safety record of civil aviation however, the number of accidents is usually very small and hence, other safety performance indicators may be necessary from other sources. This element of the public policy process is represented as box F and links 5, 6 and 7 in figure 3-1.

3.2 Aviation safety management within organisations

A number of individual organisations in the Swiss aviation system are solely responsible for the management of safety in their own operations. A generic safety management model will be used to structure the investigation of these organisations. In the next paragraphs 3.2.1 through 3.2.4 the reasons for using a safety management model are explained and the model is derived from the best practices in safety critical industries. This model will be used for the air navigation service provider (Skyguide), the airlines (Swiss and EasyJet), the airports (Unique-Zurich and Geneva) and the FOCA.

3.2.1 The evolution of safety management

As a short introduction to safety management it is useful to describe how safety management in aviation has evolved over the years.

In the early days of aviation the art of flying was a major technical challenge that was accompanied with great risk. These risks were just taken, to demonstrate the possibilities of human flight. However, aviation learned quickly from the many accidents that occurred. This can be considered as a first, but very important, element of the safety management process: learning from mistakes.

When aviation technology matured, aviation safety progressed accordingly to the level that it became feasible to conduct transport services, by private enterprises. This clearly required some form of regulation in order to protect the flying public from unwanted hazards. This led to the definition of initial national rules and regulations. Main objective of this regulation was to set a minimum acceptable standard of aviation safety. This signalled the emergence of a second important element of safety management: the definition an aviation safety policy that aims to assure a certain acceptable level of safety within the aviation system.

After World War II commercial aviation started to grow very rapidly, and began to develop as a major means of international transportation. It became clear that due to the increasing international character of air transport commercial aviation could not be effectively regulated by many different national regulations. For this reason a world-wide harmonisation of rules and regulations was undertaken. This led to the foundation of ICAO and the signing of the Chicago
Chapter 3 The study approach – the process of achieving aviation safety

Convention. This resulted into a world-wide set of accepted regulations (the Annexes to the convention). In fact an internationally accepted safety policy was accepted herewith, namely that all countries that signed the convention would comply with the same set of rules, aimed to achieve a similar level of aviation safety world-wide. It should be mentioned that although the countries committed themselves to the ICAO regulations, responsibility for compliance with the rules remained the responsibility of the states. Moreover, it was possible to file exemptions to the general ICAO rules, to account for local situations. Nevertheless, at that time this was a major achievement, and a major step forward for aviation safety. Also in terms of safety management it signalled important progress. Not only safety objectives were defined, and internationally agreed, but also best practices were formalised, and most importantly, mechanisms and procedures for accident investigation and prevention were defined (i.e. Annex 13).

Many years this system has served the international aviation community very well, and has led to major improvements in aviation safety.

However, due to the continuous growth, and the increasing complexity (technical and operational) of commercial aviation, it has become apparent that a system merely based on compliance with rules and regulations is not sufficient to guarantee safety. As an example, this is reflected in the differences in the level of safety achieved in various parts of the world. The western countries (USA, Europe, Australia) achieve a substantially higher level of safety than African and former Soviet Union countries, while basically complying to the same set of rules. Clearly this can be attributed to some extent to differences in regulatory compliance, but also to the fact that internal safety standards and safety culture of the sector parties may be significantly different. This has led to the notion that safety cannot be fully controlled by setting proper rules and regulations alone, but that active and explicit safety management is required to maintain or further improve the level of aviation safety.

Aviation in this respect is not unique. In other safety critical industries, like the nuclear and chemical industry, similar developments have occurred. As a matter of fact the concept of safety management in those industries is probably more advanced than in aviation, and therefore can provide guidance to the developments in the aviation industry.

Today, the necessity of the application of safety management concepts is well recognised within the aviation industry, as a means to control safety and to assure that required levels will be achieved and maintained. Many sector parties have already internalised safety management processes within their company, as part of the way they do their business. To some extent this is however on a voluntary basis, and the implementation of safety management processes can vary from company to company. For this reason the implementation of safety management systems
has now become part of the international regulatory framework, as drawn up by the main international regulatory bodies, like ICAO, EU, JAA and Eurocontrol. In this respect the air transportation system is currently in a state of transition. Deadlines for implementation of safety management systems, or parts thereof, can be found in the various regulatory documents (see e.g. ICAO Annexes 6, 11 & 14) in the timeframe to 2005.

3.2.2 What is safety management

Safety management has probably as many definitions as there are organisations involved in safety management. Nevertheless in the context of the present study it is necessary to precisely define what is meant with safety management. This definition is provided here, in its simplest form, as:

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

Clearly this needs some further elaboration, in order to address what are these activities and how they interact, and what is considered an acceptable level of safety.

To start with the latter part: an acceptable level of safety is 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.

Further it is identified that safety management has two 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.

To achieve satisfactory safety management, these two dimensions are equally important. Weaknesses in either dimension indicate inadequate safety management, potentially leading to safety deficiencies and the required level of safety not being achieved.

The two dimensions discussed above are further elaborated in the next paragraphs, in order to create a framework with which the current practices in Swiss aviation can be evaluated in a structured way.
3.2.3 **The general safety management process**

A part of the REACH investigation an extensive literature study has been performed concerning safety management, specifically in the context of aviation safety. From this literature study it has become clear that there are many different descriptions of safety management, focusing on various elements of safety management. However, it is evident that all those different descriptions in essence identify the same key elements, as a backbone of modern safety management.

The coherence of these key elements is depicted in figure 3-2, in order to provide a general structure for the safety management process. This process is in conformance with a "plan⇒do⇒check⇒act" cycle of systematic activities to achieve the safety objectives.

![Figure 3-2 The safety management process](image)

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.

Figure 3-2 shows the key elements of the safety management process. They can be described as follows:

- **The safety policy**: a safety goal-setting statement by the highest management responsibles. It can be part of a wider policy, integrating capacity, economic, environmental and social
aspects. As an example a valid integrated policy statement would be: "the objective to accommodate the annual growth of air traffic volume, while the overall safety level is maintained at the level of year x, while the overall noise burden is reduced with y dB". Another valid policy, as for instance adopted in the US, is "to reduce the absolute number of accidents in the time-frame 1997 to 2007 with 80%";

- **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 the 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 (e.g. introduction of new, complex equipment), economic conditions (e.g. financial problems arising from an economic downturn), environmental pressures (e.g. introduction of noise abatement procedures), operational or procedural changes (e.g. introduction of new separation standards).

- **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 executed in order to either correct safety deficiencies, or mitigate risks. As shown in figure 3-2 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.

### 3.2.4 Organisational requirements for the safety management process

In the previous paragraph the safety management process has been discussed. However, 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 required safety
activities are endorsed, supported and provided with sufficient priority at the highest management level.

- **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.

As part of the quality assurance procedures it is necessary that above mentioned quality aspects are regularly checked or audited, in order to assure continued compliance with governing rules and regulation. Surveillance is sometimes also considered part of a safety monitoring process, because it provides information on the health of the monitored system, and as such is a precondition for achieving a desired safety level.

The surveillance task is considered as traditional regulatory task. This task is essential to provide a solid basis to guarantee safety of the aviation system.
Chapter 4 Setting the aviation safety policy – the role of the government

4.1 Introduction
The previous chapters have introduced the backgrounds and objectives of this study and the methodology that is used for the analysis of safety management in Switzerland. The next chapters 4 through 11 constitute the analysis part of the report. An overall view is provided in Chapter 12.

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 4 is about Policy Setting.

4.2 Setting the policy
In general the Ministers of Transport of any Western country (and probably world-wide also) will state that safety is the top priority in aviation. Switzerland is no exception in this. The initiation of the current study by the Swiss Minister of Transport can be regarded as evidence that the Swiss government is truly concerned with aviation safety.

However, the way in which the Swiss policy is shaped in practice can be inferred from the organisational ordinance for DETEC (the so-called OV-UVEK, 172.217.1). This ordinance delegates in fact the governmental responsibilities with respect to Swiss aviation to the Federal Office of Civil Aviation (FOCA).

In general terms it has been specified in article 7 of this ordinance as one of the objectives for FOCA to guarantee a high safety standard in Swiss civil aviation. The other objectives specified for FOCA pertain to strengthening the competitiveness of Swiss aviation companies and assurance of a long-term, active role of Switzerland in international air transport. These objectives clearly indicate that FOCA's role is not only to promote safety, but also to promote Swiss aviation.
Chapter 4 Setting the aviation safety policy – the role of the government

At the government level, ultimately represented by the Bundesrat and the Parliament, no explicit policy or further objectives have been found with regard to aviation safety. The yearly objectives of the Swiss government for 2003 are published in the “Ziele des Bundesrats im Jahr 2003” (ref. 203). Altogether 20 main objectives are stated, which are further developed into 62 results to be achieved. Objective number 12 concerns Transport and stipulates 7 results to be achieved. One of these results concerns aviation and states that the “Objektblätter Sachplan Infrastruktur Luft2” shall be completed. This result has no explicit bearing on safety. Hence no specific objectives or policies regarding aviation safety have been defined at the government level as guidance to DETEC for that year. The same was true in 2002.

Ministerial objectives for aviation safety can also be found in the DETEC Departmental Strategy (ref. 110). The DETEC Departmental Strategy document considers the aviation safety policy to be embedded within an overall public transport policy.

The actual statement reads: "DETEC strives to ensure a high degree of safety in air, ...(ed. and other modes of transport), now and in future. Safety in road traffic should be increased further."

Clearly aviation safety is not addressed here as an item that needs more than average attention. Requirements for safety improvements are only recognised for road traffic.

Another relevant statement that can be found in the departmental strategy is: "Air traffic is internationally organised more tightly than other modes of transport, and therefore there are limited possibilities for action of the Confederation."

This reflects that DETEC does see not much room for own initiatives outside the international regulatory framework.

It is interesting to note that the objectives of the department to be achieved with respect to public air transport are formulated as follows in the DETEC Departmental Strategy:

- **direct air transport connections to important European regions and global centres;**
  ((requiring up-to-date national/regional airports & independent Swiss airline companies))
- **environmental protection from negative impacts of air traffic;**
- **development of Swiss Airport System;**
- **international initiative to stop tax relief on aviation fuels.**

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2 Bundesrat wird im Jahr 2003 die Objektblätter zum Sachplan Infrastruktur der Luftfahrt (SIL) 2. Serie genehmigen, welche den Flughafen Zürich, die übrigen Regionalflughäfen sowie zivil mitgenutzte und ehemalige Militärflughäfen enthalten. Die Objektblätter legen die Nutzungsart der jeweiligen Anlage fest und bilden die Grundlage für die Erteilung der Betriebsbewilligungen.
While these objectives are obviously of importance to public air transport in Switzerland, it must be noted that safety is not reflected as a clear priority in the current DETEC policy.

Also the important long-term measures, specified in the DETEC Departmental Strategy, are explicitly directed towards the promotion of Swiss aviation, viz.:

- **Realisation of a Swiss Airport System, based on the Sectoral Plan on Aviation (SIL):**
- **Securing of comparable competitive possibilities for Swiss air transport companies in the European and global context.**

Therefore, none of objectives and measures mentioned specifically addresses aviation safety as an element of the policy. This is in sharp contrast with the mentioned objectives and measures taken to promote Swiss aviation. Therefore, the current Swiss aviation policy mainly focuses on the promotion of Swiss aviation.

In view of the essential role fulfilled by the aviation safety policy within the aviation safety management process it is crucial that aviation safety, in terms of objectives, targets and measures, is clearly and explicitly expressed both in the yearplans of the government and within the departmental strategy.

In this respect, the specification of a national aviation safety policy is considered a matter of high importance.

**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.
5 Implementing the aviation safety policy – institutions, legislation and the role of DETEC

5.1 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 with the thick border indicates which element is being addressed.

This Chapter 5 is about Policy Implementation.

In this chapter the legal and institutional provisions available as the means to implement the national safety policy will be evaluated. Also, the way DETEC translates government policy objectives into action towards the aviation sector and supervises and guides the work of FOCA are addressed.

5.2 The Swiss aviation legislation from a safety perspective
The purpose of this chapter is not to present a full evaluation of the Swiss aviation legislation. The reason is that the safety relevant parts of the Swiss aviation legislation consist mainly of the adoption of internationally established rules and regulations, the evaluation of which falls outside the scope of this study. While it is commonly accepted that the international rules and regulations from the EU, Eurocontrol, JAA and ICAO contain the necessary safety provisions, it is then of course important to assess the implementation into Swiss law of these international regulations and guidelines. This assessment is provided in paragraph 5.2.1.

In addition, paragraph 5.2.2 will summarize the Swiss safety legislation and briefly present the relevant legal provisions with the specific purpose of identifying any provisions in the legislation that could impede this element of the public policy process and to assess if and how safety is specifically addressed in the legislation.
5.2.1 The implementation of international regulations into the Swiss legislation

EU-directives
Per June 1, 2002, an agreement between the Swiss Confederation and the European Union concerning air traffic has come into effect. With this agreement arrangements have been effectuated to harmonise civil air traffic regulations between Switzerland and the EU. The specific subjects of this agreement are:

1. liberalisation air transport and other air traffic regulations;
2. regulations concerning competition;
3. technical harmonisation;
4. aviation safety.

In the area of aviation safety a single directive has been ratified with this agreement: this is EU directive 94/56/EC, concerning the basic principles for civil aviation accident and incident investigation. The purpose of this Directive is to improve air safety by facilitating the expeditious holding of investigations, the sole objective of which is the prevention of future accidents and incidents. In the context of the present study, especially articles 9 and 10 of the directive are of relevance.

Article 9 states: The reports and the safety recommendations referred to in Articles 7 and 8 shall be communicated to the undertakings or national aviation authorities concerned and copies forwarded to the Commission. Member States shall take the necessary measures to ensure that the safety recommendations made by the investigating bodies or entities are duly taken into consideration, and, where appropriate, acted upon without prejudice to Community law.

Article 10 states: A safety recommendation shall in no case create a presumption of blame or liability for an accident or incident.

ICAO
Switzerland has ratified (together with 187 other UN states) the ICAO agreement on international civil aviation, known as the Chicago Convention (1944). By this agreement the ICAO member states are committed to assure the safety of aviation activities within their territory. The basis for this assurance is formed by regulations as laid down in the annexes to the convention.

Member states in general follow these regulations, or otherwise file an exemption to the rule to ICAO.
Chapter 5 Implementing the aviation safety policy – institutions, legislation and the role of DETEC

In November of 2000, an ICAO team has conducted an ICAO Safety Oversight Audit of FOCA, with the objective of ascertaining the safety oversight capability of FOCA and to ensure that it is in conformity with ICAO Standards and Recommended Practices (SARPs), as contained in Annexes 1, 6 and 8 to the Convention on International Civil Aviation and related provisions in other Annexes, guidance material and relevant safety-related practices in general use in the aviation industry.

With regard to the regulatory aspects, the audit team concluded that the regulations as laid down in the Federal Aviation Act and the various Ordinances, cover the major provisions of the Convention on International Civil Aviation and its Annexes. The transition ongoing at the time of the audit, from national Swiss regulations towards the progressive implementation of Joint Aviation Requirements (JAR’s) in the areas of personnel licensing, operations and airworthiness meant that a mix of regulations was in force. It was identified by the audit team that the conformance of the Swiss regulations to the SARPs of the Annexes 1, 6 and 8 had not been assessed. A number of differences were identified by the audit team. In addition, a number of serious deficiencies were identified with regard to the oversight capability of FOCA, primarily due to insufficient resources. The findings of the ICAO team with regard to oversight and lack of resources is addressed further in chapter 6.

In response to the audit findings, FOCA submitted a comprehensive action plan in January of 2001 to deal with all the audit findings and recommendations. The plan also involved a review of the Swiss regulations to ensure compliance with the ICAO SARPs. The implementation status of the plan was reported to ICAO in October of 2002. From a cursory review of that status report it appears that the large majority of the audit findings and recommendations have been dealt with appropriately or a that reasonable justifications have been offered for cases where changes suggested by ICAO are not executed. The review of the regulation was largely completed in July of 2002, and remaining differences were appropriately reported to ICAO. The review of a single Annex, Annex 6, was still due at the time of this study. In summary, FOCA has adequately dealt with the findings of the ICAO audit, and hence the Swiss regulatory regime largely meets ICAO requirements. The same is not true for FOCA’s oversight capability as will be discussed in chapter 6.

JAA

Switzerland is a member of the Joint Aviation Authorities (JAA). JAA is a European organisation that has harmonised the national airworthiness standards into a common European standard. This standard is known as the Joint Aviation Requirements (JAR), and Switzerland
has adopted these rules as its standard for aircraft manufacturing, operations, maintenance and flight crew licensing. As such the JARs are anchored in Swiss law by specific ordinances.

A new organisation, the European Aviation Safety Authority EASA will, over the course of a transition period take the place of JAA as of September 2003. As this is then a body of the European Union, and since Switzerland is not a member of the EU, this could change the Swiss position with regard to international rulemaking. However, no important consequences for the Swiss aviation safety legislation are expected in the near future.

**Eurocontrol**

Switzerland is member of Eurocontrol. Eurocontrol is a European organisation responsible for rulemaking and regulation of air navigation services within the airspace of Eurocontrol member states. In addition Eurocontrol itself provides air navigation services. The so-called Eurocontrol Safety Regulatory Requirements (ESARR) that so far have been developed (in the area of occurrence reporting, safety management, risk management, and ATM personnel licensing) have been adopted by Switzerland and will be anchored in Swiss law.

It is thus obvious that the rules and regulations that govern aviation safety in Switzerland are largely a national implementation of international rules. This also means that national governments are severely limited in their ability to arrange the aviation legislation along national preferences, for example by adopting common legal and institutional arrangements around the role of the national regulator as found in other sectors such as telecom and energy. This is reflected in the statement of DETEC that air traffic is internationally organised more tightly than other modes of transport, and therefore there are limited possibilities for action of the Confederation. It is usually possible to file national exemptions to the international regulations to cater for specific national conditions or considerations. Most States have filed a number of exemptions. Switzerland has filed about 100 exemptions (ref. 53, AIP SWISS). The vast majority are minor issues with little relevance to safety. The most relevant exemption with regard to safety filed by Switzerland concerns ICAO Annex 13. Paragraph 5.12 of this ICAO Annex stipulates that certain evidence collected for the purpose of aircraft accident investigation and prevention should not be admissible in a court of law. Further details are provided in paragraph 11.3.1.2. Another way to differ from international rules at the national level is to not adopt recommended practices that are non-mandatory elements of the international legislation. The most important example in the context of this study is the Swiss decision not to adopt ICAO recommendations of ICAO Annex 13 paragraphs 8.2 and 8.3 with regard to legal provisions for confidential reporting programmes. A further discussion on this matter is offered in paragraph 11.3.1.2.
5.2.2 Main characteristics of the Swiss legislation

The Swiss air transport legislation is grounded in law dated 1948 (Bundesgesetz über die Luftfahrt) and a series of Ordinances. Not all of these ordinances are relevant for safety; only those that have a bearing on safety are referenced here.

The Bundesgesetz über die Luftfahrt LFG defines the basic features of the Swiss air transport policy as well as of the institutional framework. All ordinances are derived from there.

The law does not contain a separate safety article; safety is mentioned in article 12, among many other attributes of the federal government (such as environmental protection, security, etc.). Safety is also mentioned in article 15 (again among other things) when referring to special measures the government may take. However, the LFG does clearly not include provisions that specifically address safety as a primary attribute of Swiss aviation, nor does it have a regulatory character. Rather, it is promotional in nature and states that safety is one of many conditions to be met in Swiss air transport.

Articles 23 to 25 define the accident investigation, as well as the independent accident investigator (AAIB, Aircraft Accident Investigation Bureau). Article 26 defines, in addition, a federal commission for investigating accidents (EFUK, Eidgenössische Flugunfallkommission).

The Ordinance of 1973 (Verordnung über die Luftfahrt, LFV) describes some of the above aspects in more detail. In particular, articles 19 and 20 reglement airworthiness of an aircraft. The airworthiness certificate is attributed by the FOCA and can be withdrawn by the FOCA. Articles 26-28 govern the approval of training and licensing of personnel, both of which are attributed to the FOCA. Articles 110-112, 119, 120 govern airline concessions by the department, without safety considerations.

The special ordinance on accident investigation (Verordnung über die Untersuchung von Flugunfällen und schweren Vorfällen, dated 1994) defines the role of the AAIB, as well as of the EFUK. Its main particularities are that the AAIB is independent (article 8), that the intermediate and final reports are sent to the FOCA (articles 18 & 19). This Ordinance also states that the report of the AAIB can be re-examined by the EFUK upon request. In that case EFUK rewrite the report (article 24).

The ordinance on the operation of airplanes (Verordnung über den Betrieb von Flugzeugen im gewerbsmässigen Transport, dated 1997) takes over international norms (VJAR-OPS 1). The corresponding documents are attributed and withdrawn by the FOCA. JAR-OPS 1, implemented
through this law, has introduced the obligation to operators of having a formal safety management program. This does to some extent fill in the void that is in the original law of 1948 that has no specific provisions on safety management. Similarly, the ordinance on aircrew licenses (Verordnung über die JAR-FCL-Lizenzen, dated 1999) takes over the international standards. Licences are attributed and withdrawn by the FOCA.

The ordinance on air traffic control (Verordnung über den Flugsicherungsdienst, dated 1995) stipulates that safety pertains to ownership and not to regulation: safety standards for Skyguide are determined in the strategic objectives of the government, along with other objectives (article 6). There is no mention of supervision of Skyguide by the FOCA. The ordinance on licenses for air traffic control personnel (Verordnung über die Ausweise für das Personal der Flugsicherung, dated 1995) states that these licenses are attributed and withdrawn by the FOCA. The ordinance does not specify which “personnel” are subject to the licensing scheme. In reality the personnel addressed here are the Air Traffic Controllers but not the technicians operating and maintaining the ATC equipment.

5.2.3 Analysis of the Swiss aviation legislation with regard to safety

The Swiss legislation does not differ significantly from the legislation in other western states and the Swiss legislation is well developed in its provisions to make international regulations and standards mandatory in Switzerland.

Other than the adoption of ICAO Annex 13, the Swiss legislation does not have any provisions to facilitate safety feedback to the authorities or the industry. There are no articles providing for voluntary/confidential incident reporting programmes involving legal protection of safety data or reporters of occurrences in accordance with the recommendations of para. 8.2 and 8.3 of Annex 13. In fact Switzerland has filed an important exemption with regard to paragraph 5.12 of ICAO Annex 13. This is detrimental to safety as is further contemplated in paragraph 11.3.6.2. Several other states have filed similar exemptions to this same provision but of the benchmarks states only France is among them.

Safety is not identified in the Swiss legislation as a separate consideration taking priority over other attributes of civil aviation such as economy, environment and capacity. It must be stressed however, that the absence of primacy for safety in the Swiss law is to some extent resolved because the primacy of safety requirements is effectively implicated by adopting the ICAO annexes. Paragraphs in the relevant Annexes (i.e. Annex 6: Aircraft Operations, Annex 11: Air Traffic Services & Annex 14: Aerodromes) address this subject specifically. Guidance material can be found in particular in the PANS-ATM (Doc. 4444), addressing ATS Safety management.
It outlines the general objectives of safety management, as well as the associated ATS safety management activities: monitoring of safety levels, safety reviews, safety assessments and safety enhancing measures.

In Swiss legislation, FOCA is charged with the responsibility for aviation safety. However, the extent of the responsibilities of FOCA in this respect has not been further specified. In this regard, it is interesting to take note of the findings of the inquiry into the Air Ontario accident in Dryden. The inquiry found that the Aeronautics Act (of Canada) was not specific in its delineation of aviation safety responsibility, while the raison d'être of the Transport Canada organisation (the Canadian Civil Aviation Authority) is to provide an aviation safety net. The first recommendation with regard to the relation between safety management and the regulatory organisation was therefore to enact an amendment to the Aeronautics act to delineate clearly the ministers responsibility for aviation safety. Such amendment, according to that inquiry, should emphasise the ministers responsibility to ensure that the regulatory authority is organised in a manner to keep the minister accurately informed of the ability of the regulatory authority to deliver its mandated aviation safety programmes effectively.

The legal provision for a recourse procedure on accident investigation reports seems to be rather unique. Comparable facilities have not been found in the benchmark states.

5.3 Institutional arrangements for safety

In this paragraph the current institutional arrangement for safety management in Swiss aviation is evaluated against the background of the public policy model. The purpose is to identify potential institutional deficiencies that could hamper the achievement of high levels of safety through the public policy.

The current institutional arrangement is in accordance with the legislation. This means that disagreements between the current institution and the public policy framework are likely to require a change in the legislation if they are to be resolved.

The current institutional arrangement is summarised in figure 5-1.
A number of specific characteristics can be observed:

a) The state must develop policies in many areas related to safety on a more or less continuous basis. Issues involved range from establishing bi-national treaties on airspace management to overseeing the financial health of airlines and are in most cases not primarily related to safety matters. More often these policies will combine economical matters and the promotion of aviation in the interest of maintaining a good public transport system. DETEC does, however, not have an office to develop national policies for aviation and hence must rely on the regulator FOCA to provide such policy advice. The regulator is thus charged with dual objectives (aviation safety and aviation promotion) that may regularly contradict, and as such may weaken their position as a safety regulator.

b) The safety outcomes as reflected in the results of accident investigations by AAIB and EFUK are not reported back to the government but to the regulator FOCA. This is not in accordance with the public policy model where the safety outcomes are reported back to the government in order to allow possible adaptations of the national policy. As it was already
identified that there is no national policy and that the policies are actually being prepared by FOCA on behalf of DETEC, this is understandable. It is also in accordance with the law. Nevertheless, this is an undesirable arrangement because it can only work because of deficiency a). Resolving a) requires c) to be resolved as well. More importantly, the safety outcomes should be reported to the organisation that is controlling FOCA since the recommendations could also concern the regulatory role of FOCA. Furthermore, as FOCA is mainly empowered to take regulatory measures, it is likely that only regulatory action is considered in response to safety recommendations whereas many safety recommendations do not warrant a regulatory solution.

c) AAIB and EFUK are two institutional entities that conduct the single task of providing the policy feedback element of the public policy process. While a possibility for recourse as provided by EFUK is in accordance with the law could be an arrangement that fits the national culture, it is not necessary from a public policy point of view as the only purpose of the safety outcome feedback element is to influence the policy. There are other reasons for concern regarding the institutional role of EFUK, these are being addressed in paragraph 11.

5.4 The role of DETEC

5.4.1 The organisation of DETEC
The federal Department of Environment, Traffic, Energy and Communication (DETEC) has, as indicated by its name, a very wide area of responsibility. In total 8 federal offices resort under DETEC, as well as a number of additional inspectorates and commissions. One of these federal offices is the Federal Office of Civil Aviation (FOCA).

In the transport section of DETEC’s already very wide portfolio, aviation is a relatively minor component, in comparison with rail and road transport. Therefore aviation has to compete strongly for attention and priorities within the department.

The available resources within DETEC to attend to aviation are found to be very limited. Obtained Information shows that less than 30% of the available working time of the Secretary General, and his acting representative, is devoted to aviation matters. In the not too distant past this percentage was even much less. The present increased attention for aviation is caused by several political high priority issues, such as the accomplishment of the Treaty with Germany concerning airspace control rights over Southern Germany and the aftermath of the bankruptcy of Swissair and the subsequent formation of the new national carrier SWISS. In addition, the occurrence of a series of aviation accidents with involvement of Swiss sector parties has
increased focus on aviation issues within DETEC. Nevertheless the total amount of resources devoted to all aviation related tasks (of which safety is only a small part) within DETEC is certainly much less than one full time equivalent. Moreover, specific aviation expertise is not available within DETEC. The employees involved have no technical background.

Consequently, practically all aviation related activities are effectively delegated to FOCA. This includes the development of aviation policies, the preparation of rulemaking and legislation, and negotiations concerning airspace and infrastructure planning. FOCA thus has, at the department level, a knowledge monopoly.

In conclusion it is established that the aviation related activities of DETEC are almost fully delegated to FOCA and that DETEC does not possess the necessary resources and expertise, to supervise FOCA in an effective manner.

It is obvious from the evidence collected, that the underdeveloped role of DETEC is not due to a lack of safety consciousness, but to a general drive to maintain a small federal government. Within this restriction DETEC is serious in its effort to deal with aviation safety.

5.4.2 The tasks of DETEC

Among the wide range of tasks of DETEC, several tasks are directly related to aviation safety, or in a wider context related to aviation in general. DETEC’s main tasks in this context are:

a) providing safety objectives to FOCA;

b) supervision of the functioning of FOCA;

c) providing strategic objectives to Skyguide, together with DDPS, as representative of the owner, and supervising Skyguide's performance in this respect.

DETEC’s conduct of these tasks is described below.

5.4.2.1 Providing safety objectives to FOCA

From interviews with DETEC management it was confirmed that the policy is to meet international standards. There is a general aspiration to be on par with the Western European standard. The main task of the FOCA is to keep the aviation system safe. For this reason DETEC, as the controlling authority, directs the FOCA to put its resources to safety, as a first priority. However, this safety policy has not been made explicit. Therefore it remains vague what specific priorities are, and to which extent it is sufficient to merely assure compliance with international rules.

DETEC specifies in a year plan the specific annual priorities to the FOCA.
For the year 2002 these priorities were, in descending order of importance:

1. **Ratification of the Staatsvertrag CH – D, concerning air traffic in Southern German airspace**
2. **Co-ordination of the new operational arrangements for Zürich airport, and activities in the relation to the set-up of the new Swiss airline company**;
3. **Aviation infrastructure plan ("Sachplan Infrastruktur Luftfahrt", SIL), and introduction of a new category of aircraft, so-called "Ecolight Aircraft"**
4. **Strengthening of the competitiveness of Swiss aviation entreprises**.

These priorities contain no specific regulatory priorities and also no safety related directives. Apparently, main priorities are related to the policy advisory role of FOCA.

While safety is identified in the ordinance (OV-UVEK, ref 259) as one of three objectives for FOCA, this does not constitute active guidance. It would seem reasonable to expect that high priority matters such as safety are specifically reflected in the yearplans or other guidance documents in a specific manner. Is must thus be concluded that safety, while being formally mentioned in ordinance, is not specifically addressed in the guidance provided to FOCA by DETEC.

### 5.4.2.2 Supervising FOCA

Supervision of DETEC over FOCA is not formalised. The director of FOCA meets with the Minister 5 or 6 times per year. For these meetings FOCA proposes the agenda. The meetings themselves have the character of an open discussion about the ongoing issues. In addition there are ad hoc meetings with the Secretary General and his people if the need arises. DETEC does not require any formal reports or presentations from FOCA. For example, no safety performance parameters are collected and reported to DETEC by FOCA because DETEC does not require such reports. Also, no reports on the regulatory activities, such as numbers of inspections, or analysis of inspection findings, are prepared or required. The main formal directions to FOCA are through the communication of annual goals or projects. The goals seem to concern mainly the aviation related goals of DETEC as stated in the government objectives document (ref. 116).

### 5.4.2.3 Supervising Skyguide

Towards Skyguide DETEC performs a dual role. On the one hand, through the FOCA, it has a regulatory role, on the other hand - together with the Federal Department of Defence, Civil Protection and Sports (DDPS) – it is the representative of the owner of Skyguide. In light of this
In this concept the roles of the owner and that of the regulator are defined. The *ownership role* comprises control over Skyguide in terms of financial and operational performance (including safety). This includes monitoring whether Skyguide fulfils the strategic objectives of the government, as specified by specific target performance indicators of the owner ("Eigner-Kennzahlen"). The *role of the regulator* is specified to comprise regulation, standardisation, licensing, certification and supervision.

In this context it is noted that in the supervision concept document, the "Eigner-Kennzahlen" are presented as "Regulator-Kennzahlen", indicating some confusion between the role of owner and regulator. Nevertheless, these performance indicators are provided as quantified targets to Skyguide.

In the context of safety, the strategic objectives are defined as no accidents, and no increase in incidents, as compared to the average over five preceding years. Moreover the objective has been specified to implement a safety management system as defined in the Eurocontrol Safety Regulatory Requirements, in accordance with the target schedule of Eurocontrol.

Yearly, the board of Skyguide reports to the DETEC concerning the level of fulfilment of the strategic objectives. This report is incorporated in a report from the General Secretaries of DETEC and DDPS to their respective ministers, describing Skyguide's yearly performance.

The fact that the government controls Skyguide through ownership as well as through regulation is a matter that particularly warrants some considerations. With regard to Skyguide, safety is an aspect of both the regulatory relation and the ownership relation with the government. This could lead to a situation where the accountability for safety is not clear.

Traditionally, there are three main reasons why regulatory control is necessary. The so-called “sectoral regulators” – or simply “regulators” – emerge generally parallel to a process of liberalisation. This is valid in all sectors, but in particular it is valid in the network industries, where liberalisation is always only partial, and where public service objectives remain important. From there one can derive the main reasons for sectoral regulation and corresponding regulators:

- a first reason pertains to the fact that there is emerging competition in any given sector: a regulator therefore has to make sure that all competitors are treated equally. In this respect, the regulator also has to enforce certain industry standards. Safety standards are typically such industry standards.
• In the network industries, this task is particularly relevant, given the fact that there are often issues of interoperability, as well as of usage and access to infrastructures, which again have to be regulated by the sector regulator. This again, is a matter of industry standards, and safety can be seen as being one such standard.

• Finally, there are issues of public policy. As a matter of fact, once there is competition, politics can no longer impose its public policy objectives via ownership, but must impose them via regulation. If all competitors must meet the rules of the government regulator, but some competitors must also meet requirements on related topics of the government owner, that does not represent a level playing field. Safety could be such a public policy objective, especially if safety concerns go beyond industry standards.

These general principles around control via regulation and control via ownership usually demand that the two should not be mixed.

For Air Navigation Service provision however, the situation is not quite the same.

The best performing ANSPs (such as Nav Canada), while being regulated by Transport Canada, do have a big safety part in their corporate strategy. They consider safety to be their product. It would be reasonable to expect that the owner of Skyguide, being the Swiss government, is not interested in them returning a profit. A main objective would be to provide sustained capacity and punctuality in a safe and efficient (low cost) manner. It is equally legitimate for the owner to demand a financially healthy operation as it is to demand a safe operation, hence there does not seem to be a problem in a safety performance requirement by the owner. The reason why safety requirements imposed by the owner, in addition to those imposed by the regulator are that at the national level, there is effectively a monopoly in the provision of Air Navigation Services. The consequence is that there is not a real market, and there is total dependence on the single provider. This means that traditional means to enforce regulatory demands such as imposing fines or withdrawing a license to operate are not very useful. To have a government regulator placing fines on a company owned by the government is quite inefficient, and shutting down the ANSP by revoking the license to operate is only a theoretical option when there is a single provider. Of course there are intermediate enforcement possibilities such as temporarily reducing capacity until safety deficiencies have been resolved. But as these are limited as well, it could be useful for the government to have also the options of the ownership relation, such as the possibility to challenge the position of the management, as a means to enforce safety requirements. Thus, current thinking in other sectors about the need to control via either
regulation or ownership but not both, cannot be directly transposed to Air Navigation Service Provision, as this is not a true market.

This does, however, not mean that there is no reason to carefully consider the way safety should be made part of control through ownership. This consideration should not only involve the mentioned potential for confusion in accountabilities, but also that, at least in theory, safety performance requirements in the ownership relation could lead to underreporting of occurrences. As objectively observable accidents are not a useful safety performance indicator, there is a strong dependence on the ANSP to measure their own safety performance based upon non-consequential occurrences. Any reliance on mechanisms that could, at least implicitly, put pressure on occurrence reporting cultures should be avoided. It could therefore be useful to find ways to replace the safety requirements in the ownership relation by a requirement on regulatory compliance, and at the same time strengthen the safety oversight by the regulator.

5.5 Evaluation of policy implementation and the role of DETEC
The aviation related activities of DETEC are almost fully delegated to FOCA and that DETEC does not possess the necessary resources and expertise, to supervise FOCA in an effective manner. DETECs oversight and direction towards FOCA are minimal. DETEC does not give specific safety related objectives to FOCA, not does DETEC require FOCA to report on their safety regulation performance or the safety performance of the aviation industry. Current thinking in other sectors about the need to control via either regulation or ownership but not both, have some bearing upon - but cannot be directly transposed to Air Navigation Service Provision, as this is not a true market. It could in this light be useful to find ways to replace the safety requirements in the ownership relation by a requirement on regulatory compliance, and at the same time strengthen the safety oversight by the regulator.

While the grip of DETEC on FOCA, and their role in giving true precedence to aviation safety is underdeveloped, it is important to point out that the DETEC personnel involved is charged with a very large array of different tasks. They must weigh safety considerations against other matters like economical and environmental impacts. They receive no safety objectives from the government. Nevertheless, the impression received in the interviews and from evaluating the conduct of these employees is that they do exhibit a genuine concern for safety and make a serious effort within the constraints at hand, to help ensure safety. Nevertheless it must be concluded that the safety objective as mentioned in the departmental strategy does not result in active and specific guidance and oversight with safety as thé true priority.
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.
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6 The output of the aviation safety policy – the role of FOCA

6.1 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 6 is about Policy Outputs.

As in many smaller states, the Swiss aviation authority (the Federal Office of Civil Aviation – FOCA) has a broad range of responsibilities. These authorities sometimes combine duties as a regulator with duties as an aviation policy agency. In short, the regulator develops the rules and oversees compliance, while the policy agency prepares, air space management policies, route concessions, bi-national treaties, represents the State in ECAC, etc. This combination of regulatory tasks and policy tasks presents institutional difficulties as was identified in paragraph 5.3 and are further contemplated in paragraph 6.2.1. In this chapter however, we will focus on the role of FOCA in safety management. This focus implies two things. Firstly, in view of the objectives of the current study, the work of FOCA in aviation policy support is considered outside the scope of this study and will not be addressed in this Chapter. Secondly, our focus is not on regulation but on safety management. This distinction is quite significant because it does acknowledge that the role of FOCA in aviation safety is more than just a keeper of the rules. As such this constitutes a deviation from the narrower role of the safety regulators as it is known in other (network) industries. This explicit choice of focus will ensure that the analysis is from a perspective of an appropriate role for a modern aviation safety authority. Hence it is not limited to an assessment of the current activities of FOCA in (safety) regulation.

In using a safety management approach for FOCA, a safety management framework is necessary as a reference. The framework developed in Chapter 3 will be used. While this framework is primarily intended for use in organisations that are responsible for the safety of their own operations, the processes involved apply well to the work of a modern aviation safety regulator.
6.2 Safety Management at FOCA
In this chapter the safety management framework is defined in paragraph 3.2 is used to analyse the role of FOCA. All elements of the framework will be addressed:

- Safety policy
- Safety monitoring
- Threat identification
- Risk assessment
- Safety actions

In addition, the organisation, personnel, communication, education and information aspects are addressed.

6.2.1 The safety organisation of FOCA
FOCA was founded in 1920, and is a special office of the Federal Department of Environment Transport, Energy and Communication. FOCA has been reorganised several times to adapt to developments in the Swiss aviation sector. The most recent reorganisation came into effect in January 2001. This reorganisation transformed FOCA into a process-oriented organisation. The form is that of a matrix of processes (with responsible process managers) and competence centers. It is not a pure matrix organisation in the sense that the resources belong to the competence centers and the processes use these resources to achieve their process goals. Most employees belong to particular processes and the matrix organisation reflects more that the FOCA specialists in the competence centers provide their services to various processes. One of the objectives of the reorganisation was to create more clarity in the assignment of tasks and responsibilities within FOCA. A second objective was to make FOCA more manageable, creating a small management team of the director, the deputy director to whom all processes report, and a vice-director, to whom all competence centers report. This set-up has proven to be much more efficient than the previous arrangement in which a larger assembly including all department heads, was directly involved in the management of FOCA. FOCA management invoked the reorganisation; it was approved, but not required by DETEC.

An overview of the present organisation of the FOCA, including the working areas and staffing of the various units is given in Figure 6-1.
As FOCA has no specific safety organisation, this organisational arrangement has been reviewed from a safety management perspective.

This organisation reflects the areas of work of the office in a clear manner. Judging from the documents provided and the interviews conducted, the organisation works largely in accordance with the organisation as presented.

A number of observations with regard to the organisation of FOCA from the perspective of safety regulation and safety management can be made:

a) There is no identifiable safety process and safety accountability.
b) The processes reflect the different parts of the aviation system in Switzerland, and not the main tasks of a safety regulator (rulemaking, approvals, surveillance, enforcement, information, education).
c) The aviation industry is reflected in the organisational chart as the ‘Clients’.

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3 The unit Air Transport Agreements (LVA) and the unit Federal Air Transport Service (STAC) are not reflected as separate units in “Die neuen BAZL-Einheiten und ihre Tätigkeitsgebiete” as published.
d) The activities not related to safety regulation, in the area of policy making and policy advice, are not identified as a process.

These characteristics of the FOCA organisation have implications that are discussed below.

**No safety process**

One could expect that it is important for an organisation like FOCA, which has safety as the primary objective, that the organisation somehow reflects that. This is, however, not the case as safety is not identified anywhere in the organisation chart. FOCA commented that they noticed this also and are still considering the possibility of making additional changes to the organisation. At this moment, safety is considered everybody's job and not the responsibility of a particular individual. Basically, the act of regulation is considered as a form of safety management since the purpose of regulation is to ensure safety. This approach is, however, a reflection of the "old way" of achieving safety through regulatory compliance. Today's high levels of safety in the very complex and rapidly growing aviation industry cannot be sustained unless a proper safety management approach is adopted. The associated changes in processes should also be reflected in changes in the organisations of the government agencies overseeing aviation. While there is merit in making every employee aware of his or her personal responsibility for the safety aspects for the job, the effectiveness of such statements is limited unless it is administered in an organisation where safety is the product and top-level management is accountable for that.

As regulation, in its broadest sense is the way FOCA primarily deals with safety, there is nothing wrong with the organisational structure reflecting the regulatory processes, as long as it is clear who is ultimately accountable for the safety output. FOCA is currently charged with both the promotion of aviation and safety. However, as long as these objectives remain subject to an implicit consideration at the level of the director of FOCA, the manager who is solely accountable for safety cannot be identified in the organisation.

**Process structure**

The fact that the processes in the organisation are mapped upon the different categories of actors in the industry reflects FOCA’s commitment to be an efficient provider of regulatory services. This ability to enable ‘one-stop shopping’ caters to the needs of the industry and hence constitutes a good contribution of the government to an efficient aviation system. It does, however, also present a few disadvantages. The organisational entities called processes are not really processes. As the actual processes (being the traditional rulemaking, approvals, surveillance, enforcement, information, and education) are also not reflected in the competence centres, this means that these processes are located separately in each of the seven main units.
(called processes) of FOCA. This means that each unit has employees involved in rulemaking, surveillance, etc. From a safety perspective, this has the advantage that the units that are responsible for licensing an operator and the unit conducting the surveillance of this operator, report to the same manager. This prevents situations where licenses are granted or renewed while surveillance shows that performance is actually poor (see box 1 for a real life example). As will be shown in paragraph 6.2.2, however, this advantage is not achieved because of the audit/inspection philosophy. A disadvantage of this organisational structure, again from a safety point of view, is that it does not facilitate the exchange of information and experience from, for example, airport inspectors and ATC inspectors, thus needlessly slows down the accumulation of corporate knowledge and, more importantly, strengthening the Achilles heel of aviation which are the interfaces between the different actors.

This organisational structure is rather unique; the organisation charts of most other regulators reflect the primary regulatory tasks.
Chapter 6 The output of the aviation safety policy – the role of FOCA

Client orientation

As mentioned in the previous paragraph, the current organisational structure is not mapped upon the task structure of FOCA, but rather it reflects an orientation towards the efficient provision of regulatory services to the Clients. The Clients are the parties within the aviation industry. In view of the Swiss historical perspective as sketched in Paragraph 2.1 it is interesting to take note

BOX 1 Excerpts from the report of the Seaview accident of 2 october 1994 - Australia

Excerpt from the Seaview accident report:

….. the air operators certificate (AOC) was seemingly processed with no consideration of the deficiencies which were found during surveillance. It is therefore important that all Aviation Authority officers be convinced of the need for high quality surveillance in the maintenance of a safe aviation system and to take appropriate safety action on the basis of that surveillance…..

….. Although the Civil Aviation Regulations allowed for the application of administrative fines (as is also the case in some overseas countries), the management of the Civil Aviation Authority did not implement any procedures or issue instructions to staff that would have allowed the fines to be imposed. It is possible that had such a system been in place, those straightforward breaches of regulations that prompted much of the surveillance of the company may have been more efficiently dealt with, and the system provided with a more adequate indication of the organisational health of the company prior to the issue of the - air operators certificate……

- The required airworthiness-related inspections of facilities, staff and equipment were not completed prior to the air operators certificate upgrade.
- Ramp checks were carried out in response to events or breaches of regulations by the company, rather than as a check on the safety health of the company.
- Surveillance checks had not been conducted since the operator was granted the public transport Air Operators Certificate. However, checks were planned for 10 October 1994.
- There was inadequate follow-up of deficiencies that were identified in Seaview Air’s operations prior to the issue of a public transport Air Operators Certificate.
- Deficiencies were treated in isolation from those that had previously been identified.
- The certification of public transport operators was almost entirely based on the approval/acceptance of various manuals. In this case the operator was not required to demonstrate to the Civil Aviation Authority that the organization and its employees would/could operate according to the standards laid down in the manuals.
- The Civil Aviation Authority had no internal procedure to review the issue of air operators certificates.
of the part about the regulator-industry relationship of the Plane Safe Inquiry of 1995 into the processes and performance of the regulator CAA of Australia:

The CEO of CAA Australia stated (para 2.39) that: *the best way of developing aviation safety is for the regulator to play the educator-partner role rather than the prosecutor role…*

The director of safety regulation stated (para 2.48) in a memo that: *the Civil Aviation Authority must demonstrate continued accountability to the aviation industry – an industry the CAA is committed to serve.*

The inquiry committee observed that: (Para 2.46) *The customer focus can be explained as a sign of the times. Earlier inquiry reports had stated that ” the regulator has a responsibility … to help the aviation industry to become more competitive in global terms…”.*

But industry professional representatives commented that ( Para 2.47): *… regulation is not something you provide a client. The partnership attitude, and calling the industry ‘customers’ is a major change in direction for safety regulation…*

The inquiry committee observed (para 2.49 and para 2.50) that: *the travelling public are the customers of the regulator. The customer is the user of air services and the industry is the provider. And: The committee believes that this ‘accountability to the aviation industry’ approach could be an explanation for some of the shortcomings of the [Australian] CAA in the performance of its duties.*

The inquiry committee concluded (para 2.51) that: *The Civil Aviation Authority of Australia was never captured by the aviation industry. On the contrary, the regulator offered itself as a willing captive.*

These excerpts of the Plane Safe Inquiry are not intended to suggest that the conclusion of that inquiry regarding the role of the Australian CAA is equally valid for FOCA, but it serves to show why the choice of an organisational attitude as a provider of regulatory services to the industry Clients, must be accompanied by an equally strong commitment to the safety of the travelling public. That commitment should be reflected in a clear primacy & accountability for safety in the organisation of the regulator.

In the course of the events that included the inquiry, the Australian CAA was basically discontinued and rebuilt into a separate Safety Regulator and a separate Service Provider.
An important difference that must be kept in mind when linking the Australian experience to the Swiss context is the fact that the Australian CAA at the time had entered into a system of full cost recovery from the industry for the regulatory services. As this is not the case in Switzerland, the provider – client relation can be kept more in line with a dual role of the authority.

**No separation between policy tasks & economic regulation and safety regulation**

FOCA is tasked to ensure safety and promote aviation. It is, however, not clear from the organisational structure which parts of the organisation are responsible for safety regulation, and which parts are responsible for policy advice and economic regulation. The interviews confirmed that this separation can indeed not be made in the current organisation. Safety regulation and policy advice/economical regulation are conducted in most of the processes throughout FOCA. It is not uncommon for FOCA employees to be tasked with both roles. It is important to note that policy advice cannot be developed without an adequate level of understanding of the subject matter (domain knowledge). Therefore, it makes sense for a relatively small authority to not completely separate the domain experts from the policymakers. On the other hand, the total integration of these duties, as is currently the case in FOCA, presents serious risks in combination with the lack of a clear safety policy, accountability and culture. The integration means that the considerations and trade-offs around safety and economy are now made at the level of the individual employee. Disadvantages are that the leadership of the organisation is not actually in control of these considerations and that employees taking a strong stance for safety (or economy) cannot be sure whether they are actually working in accordance with FOCA policy (and be sure of the necessary back-up in case of escalation). It seems difficult to be a strong safety regulator when all competing considerations have been integrated into every safety regulators job down to the level of the individual inspector.

It is interesting to take note of the comments in the hearings for the Fourteenth report of the House of Commons regarding the relationship between the UK CAA Safety Regulation Group and the UK aviation industry. In the UK, the Safety Regulation Group and the Economic Regulation Group, each with own director, together form the CAA. The director of the Safety Regulation Group responded to questions regarding the potential conflict of interest between safety considerations and considerations regarding the encouragement of competition, in the oversight of operations and equipment. He commented that it might be helpful to separate the Safety Regulation Group and the Economic Regulation Group (the principal task of which is “promoting air transport users’ interests by encouraging a diverse and competitive industry”) into separate organisations to eliminate any suspicion of conflict. He also said that “chinese walls” separate these two groups within the CAA.
Other states have other solutions. In the Netherlands, the safety regulator and the policy group have been physically separated into different units reporting to different Directors General of the Ministry of Transport. While this provides a clear separation between safety regulation and policy, it has disadvantages too, mainly with regard to the application of domain knowledge in policy development.

It is important to take a course of action that is sufficiently structural to have an actual impact on the ability of FOCA to administer effective and efficient safety regulation, but at the same time give due consideration to the relevant circumstances of FOCA and the need to ensure that a coherent organisation under a single accountable manager remains. In this regard it is illustrative to recall how the Australian authority underwent significant change in the area of safety regulation in the mid-nineties. The Australian Authority was at that time under strong pressures to become a smaller and more efficient government agency and at the same time a number of fatal accidents occurred in which the role of the (safety) regulator was implicated in the causal factors of the accidents. As a consequence, the resources of the authority (that also included the ANSP) were slashed by 50% over a five year period, and the safety regulation activities, which were initially already a Division of the CAA, went through considerable change. Safety Regulation staff were reduced from 736 in the beginning of 1991 to 490 by the end of 1992. CAA management rejected a recommendation from one of a range of investigations and inquiries to the effect of setting up a separate Safety Regulation Directorate within the CAA. Public scrutiny however led to the demand upon the Authority to formally confirm that safety has primacy in CAA’s work and the establishment of a Directorate of Aviation Safety Regulation. A further fatal accident in which the oversight of the CAA was implicated prompted the government to take further action and led to the decision to establish a separate Aviation Safety Agency within the CAA. A next accident led to the removal of the director of the Safety Regulation Division and the decision to set up a new and separate Aviation Safety Agency, and to considerably increase funding for safety regulation. This agency became today’s CASA (Civil Aviation Safety Authority). In the seven years previous to the establishment of CASA in 1995, there had been four chairman of the board, four CEO’s and six heads on safety regulation. Such dynamics are obviously not good for safety regulation and it would thus be preferable for FOCA to establish clear safety accountabilities through a more constructive process.

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4 This was the only recommendation not accepted out of 59 recommendations that followed after the Terrell/Ward report.
6.2.1.1 Personnel

**Personnel qualifications**

The general impression gained in the interviews for the REACH project is that the personnel of FOCA is well qualified and motivated for the job. Many FOCA employees have considerable experience, and the contribution of FOCA representatives in international bodies is generally well respected. This impression is confirmed by the findings of the ICAO Safety Oversight Audit that did, for example, find that "the Aeronautical Material Division [responsible for airworthiness, certification and manufacturing oversight] is a competent and mature organisation staffed by well-trained and qualified personnel". The JAA audit of June 2000 confirmed that FOCA meets the JAA requirements in the area of flight crew licensing to get the "Mutual Recognition" status of JAA.

There are however a few comments to be made. There is currently no dedicated degree education on Aeronautical Engineering at a Swiss university. As a consequence, many people working in aviation in Switzerland hold another –mostly– relevant degree and specialise in specific aviation issues while being employed in aviation. This makes it necessary for FOCA to hire either non-aviation specialists that acquire aviation domain knowledge "on-the-job" at FOCA or they hire specialists from the industry. The former approach has the disadvantage that this FOCA personnel, at least initially, has a considerable disadvantage with respect to their industry counterparts. This makes it difficult for FOCA to become a stronger regulator. In the latter case (hiring specialists from the industry), a disadvantage could be that it would be difficult to ensure that these former industry specialists are not tasked to conduct oversight of their previous employer and colleagues. FOCA has not always been willing or able to ensure such separation, as the chief airline inspector of FOCA used to be a former Swissair employee. As SWISS International Airlines dominates the aviation sector, this difficulty remains. The current downturn in (Swiss) aviation thus provides a welcome opportunity to hire qualified specialists from other airlines.

In this light, the fact that FOCA runs a flight operation for government transport as well as to provide operational exposure for FOCA personnel is justifiable, although not necessary. The provisions for FOCA personnel to acquire and maintain a general aviation license through FOCA's own flight operation, albeit perhaps somewhat extensive, does to some extent help to compensate for the lack of a formal degree education in aeronautics.

Another difficulty in the qualification of FOCA personnel is in the area of large air transport operations. Even though Switzerland has a large General Aviation sector, which justifies a
sizeable contingent of GA inspectors in FOCA, the safety of the travelling public is mainly related to airline operations and therefore should be the main focus of FOCA. So, it is very important that FOCA has a strong capability for the oversight over major airline operations. Sufficient inspectors holding current licenses of large commercial transport aircraft seems limited. A high degree of delegation to Swiss check pilots as delegated FOCA inspectors ensures a smooth provision of regulatory services. It would seem however, that FOCA should make an effort to strengthen their capabilities in this regard, by getting more inspectors qualified to conduct oversight of major airline flight operations. This does not necessarily mean that more inspectors are required. As such qualifications are likely to incur certain costs, and since funding constraints could thus hamper such a development, it may be advisable to shift the focus in operational proficiency towards air transport at the expense of general aviation.

**Staffing levels**

There is no doubt that FOCA was understaffed a few years ago. The ICAO Safety Oversight audit had as one of its main conclusions: "FOCA's licensing, operations and airworthiness sections suffer from an acute shortage of qualified technical personnel.5" And also: "The existing number of staff is not sufficient to ensure the implementation of the numerous tasks required to be carried out during the transitional period of implementation towards JAR-FCL.6" While the JAR-FCL matter was of a temporary nature, the other issues were more fundamental. Also, in the interviews conducted in the aviation sector, several actor representatives commented that FOCA is short on staff. Bearing in mind that the aviation industry generally does not ask for more regulators, these comments must be regarded as evidence of the fact that the industry does experience negative consequences of what they perceive as a lack of resources at FOCA.

The shortages in staff were identified by FOCA management and are the subject of several requests to DETEC for additional resources. Part of the correspondence has been reviewed in the course of the REACH study. Between 1998 and 2000 FOCA made several requests to DETEC for additional resources. These requests were generally not honoured by DETEC under reference to the limited means available to DETEC and the insufficient substantiation of the requests. The requests of FOCA did not refer to very serious shortages or to the fact that essential responsibilities of FOCA could not be met due to these shortages. After the ICAO audit, FOCA requested more resources but this request was not honoured. In the mean time,  

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5 ICAO audit report paragraph 3.1.6  
6 ICAO audit report paragraph 3.1.3  
7 It is interesting to note that ICAO drew this conclusion and that a few months prior to the ICAO audit, the JAA audit regarding FOCA's ability to administer the JAR-FCL regime found FOCA fit for Mutual Recognition.
cost cutting leads to a reduction in the workforce from 155 FTE to 150 FTE in 2000. In early 2002, after the intermediate report of Bassersdorf was received, FOCA sent a strong signal to DETEC indicating the need for additional resources to take care of existing vacancies and more oversight and support and additional new workload related to increased oversight of the airline SWISS. Around this time, AAIB signalled to DETEC that the potential safety implications that might arise from the merger of Crossair and Swissair into the new airline SWISS and the associated merger of the two pilot corpses warranted intensified oversight by FOCA. It was the indication of AAIB in particular that led DETEC to the conviction that additional resources were indeed necessary for the oversight of SWISS. The total funding required to take care of all needs added up to 4.5 million SFr. Apart from the resources needed to increase FOCA’s involvement with the new airline SWISS, the requests were not granted. In April of 2002, FOCA indicated to DETEC that a considerable shortage still existed, and suggested an external audit to confirm the need. In May of 2002 DETEC granted FOCA resources to the extent of 13 FTEs, although the necessary funding was not available in the DETEC budget. Several smaller allotments were thereafter granted to FOCA and by early 2003, some 22 additional personnel had been hired. In March of 2003 FOCA indicated that additional resources were required in view of the GPK review and possibly the outcome of the REACH study. By April of 2003, FOCA indicated that the size of the regular workforce was 175 FTE, and the various allotments granted by DETEC together amounted to 32 FTE to arrive at a staffing level of about 207 FTE. Thus, the increase in staffing level since early 2002 has been substantial.

It is quite difficult to assess whether the current resources of FOCA are sufficient in an absolute sense. It would require a fairly detailed analysis of the tasks of FOCA and the resources needed to conduct these tasks. Such an analysis is outside of the scope of the REACH project. An impression of the adequacy of the staffing levels could however be gained from a comparison of the staffing levels of FOCA with those of the authorities in the benchmark states. The easiest way to achieve this would be to compare the total number of staff in the authorities of each of these states and adjust them to take into account the different sizes of the aviation sectors in these states. In reality however, the different authorities do not only differ with regard to the size and complexity of the aviation sectors they regulate, but also with regard to their tasks and responsibilities. As a consequence, comparing the staffing levels of the authorities is not just a matter of straightforward calculations. Instead, a subjective estimation is necessary which gives due consideration to the various differences between these States.

Appendix B provides details about the different authorities. The most relevant differences from the perspective of the necessary staffing levels are summarised below.
The main differences concern the tasks related to policy making and oversight of the air navigation service providers and oversight of airports. For example, the Dutch and German Authorities have specific policy units or services at the Ministry level, whereas in Switzerland there is no specific policy unit and policy support is thus provided by FOCA. Also some specific differences may exist such as the fact that FOCA has a flying service whereas the Dutch authority does not. Another difference is that the oversight of DFS is not conducted by LBA.

A rough estimation can be made using information about the number of personnel that can be attributed to specific parts of the aviation sector and an indicator for the size or complexity of that part of the sector. For FOCA, the number of personnel for airports, operator oversight, ATM oversight, licensing & training, airworthiness, etc., has been provided by FOCA. By using indicators such as the number of licensed personnel, the number of general aviation aircraft and the number of large transport aircraft in the civil register, the number of major and regional airports, the number of IFR kilometers per year in the national airspace, the number of AOC's, the number of personnel to be expected in other states based on the Swiss staffing levels per specific part of the sector can be estimated. By subsequently allowing for the same levels of overhead as are present in FOCA, the total number of personnel can be estimated for each of the benchmarks states. As the actual total number of staff is known for each of the benchmarks states a rough indication is found of staffing levels in the authorities of Germany, France and the Netherlands relative to that of Swiss FOCA.

Through this rough and subjective estimation exercise it may be deduced that the German relative staffing levels are slightly above that of the Swiss authorities. The French authorities are much lighter in staff, but this estimate may be less reliable because it is rather difficult to fully understand how exactly the French authority is organized. Relative staffing levels at the Dutch authority (including their policy unit DGL) are considerably higher than in FOCA. The Dutch authorities are expected to shed a considerable number of personnel (estimated at around 45 fte) in 2003 and some 27 fte of temporary staff of FOCA may leave some years into the future. Taking these resources out of the estimation, the relative staffing levels are still somewhat lower at the French authority, above FOCA levels at the German authority, and still considerably above FOCA levels at the Dutch authorities.

The larger authorities enjoy some economy of scale, as the German and French sectors are considerably larger, their authorities can operate in a more efficient manner, particularly in the area of overheads. Bearing in mind that the estimates for the French authority must be considered less reliable, and since the Dutch staffing levels seems rather high, it is probably best
to mainly refer to the German staffing levels. When including the 27 fte temporary staff, relative staffing levels at FOCA are slightly below that of LBA. Bearing in mind also the economy of scale as mentioned above, it thus seems likely that staffing levels at FOCA, even with the considerable number of additional staff, are still somewhat light in comparison with German LBA. It will therefore not be easy to accommodate the need to increase FOCA's oversight activities as identified elsewhere in this Chapter, the need to establish the missing or underdeveloped parts of FOCA's safety management system, and the need to strengthen the unit of FOCA involved in approving airport and ATM Safety Cases, with the current staff.

This is not to say that additional tasks must necessarily lead to a need for additional staff. To some extent, the other authorities are already doing within their current staffing levels the things that still need to be developed in FOCA. As there will also be limitations in the amount of resources than can be provided by DETEC, a need exists, to conduct two types of analysis. One type of analysis concerns a detailed task and workload analysis for the FOCA staff as the substantiation of previous requests for additional staff has been weak. The second type of analysis must be to establish, based on a risk portfolio and the currently available staff, which will be the tasks that FOCA can realistically achieve and which tasks will not be performed. This is necessary because a lack of staff may not result in an uncoordinated regulatory activity. The analysis, based on the available resources, should be approved by DETEC to ensure that the expectations of DETEC and FOCA are the same.

6.2.1.2 Communication & network

Communication

FOCA communicates at the professional level with their counterparts in the aviation sector, such as the airlines, maintenance organisations etc., and with individual license holders. In the course of this study, no complaints or unfavourable opinions were expressed with regard to the content, nature and timeliness of FOCA communications. Communications with FOCA personnel during the REACH project were swift and clear.

FOCA also communicates with the general public and the government. An excellent website is maintained by FOCA. It provides rather extensive and up to date information. FOCA has an active communication strategy and regularly publishes press releases on relevant issues.

Networks

FOCA has an extensive network of contacts throughout the industry. At the national level, many processes of FOCA are connected with actors in the aviation industry through working groups and committees in which FOCA participates. While cooperation with actors in such working
groups and committees is very useful and deserves a positive appraisal, there is a risk involved that seems to be related to Swiss culture in social interactions. That risk lies in the lack of formal and explicit accountability about safety related matters in the way these groups and committees work. Also at the level of personal contacts between FOCA and the industry, there is a tendency to make actors aware of safety deficiencies or concerns, but not demand a formal response. Bringing safety concerns to the attention of managers in the aviation sector rather than formally asking them for a response makes it difficult for FOCA to ensure that identified safety concerns are actually taken care off by the actors, and places a liability upon the regulator.

At the international level, FOCA has extensive contacts and, as a matter of policy, participates extensively in international programmes, working groups and committees to ensure that the international rules and guidance material are suitable for implementation in the Swiss context.

The Swiss participation and contribution is well respected at the international level.

6.2.2 The safety management system of FOCA

Within this chapter safety management at FOCA has been assessed along the lines of the general safety management framework, as presented in Chapter 3.

In subsequent paragraphs the execution of the main processes related to safety management within FOCA will be addressed; namely the safety policy, safety monitoring, threat identification, risk assessment and safety actions. In the context of safety actions, the safety regulatory activities of FOCA are most relevant in relation to the tasks that FOCA has to perform. Therefore, the safety regulatory activities, including oversight over Skyguide, the airlines and the airlines are given due attention.

6.2.2.1 The safety policy

The safety policy is of vital importance to an organisation that is responsible for safety. Among other things it provides the employees with a frame of reference for decision making in their day-to-day duties, and it supports the accountability of the organisation because it states what the organisation wants to achieve, and it sends a powerful message to the industry and to the general public.

As was concluded in Chapter 4, safety is, at least formally, not addressed in the guidance provided to FOCA by DETEC. In a general sense, an aspiration to be on par with the Western European standard prevails, and FOCA is expected by DETEC to put its resources as one of three priorities as specified in the organisational ordinance (GO-UVEK).

The written safety policy (ref. 46) of FOCA reads:
"The FOCA puts forward aviation safety as main focal point, and furthermore relies consequently on international standards".

Furthermore, FOCA has published a leaflet (ref. 40) regarding the safety philosophy in civil aviation. This leaflet states that safety is based on the mutual dependencies between all aviation actors (Vernetzung) and the own responsibility of the industry. It does also point out that the rules for safety are determined internationally, and that Switzerland must adhere to these rules.

There is no further elaboration of this policy. Also there is no intention to adopt a policy beyond compliance with international rules, because this would constitute a competitive disadvantage of the air transport sector in Switzerland. The policy can thus be summarised by “Safety First” and “Adhere to the International Rules”. This was confirmed by the directors of FOCA as well as several process leaders.

"Safety First" is very common but not very adequate because it suggests that safety should take precedence in any decision in which a safety consideration is involved. In reality, there will always be a balance between safety and other considerations. Not even the travelling public wants "safety first" at any price. What is needed is a safety policy that ensures that the right balance is found, and the "safety first" statement does not help to strike the right balance.

Judged from the needs of a well functioning safety management system, these statements constitute the embryonic stages of a safety policy. Also, the ambition level expressed is not in accordance with the statements by the FOCA leadership about the fact that Swiss society is accustomed to the image of excellence of Swissair and thus demands excellent safety instead of mere adherence.

For a safety policy to 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.

It is quite common for the relatively smaller Authorities to not have a well-developed safety policy. The safety policies of the authorities of France, Germany, and the Netherlands are more
or less along the lines of the FOCA policy. This contrasts strongly with the policies of the most advanced authorities such as Transport Canada, which has a detailed Aviation Safety Policy document spanning 20 pages.

In the absence of a well developed safety policy, and because safety performance criteria are not a part of the yearplan\(^9\) that constitutes DETEC’s order to FOCA, it is not possible for FOCA or anybody also to assess whether they are meeting their performance requirements.

### 6.2.2.2 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. This should occur at two levels; at the level of the safety outcomes (accidents and incidents) because that is what FOCA will ultimately be held accountable for, and at the level of the output of FOCA (e.g. surveillance results) because that is where FOCA gets direct feedback of its own processes. The results of a safety monitoring activity are also necessary in support of the information task of FOCA as discussed in paragraph 6.2.2.5 with regard to safety actions.

Monitoring of safety developments at the level of safety outcomes, accidents and incidents, is not difficult because these data are readily provided by AAIB. The data on accidents are also reported by FOCA in their annual report. As FOCA is formally obliged to take a position on the recommendations of AAIB resulting from the accident investigations, and against the background of the severely strained relationship with AAIB, the management of FOCA is well aware of these recommendations. The co-ordination of activities around the AAIB recommendations is mainly handled by an internal activity/office called KFU (Koordinationsstelle für Flugunfall-untersuchungen und Unfallverhütung). The FOCA officer tasked with the processing of the AAIB recommendations does an excellent job with the logistics of the AAIB recommendations. This process is well organised by FOCA and has been given more priority recently. The FOCA officer involved works very diligently on this task. He is however not a safety expert. Information meetings for specific accidents at AAIB are often attended by him as the formal representative of FOCA, rather than a FOCA expert in the area that seems to be most relevant to the accident involved.

FOCA believes it is outside the scope\(^10\) of AAIB to conduct analysis on the accident data and make the results public. In their opinion, FOCA is responsible for the analysis, but they did not perform analysis on the accident and incident data as yet. AAIB indicated that they could

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9 Although the yearplan does not normally address the regular tasks of FOCA, but mainly the specific priorities for a particular year, one would expect, in view of the accidents, that safety would have qualified as a specific priority.
10 The law on accident investigation (art. 34 & art. 37) does not forbid nor oblige AAIB to conduct such analysis.
provide analysis results (and in fact they possess such results) but that FOCA has indicated that this is not AAIB's task. FOCA suggested that it would probably appropriate to ask the national bureau of statistics to conduct the analysis\(^\text{11}\).

The way FOCA and AAIB are dealing with the matter of analysis of accident and incident data seems to be more an indication of the strained relationship between the two organisations than as evidence of a well developed monitoring activity as would be appropriate in a safety management approach. As a consequence, FOCA management is for example not aware of the increase in the number of air proximity events over the last two years (the FOCA process leader for Skyguide is well aware of that trend).

It is also important to point out that accident and serious incident statistics constitute a reactive indicator of the safety performance of the industry. While monitoring and analysing accident and incident data is certainly necessary, it is obviously not an adequate basis for pro-active safety management. If safety trends in the industry are to be formally identified before accidents and incidents occur, an appropriate set of safety performance indicators must be developed and used.

In the absence of such information, it seems difficult for FOCA to maintain an adequate awareness of the state of the industry they regulate, questions in this domain can only be answered based on the subjective opinion of the FOCA personnel that works with the industry on a daily basis. Such opinion is often much more valuable than statistical data and can be solicited if the need arises. The awareness that is present in the FOCA experts does however not effectively influence FOCA policies and priorities unless the elicitation of their insights is an explicit part of the FOCA processes. As yet this is not the case. The resulting lack of data on the safety state of the industry does also introduce vulnerabilities of FOCA and DETEC in the public and political domain.

More importantly, a pro-active safety management by FOCA requires the availability of safety performance indicators that help to spot pre-cursors to accidents. In general FOCA has no access to safety statistics from sector parties, for instance from flight data monitoring programmes.

But a rich source of safety indicators is the results of FOCA audits and inspections. Collection and analysis of surveillance data would enable an excellent monitoring programme, also because FOCA can themselves decide on priorities in surveillance if trends in the data give rise to concerns in particular domains.

\(^{11}\) This is not something the study team would recommend, as the analysis of incident and accident data necessitates a high degree of judgement based on adequate domain knowledge.
In practice however, the amount of information gathered in this way is fairly limited as a consequence of the limited surveillance activities. The results of FOCA's surveillance activities, albeit limited, are not collected and analysed.

A positive exception in this respect is formed by the SAFA inspections. Findings of SAFA inspections are statistically processed into a form that enables to identify trends and to focus future inspections.

Overall it has to be concluded that, with the exception of the SAFA activity, safety monitoring within FOCA is virtually non-existent. Of course the FOCA inspectors get a good impression of the safety performance of the industry. Such informal information makes it difficult however, to identify cross-cutting trends, also within individual operators, to maintain a good level of awareness at the management levels of FOCA, to assess the effectiveness of FOCA's safety actions, and to commit the limited resources for oversight in accordance with the priorities emerging from surveillance data.

6.2.2.3 Threat Identification

Threat identification is vital for pro-active safety management as it allows safety risks to be averted before they cause incidents or accidents.

Threat identification is required for two purposes; to (1) identify developments in and around the industry that could introduce new hazards, and to (2) ensure that safety actions by FOCA, intended to improve safety, do not inadvertently introduce new risks. A good example of the latter is the mandatory introduction of the Traffic alert and Collision Avoidance System (TCAS) without an equally mandatory amendment to company operation manuals regarding the way crews must deal with conflicting indications of TCAS and air traffic control. It is to be expected however, that the need for threat identification on FOCA safety actions is limited. There will however be strong demands upon FOCA's capacity to oversee threat identification in safety cases submitted by the industry for approval.

Threat identification by FOCA, particularly with the purpose of identifying new external safety threats to the aviation industry is currently based upon the general awareness of the FOCA managers. An example of a well identified threat concerns the consequences of the bankruptcy of Swissair and the subsequent merger of former Swissair and Crossair into Swiss. AAIB saw the safety implications of that event and took positive action by pointing this issue out to DETEC. DETEC subsequently secured additional resources for FOCA to employ additional
inspectors to stay on top of the safety situation at Swiss. See Box 2 on Globalisation and Airline Mergers.

The AAIB accident reports also serve as an important means to identify new threats. An example of a threat that has been correctly identified by AAIB is the possible consequences of the influx of foreign pilots in Swiss aviation. No particular action in that realm has become apparent to the study team. See box 2.

**Threats may also be identified by trends in safety data, but as the monitoring activities of FOCA are very limited, this source of threat indicators is in practice not available to FOCA.**

**Taking note of threats identified by other organisations also constitutes a means to increase awareness. For example, the UK-AAIB points out particular difficulties posed by overseeing safety cases of airlines, which have contracted out services, and by the emergence of virtual airlines. Such airlines consist mainly of a management structure leasing all the services they need from companies that may be based anywhere in the world. As the regulator may be facing an operator with sub-leased engines on sub-leased aircraft being serviced by a third party maintenance provider, it becomes increasingly difficult to decide who is responsible for the airline. As even the most advanced authorities are struggling with that, it is something an authority needs to prepare for.**

Threat identification is currently conducted in an informal manner within FOCA. There is no specific process to identify threats and hence no shared awareness of safety threats. The priorities of FOCA are thus not set such as to act upon threats before they affect safety levels. It is important to note that this does not always mean that FOCA themselves must do the work, a proper line of action could also be to give attention to the way the operators deal with the risks identified in the surveillance programme.

**Not surprisingly FOCA managers have responded quite diverse to the question what they consider the top three safety threats to Swiss aviation. Very generic issues were mentioned, like the rate of change of the system, but also very specific issues, like problems with the pilot corps at SWISS. Judging from the fact that, in general, respondents found it difficult to answer this question, and the fact that there was almost no commonality in the answers, it must be concluded that a common perception of the threats to safety is not present.**

It is important to stress that threat identification is typically something the regulator should conduct together with the aviation industry. Not only would this give the regulator the benefit of the vast collective wisdom of the industry, but it will also instil a sense of partnership. Bearing
in mind that many safety measure in aviation are of a multi-disciplinary nature, it will ensure that the safety measures taken to deal with the most important threats are well co-ordinated and do not contain weak links in the operational or the regulatory domains.

As a first starting point, Appendix D contains a list of all the threats that have been mentioned in the course of the REACH study in the industry and in the government agencies.

Risk profiling, and in particular publishing results, will strengthen the accountability of the industry. As such an approach is particularly out of tune with the traditional position of FOCA, it should seek external advice to assist FOCA in setting up such an approach in consultation with the industry.

A well functioning risk profiling capability will also make the organisation less vulnerable to outside pressures toward particular regulatory priorities concerning matters of limited relevance to safety.

Threats may also involve the functioning of FOCA itself. In this regard, FOCA may wish to take note of the fact that ICAO's Safety Oversight Assessment (SOA) is developing a “Critical Element Assessment Model (CEAM)” to assist in determining the need, frequency, depth and duration of future safety oversight audits of Contracting States. Using the risk profiling model of ICAO may be useful to identify threats within the Swiss government side of aviation.
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Box 2: Findings of the ICON study for JAA on the safety consequences of globalisation

The aviation industry is evolving rapidly. Particular developments are the increasing globalisation and mounting commercial pressures. The effects of commercial developments, and in particular of airline mergers, leads to changes in organisational culture, leading to changes in individual performance. Globalisation leads to an increased incidence of multinational crews, with different native languages and different national cultures. These developments will have a number of Human Factors effects, particularly on the flight deck. A link between national culture and flight-deck behaviour is well established. These differences may lead to different attitudes toward Standard Operating Procedures, the use of automation and and management relations on the flight deck. While flight deck errors are quite common (such errors occur on 68% of flights), they rarely present a safety risk because crews are trained to trap such errors and recover from them. The occurrence of such errors and their recovery are primarily dependent on crew-related interactions, rather than on technical proficiency. Team skills are thus vital to a safe flight and the cultural differences and their consequences as mentioned above are thus highly relevant for safety. Language difficulties may aggravate the effects of cultural differences. While all aircrew must meet minimum proficiency requirements in english, nevertheless, mixed language operations are thus likely to have a negative effect on safety, also because of the consequences for off-duty social interaction.

Globalisation and the influx of foreign aircrew thus presents a potential threat to the Swiss aviation industry in view of the considerable influx of foreign pilots to e.g. the former Crossair. The ICON report specifically refers to the influx of pilots from the former Soviet Union. This is also correctly identified in the investigation of the Nassenwill accident and the recommendations by AAIB.

The ICON study points at additional airline merger effects to potentially cause difficulties, such as membership of different trade unions, different safety or CRM philosophies and concerns over flying skills and technical knowledge. Obviously, these effects also play a role in the aviation industry in Switzerland.
6.2.2.4 Risk Assessment

Risk assessment pertains to the process used to determine the seriousness of the risks identified. There are many ways to assess risks, most of which involve a judgement or analysis of the seriousness of the consequences of the unwanted event involved and the probability that that will happen. The resulting seriousness and probability are used to classify the risk into one of several categories of risk, usually involving some kind of risk matrix. The location of the risk in that matrix subsequently leads to the assessment of the risk in terms of its tolerability. Obviously, the intolerable risks needs corrective action, as to the risk that can be reduced.

Many organisations such as Eurocontrol and the Joint Aviation Authorities have developed guidance and tools for risk assessment.

Obviously, the risks must be identified before they can be assessed. As there is currently not a formal risk/threat identification process in FOCA, and hence risks are not formally treated as part of a safety management approach, there is also no activity for risk assessment.

If FOCA would enter into a more explicit way of dealing with risks, it is important to ensure that an appropriate and, in particular, practical assessment procedure is adopted as well.

As yet, there is no common risk portfolio within FOCA, and as a consequence, safety priorities are not being set accordingly.

6.2.2.5 Safety Actions

As a general impression it can be stated that FOCA is rather active and thorough in their responses to external recommendations or concerns such as the BFU recommendations and the findings of the ICAO audit report. The responses of FOCA to the SR-111 investigation findings are quite comprehensive and reflect an active attitude towards safety action. It must also be noted that this active approach is particularly present with regard to matters that concern FOCA itself.

As the purpose of safety regulation is to ensure and possibly improve safety, the regulatory tasks of FOCA are treated as the safety actions in their safety management framework.

The main tasks of a safety regulator are:

1. to license
2. to approve
The subject of the REACH study is to investigate how the safety of aviation is being managed in Switzerland. Regulation is an essential instrument in safety management. Therefore, the activities of FOCA are an important part of this study. It is however not the intention of the current study to conduct a broad assessment of FOCA’s regulatory capabilities. Such is the work of organisations like ICAO and JAA. Rather the focus of this study is upon those activities of FOCA that are of particular essence in the management of safety in the Swiss aviation system.

The next chapters on safety action are organised such that the information on a particular category of actors is combined into a single chapter. This is in accordance with the organisation of FOCA. It prevents the difficulty of having to refer to different chapters to get a complete picture of the activities of FOCA relative to a particular group of actors.

6.2.2.5.1 Regulating Skyguide

Licensing
Skyguide Air Traffic Controllers are licensed by FOCA in accordance with ICAO regulations. In practice however, FOCA receives a message from Skyguide that a particular controller meets all license requirements (with respect to training, exams, etc.) after which FOCA grants the license. As no surveillance programme of Skyguide is yet in place, it is unclear how FOCA verifies that the associated Skyguide processes ensure that new ATCOs have indeed received all the necessary training. This is particularly relevant in the light of the current shortage of ATCOs at Skyguide.
Contrary to almost all other personnel in aviation, ATC equipment technicians are not licensed. This is common for ANSPs just like it is common that ATC equipment, unlike aeronautical equipment, is not certified. While Skyguide is no exception to most foreign ANSPs in this respect, it does nevertheless seem illogical that rulemaking around safety critical equipment and the associated personnel are so poorly developed.

Oversight
Within the last 15 years the supervisory control of FOCA over the national Air Navigation Service (ANS) provider has undergone several and significant changes.

In 1988 Swisscontrol was founded, as a first step in the privatisation of ANS provision in Switzerland. With the foundation of Swisscontrol the supervisory role of FOCA changed in the sense that Swisscontrol was allowed by the associated legislation to decide over personnel planning, purchases and investments. However, the president of the board, as well as two board members were provided by FOCA, so that FOCA still was involved in the strategic control over the company.

In these years, surveillance activities by the FOCA were virtually non-existent. Swisscontrol had established an internal audit system in 1991. This system formed the basis for a tri-national audit system, in co-operation with the German and Austrian ANS providers, that was initiated in 1998, and that was accommodated by a dedicated organisation (TriNET). While FOCA relied on this system of self audit to provide sufficient safety and quality assurance, the leader of the process in FOCA responsible for the oversight of Skyguide, was never informed of the internal audit results. Before the Überlingen accident in 2002, results of the TriNET audits were not distributed to FOCA. Therefore the safety oversight was more or less, informally, delegated to the ANS provider itself. FOCA fully trusted that this internal audit system was sufficient for assuring safety and quality of the ANS provider, without further verification.

Over the years the influence of the FOCA was gradually reduced by successive withdrawal of FOCA members from the board. In 1996 Swisscontrol was given full financial independence from the Swiss Confederation and became a joint stock company under civil law. In 2001 Skyguide was founded, integrating all air navigation services, civil as well as military, within one company. With the founding of Skyguide the presence of FOCA in the board of the company was terminated. Consequently FOCA, as supervising authority, lost its direct influence over the company.

Due to these developments a new concept of supervision had to be devised, that newly defined the role of the owner of Skyguide (represented by DETEC and DDPS) and the supervising
authority (FOCA). This new concept has been laid down in a document called "ANS Aufsichtskonzept", ref. 46. This concept describes the role and responsibilities of the owner, respectively the regulator in surveying Skyguide and the surveillance concept itself (objectives, what and how is being surveyed). This supervision concept marks a significant difference from earlier practices, and signals an intention of FOCA to increase oversight over Skyguide.

Currently the responsibility for the supervision of Skyguide resides within the Process Infrastructure Planning (IP) within the FOCA. This supervisory task is one of many functions, related to air traffic management, under responsibility of IP. According to the present supervision concept the main activities to improve surveillance are defined as:

- introduction of audits and inspections within the units of the ANS service provider
- examination of the internal audit reports and monitoring of findings
- regular audits of the safety management system of the ANS provider
- validation and approval of safety cases
- definition of safety performance indicators and yearly evaluation of performance

These activities are well chosen, and in accordance with current thinking about safety management. However adoption of these tasks by the responsible process (Infrastructure Planning) within the current organisation of FOCA represents a significant extension of activities. Current level of staffing and capabilities is considered inadequate to take on these tasks.

Within the present version of the supervision concept no schedule of inspections or audits has been specified, except that every 3-4 year a general audit will be performed in co-operation with an external specialist organisation. Also, there has been no formal publication of this new concept to the organisations that will be subject to the oversight concept. We have found no communication and consultation process aimed at achieving adequate buy-in from the sector parties involved. While Skyguide is aware of the new concept and have expressed agreement with its contents, the response in the sector does not indicate an active commitment to put the concept to use as guidance to prepare for a new oversight process. This may partially be explained by the fact that Skyguide is preparing for ESARR compliance anyway and the new oversight concept of FOCA is largely in accordance with the ESARR requirements. Nevertheless, it does also indicate that FOCA oversight activities are not driving Skyguide’s behaviour.
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**Approvals**

Monitoring the development of the safety management system within Skyguide, approving ESARR compliance, and the validation and approval of safety cases are new tasks within FOCA. In essence this task has been assigned to a single person within FOCA, under responsibility of the process leader of the infrastructure planning process. In view of the large amount of work and know-how involved in this task this is considered not at all sufficient.

Experience shows that evaluation and approval of risk assessments and safety cases require profound knowledge of the systems involved, and of the analytical approach.

It is imperative that the required experience and know-how is built up within FOCA, and is distributed over several specialists within the FOCA, in order to ensure that FOCA becomes a trustworthy and independent evaluator of safety cases of new procedures and at Skyguide.

It can be anticipated that the introduction of formal Safety Management System within Skyguide and the associated processes of personnel licensing, and approval of systems (hardware and software) and procedures will lead to a continuous and substantial process of interaction between FOCA and Skyguide. It crucial that FOCA is prepared to sustain a stable and knowledgeable workforce in this area to perform this essential role.

The impact of moving towards safety cases and performance based regulation should not be underestimated neither with the regulator nor with the regulated.

6.2.2.5.2 Regulating the airlines & aircrew

**Oversight**

The operational and technical approval and supervision over the airlines is performed by the Process Air Transport Companies within the FOCA. FOCA discriminates 14 specific operator audited areas, roughly in accordance with the JAR-OPS Guidance Material:

- dangerous goods
- dispatch
- equipment
- flight operations
- ground operations
- maintenance
- navigation
- operation manual
- organisation
- quality system
- records
- security
- training & checking cabin
- training & checking cockpit

Information has been obtained from FOCA concerning the inspections and audits performed over the last 3 years (1999-2002) at 24 airlines in Switzerland that hold a so-called Air Operator
Certificate (AOC). In this period, an average of around 20 inspections in the area of maintenance has been performed annually. Other areas were practically never inspected, with the exception that in the last two years (2001-2002) increased audit activity can be observed in the areas of the AOC organisation and quality systems. In this timeframe in around 60% of the AOC holders have been subject to an audit of their organisation and quality system. Furthermore in the year 2002 a few isolated audits have been performed in the area of flight and training & checking of cockpit crew. Also, in the area of cabin crew training 18 inspections have been performed in 2002, focusing on Belair (6), SWISS (4) and Farnair (3).

Overall, these numbers reveal an extremely light inspection regime.

In contrast, the SAFA programme of FOCA, which concerns ramp checks of foreign aircraft, logged 161 rampchecks in 2001, and 156 rampchecks in 2002 with just two inspectors.

The ICAO audit of November 2000 found that the relevant sections of FOCA were understaffed and unable to complete their audit and surveillance plan in the timeframe required by JAR-OPS and JAR-145. The ICAO audit also found that FOCA had not established an audit schedule for Swiss commercial air transport operators. For 2002 however, no audit schedule was present. As the above data indicates a structural lack of an audit programme in all areas other than maintenance, organisation and quality systems, it must be concluded that the airlines essentially still operate without effective oversight by the authority. This observation underlines that the increases in staffing levels over the last years have not yet resolved the difficulties that were identified in the ICAO Safety Oversight audit of November 2000.

The lack of oversight of the FOCA over the air operators in mentioned areas has been acknowledged by FOCA. Main reason for the lack of audits and inspections was indicated to be that operations inspectors have been over-loaded by a wide variety of tasks required for certification, approval and surveillance of licensed personnel and operator organisations. Each AOC holder had an assigned inspector that acted as focal point for the operator. An important task of the inspector was to assist the operator in achieving and maintaining its operational status by providing advice and assistance in solving certification issues. Actual inspection activities were limited to introduction of new operations or aircraft types, or to first checks of captains.

This is a clear example of a consequence of the decision to consider the aviation industry as clients and the own activity as the provision of regulatory services. The fact that FOCA is tasked with the promotion of safety as well as the promotion of aviation, with both priorities not clearly allocated to separate parts of the organisation, has led to severe deficiencies in safety oversight.
FOCA is not alone in dealing with the problem of inspectors being overloaded with non-surveillance tasks. The audit of CASA Australia revealed that large proportion of the time of surveillance personnel is spent on lower priority regulatory services to the detriment of surveillance duties. A proportion as low as 15 to 17% was mentioned in 1999. At the time of the follow-up audit in 2001/2002, this proportion had been improved to about 40% without an increase in staffing levels.

The tension between regulatory service provision and safety oversight also played a major role in the Air Ontario – Dryden accident. In the inquiry after the accident, the Director General of Aviation Regulation of Transport Canada said: “….So what you tend to do is you will take your resources from the audit, the surveillance and those activities and you put them into the certification activities. You know, as the Client is screaming at the door and saying, I want you to certify my carrier, that you will add the necessary resources – basically take them from the [oversight] side and put them into the (level of) service side to certify that carrier. It is a short term solution to serve the industry but on a sustained basis, it becomes a problem because you are then taking your resources and you are reprofiling them into these service areas at the cost of the surveillance of the industry.”

Judge Moshansky, who led the inquiry, observed that this statement succinctly describes the regulators’ dilemma. The legislation prescribes that certain standards of certification and licensing must be observed by the air carriers. These regulations include applications for and issue of operating certificates, operational manuals, maintenance procedures, pilot licenses, proficiency checks, license renewals, etc. Having legislated such requirements, it follows that the Aviation Authorities are bound to provide the inspection and administrative services required by those regulations. Such services must be delivered as a matter of priority. Other inspection functions of surveillance and monitoring of the performance of the industry through audits, ramp inspections, and in-flight inspections, although high in safety assurance value, fall into the category of discretionary tasks. This is the dilemma that the regulator must confront in the allocation of priorities to workloads.

It must be noted however, that the situation in Canada in terms of lack of resources, or at least the increase in workload was very grave indeed and does seem to be incomparable to the situation in Switzerland. The Chief of air carrier operations of Transport Canada, stated in a memo to the Director of flight standards that the office had at its disposal 19 qualified Air Carrier Inspectors where a confirmed need for 41 existed. Inspectors were regularly doing 30 day continuous stretches without a single day off. 30-40 new carriers applied for certification every year. “….As a consequence, we have virtually ceased all monitoring and surveillance of
the industry to concentrate exclusively on initial type ratings, captain upgrades, CCP monitors, and certification of new carriers.” He went on to state: ”As one can see, Air Carrier Inspection is no longer capable of meeting even the minimum requirements necessary to ensure safety. In fact it is no longer able to assure the Minister of the safety of large air carrier commercial services in Canada. … The situation is to the point where every inspector and an increasing number of pilots are convinced that a major accident is inevitable in this country.”

The Memo of Chief of air carrier operations of Transport Canada was sent to the Director of flight standards seven weeks before the Dryden crash.

While the staffing difficulties in FOCA are not of the same level as those in Transport Canada at the time, this example shows that when regulatory service provision and safety oversight compete for scarce resources, oversight is likely to loose out.

With the introduction of JAR-OPS 1 within Swiss aviation legislation - by ordinance VJAR-OPS 1 (748.127.8), per November 1, 1997 – the workload of the operations inspectors increased further due to the large effort involved in certification of the operators according to the new requirements. As a consequence, after the introduction of JAR-OPS 1, surveillance activities in the areas of flight operations and training virtually ceased to exist.

Our findings at the airlines confirm that effective oversight, other than in an administrative manner, is practically non-existent.

In November 2000 the FOCA has been audited in the context of the ICAO Universal Safety Oversight Audit Programme. Results of this audit confirm the findings above. The audit summary report clearly indicates an acute shortage of qualified operations inspectors, and a crucial shortage of technical expertise to conduct the core functions of certification of operators. The report establishes that surveillance activities are very limited, and that FOCA mainly relies on operators and other entities to ensure safety oversight. In addition, FOCA has not established an audit schedule of Swiss air operators.

The audits
Apart from the data on the number of inspections and the areas of inspection, it is also of interest to look at the actual audits and inspections as reported. As it was not possible within the scope of this study to perform a thorough review of all audit reports, a small set (12 reports of AOC audits) was provided by FOCA.
It was confirmed by FOCA, however, that the inspections necessary to establish whether operators met all requirements to be awarded an AOC license have essentially been limited to administrative assessments. No on-site inspections or audits were conducted to determine whether the JAR-OPS provisions described in the company operating manual and other documents were actually present and functioning as described. Although no audits are formally required according to the JAA guidance material (contrary to the JAR-145 licensing procedures for maintenance organisations), it would be wholly appropriate to award AOC licenses also based on findings of inspections or audits at the airline facilities. It must thus be concluded that airlines were awarded their AOC licenses based on documentation submitted to FOCA by the operator, without an assessment of whether the organisation, operation, facilities, procedures and record did actually exist and function as described. Here too, the Seaview accident report illustrates how this approach to AOC approvals eventually may be implicated in an accident: "The certification of public transport operators was almost entirely based on the approval/acceptance of various manuals. In this case the operator was not required to demonstrate to the Civil Aviation Authority that the organisation and its employees would/could operate according to the standards laid down in the manuals."

It must be understood, however, that the recent series of AOC licensing actions at the introduction of JAR-OPS did not involve new operators, but operators that were already in business. In such cases the re-certification for JAR-OPS is likely to be perceived as an administrative matter rather than a true assessment of the operators ability to meet all JAA requirements. On the other hand, as the switch to JAR-Ops has also been heralded as an important step forward, filling in voids in the existing regulations, for example with regard to the safety organisations of airlines, it should have been conducted thoroughly. In particular in an organisation like FOCA, where a shift is to be made from a somewhat relaxed oversight philosophy to a more comprehensive oversight programme, the occasion of the necessary JAR-OPS certification could also have been approached as an opportunity to re-calibrate the relation with the operators in this regard. While it is understood that the already strained resources at the time did not allow additional scrutiny, lack of resources is not always a sufficient justification.

In a regular flight operations audit of an AOC that had already been certified, one of the findings was that the companies incident reporting programme was not described in its Operations Manual, which forms the basis of the AOC certificate. Hence the corrective action was that the OM had to be revised to reflect the incident reporting programme. However, as having such a programme is an important JAR-OPS requirement, it is unclear how the AOC license could have been awarded without this paragraph in the manual.
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It is re-assuring to see that in one of the audits, specific attention has been given to the crew pairing policy. The inclusion in the Operations Manual of procedures to avoid pairing of less-experienced crewmembers was made a corrective action. The need to ensure that an appropriate crew paring policy is in place was one of the main recommendations of the Nassenwill accident investigation report by AAIB. This audit item thus reflects how FOCA adapts its oversight activities based on AAIB recommendations.

In an audit report the airlines procedures for hiring new pilots are described. The report states that the procedure involves an assessment by external experts of Swiss international Airlines. It is interesting to note that a similar external assessment procedure was used in the former Crossair, but in a number of cases, new pilots were hired even though they had received a negative assessment by the Swiss team. Since this anomaly was well known, one could expect that the auditors would in this have ascertained that no pilots are hired that did receive a negative assessment.

Also, the report of an audit of an AOC holder did not refer to the findings and corrective action of the previous audit. A number of shortcomings in the operations manual were identified. As this was not an audit for the fist approval of this AOC, it is unlikely that these shortcomings were not in the manual during the previous audit, although they may have been missed by that audit. If audits do not involve a check of the implementation of previous corrective actions, it is possible that the audit findings do not consistently result in improvements. This finding is particularly relevant in view of the SR-111 report that states: "The similar nature of various FOCA audit finding indicates that they concentrated on ensuring that the QA programme had the required elements. The findings tended to identify symptoms, rather than the underlying factors manifested in recurring findings. ... The FOCA accepted SR Technics' corrective actions, but made similar findings on subsequent audits."

Equally illustrative are two conclusions from the Seaview accident report:"There was inadequate follow-up of deficiencies which were identified in Seaview Air's operations prior to the issue of their AOC. ... Deficiencies were treated in isolation from those which had previously been identified."

Finally, in the conclusions of an audit report, it is stated that the findings will be closed after the receipt of a formal statement that the corrective actions have been fully implemented. Such an administrative closure would not seem desireable. Unless the corrective action was an administrative one, for example to amend a manual, it is necessary to close the findings after a next audit has shown that the corrective actions have been implemented and are actually “working” in the airline.
A new regime
The FOCA has clearly recognised that a fundamental change of the surveillance concept is required to restore trust in the quality and safety of the Swiss air transportation system. Based on several interviews at various levels within the FOCA - from the Directors, Process Leaders, to the actual inspectors - a clear and consistent understanding has been noticed that the myth of a perfect air transport system in Switzerland does no longer exist, and that FOCA must adapt to the changed situation.

For the first time in many years FOCA has received from DETEC additional budget for increased surveillance. This additional budget (1.9 Million CHF) has now been assured for a 3 year period. This budget has been provided to enhance surveillance activities, with focus on SWISS international airlines operations. This allocation of additional resources is wholly appropriate in view of the additional risks that may be present in the current Swiss operation. However, the records for 2002 do not show a significant increase of the surveillance activities at Swiss. Also, judging from the activities of the additional FOCA personnel dispatched to Swiss as described in the interviews, their presence seems to also have a facilitating character. The new airline will encounter a range of regulatory hitches, the solution of which will benefit from the presence of on-site FOCA personnel. While not discounting the benefits for safety oversight of the extra FOCA inspectors for Swiss, and in respect of the legitimate need to also assist the national carrier in its most difficult time, it is also fair to state that the additional resources have been provided to FOCA in order to take care of additional threats. Therefore, the extra personnel as granted in view of the developments around Swiss, are not likely to strengthen safety oversight in the rest of the Swiss aviation sector.

In order to ensure that inspectors for surveillance are not tasked with so many other tasks that surveillance ultimately ceases, a reorganisation within the Process Air Transport Companies of FOCA has taken place recently, clearly separating the inspection and audit activities from certification activities.

A surveillance team has been set-up, consisting of five inspectors, each directly responsible for a number of AOC holders. In addition there are two SAFA/SASA (Safety Audit of Foreign/Swiss Airlines) inspectors, and a number of additional inspectors for airworthiness, cabin crew, security and dangerous goods. A new surveillance concept has been established, defining main focus and targets for the coming year. Because the new audit and inspection regime has become effective as of beginning 2003, it cannot be established as yet how effective the increased surveillance will be in practice.
There seems to be no specific analysis that has led to the current audit plan. In view of the fact that resources will always be limited, some kind of risk assessment should be used to determine which (types of) organisation would be subject to which types and frequency of inspections. This is true for large and small regulators alike.

Also, as the FOCA inspection plan is the same for all certificate holders, previous compliance history seems to play no role in the planning process. This is unfortunate because it is well known that previous compliance history is a good predictor of future compliance behaviour.

Audit and inspection results are not collected in a central database. Also, no analysis of audit data across the full audit programme is conducted. This means that FOCA has no means, other than by the gut feeling of the inspectors, to detect trends and developments in compliance. This has several consequences. One important consequence is that unless inspectors take the trouble of consistently reading the reports of their fellow inspectors, which is unlikely in view of the existing workload, the build-up of awareness of developments in the industry is limited to the audits performed by the individual inspector. Of course the inspectors will discuss their experiences at formal meetings and informally in the office. But as the intention is to have the inspectors spend much more time with the operators this interface will become less effective. The availability of surveillance results analysis could alleviate this.

**Oversight at arm’s length**

Throughout FOCA, a strong attitude towards oversight at arm’s length was met. Such oversight is in line with today's thinking in the aviation sector. Many authorities adopt these concepts also because deregulation, and the resulting abundance of new and very different entrants in the air transport market, have strained their resources beyond capacity. A word of caution is appropriate for the Swiss situation, however. The support met throughout FOCA for stronger reliance on the own responsibility of the operators would in some parts of FOCA seem to constitute primarily the seizure of an opportunity to justify the continuation of the existing weak oversight practices rather than a victory of philosophy. Although the new oversight philosophies as they have been formulated in the beginning of 2003 certainly constitute a significant step forward towards a modern and appropriate attitude in oversight, the real difference must be made in day to day practice by the inspectors of FOCA and, in particular, by the management of FOCA. Therefore, the introduction of the new philosophy should be accompanied by measures to strengthen the appropriate safety culture within FOCA. In addition, in developing and introducing the new oversight philosophy, the industry must be involved from the very beginning, not at the end. This is not likely to happen autonomously in the current attitude of FOCA towards the relationship with industry and hence must be made an explicit objective. The
introduction by FOCA of the new oversight philosophy for Skyguide is in this regard not a good example.

The state of affairs in Switzerland thus demands that FOCA is not too ambitious, at least in the coming years, with regard to reliance on the industries own responsibility for safety oversight. FOCA should also take note of contra-indications.

Lord Cullen, in the 1990 inquiry report of the Piper Alpha off-shore disaster, that led to the further development of modern self-regulation practices, wrote that also in self regulated industries, it is a legitimate expectation of the public that operators should be required to demonstrate the safety of their operations (not to be confused with their safety management processes) to a regulatory body.

Deregulation has led, as intended, to greater competition, and to many new and quite differently organised entrants in the marketplace. This led to the need to change the oversight to their current 'at arms-length' regimes. Deregulation did however also have other effects directly related to safety. The ICON study concluded that the globalisation and increased competition have important consequences, particularly of the flight deck (see box 2). The Plane safe report of the Australian CASA inquiry states: "to the extent that greater competition provides an incentive not to comply fully with safety requirements, there may be a case for strengthening enforcement procedures". The Fourteenth Report of the UK House of Commons states: "Given the growth in civil aviation over the past ten years, an organisation of finite resources such as the Safety Regulation Group must alter the way in which it operates to respond to increasing demands on its services. Thus the development of a more 'hands-off' approach may be seen as inevitable: we do not regard it as necessarily desirable. For that reason, we recommend that the record of the Safety Regulation Group be closely overseen by the government."

We have not investigated the state of safety of the Swiss operators, but we have been provided with credible indications\(^\text{12}\) that at least in the recent past, safety deficiencies in some operators had a greater incidence than is to be expected in regular operations. In view of these indications, it is reasonable to expect that FOCA inspectors were aware of these deficiencies of the recent past. FOCA inspectors indicated however, that it would have been difficult to strengthen oversight for particular operators because these operators regularly pointed out to FOCA that closer oversight was incompatible with deregulation. Deregulation, in the eyes of these operators, meant that FOCA should take a greater distance. Increased scrutiny would have led to action of these operators on the political front based on the notion that the "new" operators received undue scrutiny, stifling their ability to compete with the established operators. In the

\(^{12}\) This evidence does not involve EasyJet.
interviews, FOCA personnel referred to such outside pressures to the effect that, while stricter surveillance of new operators was required, more rigorous surveillance of these operators would have led to the reproach that Swissair’s operations were favoured and privileged by the authorities, thus contradicting the objectives of deregulation. FOCA personnel stated that they felt they could have lost their jobs if they would have pushed ahead with a stronger oversight regime for some airlines.

Regardless of whether or not the mentioned deficiencies were actually there, the position of FOCA is telling, as oversight was indeed not intensified. Apparently, deregulation is projected upon all aspects of regulation whereas deregulation obviously only concerns the regulation of competition. This shows how the fact that all FOCA personnel are tasked with both safety regulation and the promotion of aviation leads to inappropriate priorities. A common philosophy for regulation is not appropriate. Separate philosophies must be developed for safety regulation and other regulatory tasks. It is difficult to the extent of being impossible for the same FOCA employee to switch philosophies on a daily basis in the conduct of his or her regulatory duties.

**Enforcement**

The management of FOCA indicated that FOCA is not interested in giving fines as a means of enforcement because fines do not remove causes.

In enforcement, FOCA seems to rely heavily on its legal privileges, when confronted with unsatisfactory conduct in the industry. FOCA tends to take action only when a breach of regulation has occurred, and states that it sometimes have no choice but to take action because that is required by the regulations. This approach in enforcement seems to constitute an “all or nothing” philosophy that does not lend itself to measured responses to unsatisfactory conduct. Informal Enforcement options such as counselling/warning, remedial training, and requiring a person to undergo an examination should be considered. Such Informal Enforcement Action should by no means be considered as feeble and non-effective, also because informal enforcement action if not effective is obviously the prelude to formal enforcement action that could involve more serious consequences such as variation of cancellation of licenses.

Data received from FOCA shows that, in accordance with the philosophy expressed by FOCA management, enforcement action is virtually non-existent. This may either indicate that the Swiss aviation sector shows an unusually high level of compliance or that the enforcement regime of FOCA is very light.

This is not to suggest that FOCA should hand out an 'annual quota' of enforcement actions. On the other hand, particularly in view of the historical perspective of FOCA and the Swiss aviation
sector, it is interesting to take note of one of the findings of the plane Safe inquiry: “Although the Civil Aviation Regulations allowed for the application of administrative fines, the management of the Civil Aviation Authority did not implement any procedures or issue instructions to staff that would have allowed the fines to be imposed. It is possible that had such a system been in place, those straightforward breaches of regulations that prompted much of the surveillance of the company may have been more efficiently dealt with, and the system provided with a more adequate indication of the organisational health of the company prior to the issue of the low capacity regular public transport air operators certificate.”

Depending on intentions with regard to the enforcement policy FOCA may wish to ensure that the evidence collected during surveillance is of a quality that is admissible in court.

6.2.2.5.3 Regulating the airports

The requirements for ensuring safety at airports, and the provision of the associated airport infrastructure, are based on the Swiss Ordinance of Aviation Infrastructure (specifically articles 1 and 3 of the VIL; SR748.131.1) and on Annex 14 of ICAO.

Within FOCA the supervision over the airports is tasked to the Process Aviation Facilities. This process employs 20 persons. Within this process the main effort is directed to Airport Authorisations (i.e. approvals of plans, concessions, exploitation, etc.).

As far as supervision over the airports is concerned, it has been established that in the areas of fire brigades and rescue services, airport security, and fuel installations regular inspection are carried out, according to a defined schedule.

In the area of fire brigades and rescue services it has been shown that in practice each civil airport is visited at least once a year for surveying emergency exercises, alarm tests, inspection or training.

In the area of security checks, increased inspection activity can be observed during last year. In 2002 six security checks were performed, as compared to four in 2001, and two in 2000.

Also obstacle inspection activity has been substantially increased in 2002. Five inspections were performed, as compared to one in 2000, and none in 2001.

The inspection programme for fuel installations shows a regular schedule that is followed during the last ten years more or less on a routine base.

The inspection activities in the aforementioned areas are considered a reasonable effort, taking note of the increased effort in the field of security checks.

In other areas of the airport operations FOCA has no clear surveillance concept or supervision plan. Audit and inspections in these areas are performed irregularly and on an ad-hoc basis.
Feedback from the two largest airports in Switzerland (Zürich and Geneva) confirm that there is no structured programme for audits or inspections of the airport operations.

In general, FOCA appears to rely on and trust the internal safety management systems and procedures of the airport organisations themselves, in order to assure airport safety. Our investigation shows however that the airports do not have an established safety management system, and as a logical consequence no such management systems have been approved by FOCA.

The process of certification of airports, according to the requirements of ICAO Annex 14, as well as process of formal approval of the associated airport safety management system has still to be initiated (planned for March 2003).

So, the confidence of FOCA in current safety management processes at the airports so far is mainly based on informal interactions between FOCA and the airports.

In the recent past also Swissair played an important role in ensuring safety at the airports. Especially at Zürich airport Swissair practically dominated all activities at the airport. This implied that the safety philosophy of Swissair was extended to the airport operations. This created an image towards FOCA that strict surveillance of airport operations was unnecessary. Here a clear parallel can be drawn with the surveillance approach of FOCA concerning the air operations of Swissair.

After the breakdown of Swissair this situation significantly changed. As part of the reorganisation of FOCA and the intended strengthening of FOCA's regulatory role new initiatives are taken to increase surveillance activities in relation to airport operations.

This is reflected in the specification of the surveillance programme for 2003. For four airports (including Zürich airport) specific safety inspections have been planned. However a clear concept for surveillance of the ground- and airside- infrastructure has still not been defined. This surveillance concept should be developed with more priority, especially in light of the fact several persons involved in this process will retire in the coming two years.

6.2.2.5.4 Education

In states with mature safety management systems, particularly in the larger states such as the UK and Canada, regulators may play a role in providing guidance documents or even courses to facilitate the implementation of state-of-the-art safety management systems. Smaller operators in particular, that have limited resources to develop an SMS, may benefit from such an educational role of the regulator. This role is an appropriate task for regulators as it helps the aviation community to comply with the rules.

In view of the fact that FOCA itself is still in the initial phases of building an SMS, it is not in the current interest of FOCA to be tasked with an educational role. In a few years from now,
FOCA may want to consider some educational activity or FOCA may work with other states or JAA or private companies, to establish education possibilities.

6.2.2.5.5 Information
Civil Aviation Authorities are in a unique position to provide information that is only accessible to them or that will carry an appropriate level of objectivity. To inform is a powerful way of making an impact that regulatory authorities often shy away from. These authorities often feel that by making certain information public, they damage their working relationship with the organisations that the information is about. Although ensuring that good working relationships remain is of course important, it should not result in the authorities loosing one of their means to promote regulatory compliancy and safety consciousness. Keeping safety relevant factual data away from the public and policymakers, places a needless liability upon the regulator. By providing information, of course with appropriate explanatory material is a means of making an impact that should be developed more by FOCA. The information provided on the FOCA website today, while being an excellent site, is not very rich on safety relevant matters. The intent of FOCA would of course not be to 'blame and shame' the industry, but to influence policymakers and the industry partners alike. As FOCA should reconsider its position relative to the industry in view of the findings in paragraph 6.2.1, the issue of information as a means to strengthen accountabilities and influence behaviour should not be left unattended.

6.2.3 Evaluation of Safety Management at FOCA

Organisation
The organisational structure is clear and seems to be working well. It is particularly catered to the needs of the aviation industry, which is regarded as the Client. The choice for a relationship between FOCA and the industry of the provider of regulatory services and the client for those services have important implications for the conduct of FOCA as a safety regulator. It is certainly necessary for FOCA to be effective and efficient in its dealings with the industry, and the importance for the competitiveness of the industry of a well functioning regulator must not be under estimated. However, the appropriateness of this stance of FOCA as a safety regulator, also in view of the historical perspective of FOCA's relation with the industry, must be carefully reviewed.

The tasks of FOCA related to safety regulation and the tasks related to policy advice and the promotion of aviation are not located in separated parts of the organisation but rather they are fully integrated throughout the organisation. It can be shown however, that the resulting lack of primacy of safety and the lack of clear accountability for safety ultimately leads to poor
oversight of the industry. Also it is clear that for a relatively small authority (FOCA) and department (DETEC) it is not practically feasible to split the safety regulation tasks and the other tasks into different and fully separated organisations.

**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.

**Safety policy**

The safety policy of FOCA could be summarized as "Safety First". While it is wholly appropriate for a regulator to give safety priority over other considerations, the policy does not at all meet the criteria to make it the core of a well developed safety management system.

**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.

**Safety Monitoring**

Monitoring of safety performance indicators is, for all practical purposes, not conducted by FOCA. As a consequence, FOCA management has insufficient awareness of relevant trends, emerging problems, and the compliance levels they achieve in the industry. This prevents the maintenance of a sharp and up-to-date awareness of the safety of the industry. It also makes it difficult to identify threats, to match FOCA's performance against its goals, and to inform the public. As there is a need to monitor the FOCA safety output (e.g. audit findings) as well as the safety outcome (accidents & incidents), action is required on both needs.

It is important to ensure that an initiative to collect audit and inspection data in a database, is accompanied by an equally important initiative to set-up an analysis capability and means to ensure that analysis results are incorporated in FOCA’s business processes. To commence a data collection programme without at the same time having the analysis capability would constitute a potential liability to FOCA.
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Threat identification & Risk assessment
It is apparent from the interviews and the documents received, that FOCA does not have and maintain a risk portfolio. There is no common awareness and agreement in FOCA on which threats to safety warrant 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 6-3: Development of a safety performance data monitoring process.
It is recommended to 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 safety threat identification
It is recommended that FOCA develop a formal process to identify safety threats, to develop a risk assessment process, and to build and maintain a risk portfolio.

Oversight of Skyguide
Over the last decade, oversight by FOCA over the Air Navigation Service provider (now Skyguide) has been virtually non-existent. This is still the case today. Licensing of air traffic controllers by FOCA is only an administrative procedure. FOCA has well understood the need to improve and has developed a new oversight philosophy. While the philosophy is well developed and meets the requirements for modern and effective oversight, it has not resulted in significant oversight yet. Skyguide is working towards an ESARR compliant safety management system, and this is indeed an excellent priority that will also facilitate FOCA’s ability to conduct oversight. It is however unacceptable that Skyguide is in the mean time left to its own resources.
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Safety Cases
A matter of specific attention concerns FOCA’s role in the approval of safety cases. It is all too easy for the operators to now consider their responsibility for safety critical decisions as delegated to the authority because FOCA must approve the safety case. As is emphasized in ref. 168 (Reason), the safety case approach is not a licensing or approval process that could be seen as transferring some of the responsibility for safety to the Authority. The responsibility lies squarely with the operator. But from the perspective of the regulator, the move towards safety cases and performance based regulation, not only places a clearer accountability on the operator for an appropriate rationale underlying their safety critical decisions, it also introduces new liabilities for the regulator. In the past the regulator enjoyed the availability of an agreed standard in identifying violations against the regulation. But now they are faced with a need to identify violations against a safety case that serves as a reference for which they must take some direct responsibility since they approved it. Spotting, monitoring and sanctioning violations were difficult enough in the past, but now the responsibility placed upon the regulator becomes very great indeed. Not only do they have to police compliance with a variety of Safety Cases, they also need a very clear idea of what constitutes an adequate Safety Case, and this is by no means an easy task. In order to judge the adequacy of a safety case in something other than a cursory checklist fashion, regulators are now required to have a very detailed appreciation of all the many factors contributing to both individual and organisational accidents. The situation of the regulatory authority could now become even more difficult should one of its overseen organisations suffer a major accident. The subsequent investigation could turn up one of two things: either the organisation's performance was in compliance with its Safety Case, or the accident was due in part to violations of the safety case. The former could be judged as stemming from shortcomings in the regulator’s evaluation process- the Safety Case should not have been approved in the first place- while the latter is likely to be viewed a failure of regulatory surveillance. [After Reason] FOCA could thus face a loose-loose scenario. Therefore, FOCA must strengthen their oversight function to prepare for these new responsibilities and liabilities. The objective would not be to prevent difficulties as projected above, as these can not be completely avoided, but to be able to demonstrate that a capability for facilitation and oversight of safety cases has been put in place that is sound and reasonable.

**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 task ahead for FOCA, and the associated liabilities, the resources available to the process that is responsible for the oversight of Skyguide must be considered insufficient. FOCA believes the available resources are tight but adequate.

**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.

**Airline Oversight**

The process of FOCA tasked with the approval and oversight of the airlines has 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 has strained the resources beyond their capacity. This has had consequences for the process of AOC approvals and for airline oversight by means of audits and inspections. It became evident that part of the staffing problems have resulted from the fact that inspectors spent a large percentage of their time helping the airlines prepare for the AOC approval. While this is in accordance with the corporate image of FOCA as a regulatory service provider, the remaining resources for surveillance were so few that oversight of the airlines through audits and inspection has ceased 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 appears that the surveillance philosophy of the FOCA has 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 has 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.

No clear signs have been found that FOCA has actively attempted to solve this dilemma.

In hindsight it can be concluded that the Swiss air transportation system has undergone significant changes over the last 10 to 15 years, without adapting the surveillance concept of the authority. On the contrary, the surveillance concept was even further eroded in last five years.
Clearly this has undermined one of the barriers against failures or negative safety developments in the system.

In how far this development has contributed directly to the series of accidents that have occurred with Swiss registered aircraft and/or within Swiss airspace remains to be seen. But that inadequate surveillance has the potential to contribute to major accidents can also be judged from the NTSB report on the ValuJet accident of 1996 which states in the Probable Cause section: "Contributing to the accident was the failure of the FAA to adequately monitor ValuJet's heavy maintenance programmes and responsibilities".

FOCA became aware of the deficiencies in the oversight programme. A new oversight regime has been developed in early 2003. A new audit programme has been established as well. These are good indicators that the new regime has the potential to become a powerful instrument for safety regulation. The actual success can of course only be established in the long run.

However, regardless of the intentions with regard to shifting resources within FOCA, available resources will also be limited. It is therefore very important that the annual audit plan is realistic in view of the available resources. If the plan, in terms of the types of inspections and the number of inspections per organisation, is set up such as to satisfy JAA and ICAO requirements or indeed management or public expectation, but without regard to what can reasonably be achieved with the resources available, it will fail to serve as a means to achieve the maximum possible impact of the surveillance activity. An unrealistic plan will fail to enlist the commitment of employees to achieve it in full, and thus tend to become irrelevant in governing the surveillance activity. As the surveillance activity in the previous years has been almost non-existent, it seems unlikely that very a comprehensive plan can now suddenly be achieved, even though some additional resources have become available. As a performance review over 2003 is thus likely to show that the plan was not conducted as planned, this does reflect unfavourably on FOCA and will thus not contribute to the motivation of the surveillance staff.
Also the success of the new regime will ultimately depend on the extent to which the follow-up on deficiencies is sufficiently persistent. The ability to do so depends completely on FOCA management. As FOCA management is still closely involved in the role of FOCA as a promoter of aviation (in accordance with DETEC directives), the success of the new surveillance regime will 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.
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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 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 7 is about Policy Impact at the Air Navigation Service Provider 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).

In this Chapter the internal safety management within Skyguide is evaluated using the model described in Paragraph 3.2.3 and guidance from several sources, related to developing and evaluating safety management within Air Navigation Service providers; see for instance various references on safety management by EUROCONTROL (ESARR 3 in particular), ICAO, Transport Canada and Civil Aviation Safety Authority Australia(ref. 79, 81, 84, 130, 133, 239, 241). Input for the evaluation are interviews held with several key persons in safety management within Skyguide, as well as with heads of the FOCA department regulating Skyguide, IFATCA (the International Federation of Air Traffic Control Associations) and SATTA (Swiss Air Traffic Control Technical Association). In addition, documents and information provided by the interviewees, as well as obtained from other available sources, have been used to support the evaluation.

The evaluation of safety management within Skyguide does not have the character of a formal audit, in the sense of a compliance check of safety management procedures against formal requirements. The main objective is to assess whether safety management processes within Skyguide are functioning adequately.

7.2 The safety organisation at Skyguide
The organisation of Skyguide, with emphasis on the safety activities is shown in figure 7-1 below.
Safety actions

Safety actions that are arising from the TriNET auditing process appear to be well organized and effective. The process of identification and execution of safety actions that arise from internal incident reporting and incident investigation appears to be less effective. The process is mainly hampered by some reluctance to report and insufficient personnel for incident investigation.

Moreover, the identification of safety actions as result of the risk management process is still in an initial stage. Currently, definition of safety actions to mitigate risks of the introduction of new systems or procedures is still primarily the responsibility of operational departments, due to which it has a less structured character. This does lead to inconsistencies between processes and procedures between various departments, particularly between the Zurich and Geneva control centers.

Positive changes have also been noted such as the introduction of TOKAI, the introduction of a company-wide safety bulletin, the introduction of Safety Improvement Reports and the more transparent safety accountability in the new organisation.

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.
This organisation diagram outlines the accountabilities of management, particularly in relation to safety. Safety management within Skyguide is organised within the Center of Competence, also indicated as Quality & Safety Management.

The functions and responsibilities of the Center of Competence directly relevant for safety management are listed below:

- The Head of Quality & Safety Management is directly accountable to the highest organisational level (the CEO) and globally responsible for quality and safety management;
- Safety Management is responsible for implementation of a safety management system at Skyguide according to the ESARR 3 (ref. 130) requirements of Eurocontrol and is also tasked with ESARR 2 (Safety Regulatory Requirement: Reporting and Assessment of Safety Occurrences in ATM, ref. 129) and ESARR 5 (Safety Regulatory Requirement for ATM Services’ Personnel, ref. 132). Currently Safety Management comprises two persons.
• Risk Management is tasked with implementation of ESARR 4 (Risk Assessment and Mitigation in ATM, ref, 131) in Skyguide. Currently, Risk Management comprises only a single person.
• Audit Management is responsible for the internal audit process and co-ordination of international audits in the context of the TriNet audit agreement with the Austrian and German air navigation service providers. Outside the department itself, there are 22 unit auditors; and
• About 6 Quality and safety officers are appointed in various Operations and Technics departments. They spend about 30% of their time in support of Quality and Safety Management.

It should be noted that the current organisation is fairly new. The present CEO has been in office as from March 2001. After his appointment the CEO has clearly noted that safety management within Skyguide was not properly organised at that time. Before his appointment there was no formal safety management function within Skyguide, and safety was dealt with as an implicit part of the operation. In itself such an organisation cannot be characterised as unsafe by definition, but it implies that safety levels are less explicitly monitored and controlled by management.

It is positive to note that the current CEO has quickly assessed this situation and has implemented proper organisational changes.

Concretely, the CEO has assigned the responsibility for the explicit management of safety to a Center of Competence (CoC). The CoC is functioning as of September 2001 as a separate entity, which reports directly to the CEO.

The CoC has a clear responsibility for safety and quality within Skyguide and as such the head of the CoC is the accountable manager for safety and quality within Skyguide.

The head of CoC is well qualified for this function. He has been working for Skyguide (and predecessor organisations) for 35 years, of which 20 years as an air traffic controller. He has over ten years of experience in quality assurance functions within Skyguide and has been the Swiss responsible for the TriNet auditing programme.

The CoC is still in a build-up phase. Some parts appear to be relatively mature, because they are based on well-established parts of the organisation, such as Audit Management and Quality Management. However, Safety Management and Risk Management within the CoC are clearly less developed.

Both functions are mainly aimed at implementing the governing Eurocontrol Safety Regulatory Requirements (ESARR).
No former experience exists within Skyguide concerning the implementation and conduct of safety management and risk management in accordance with ESARRs, and therefore this know-how has to be fully developed.

The managers assigned to implement these functions within Skyguide have solid engineering backgrounds in general. However, they appear to lack specific expertise in the field of aviation safety, air traffic management operations and safety regulatory issues. Moreover, these managers have been appointed fairly recently by Skyguide and therefore also lack the intimate knowledge of current processes and procedures that have to be embedded within the new safety management system of Skyguide.

In this light it is uncertain whether the appointed managers are fully capable to achieve the objectives they are charged with. This will largely depend on the level of support and buy-in from the operational departments that can be ascertained by these managers.

In general it is observed that safety management, in terms of position and accountability within the organisation, has been well arranged. However, it appears somewhat confusing that the accountability for safety management implementation is on the same organisational level as that for risk and audit management, while the latter can be seen as sub-processes of safety management. Further it is observed that extensive support to Safety Management and Risk Management, both from operational departments and their management, will be required in order to enable the CoC to provide a meaningful implementation of the ESARR requirements. It is questionable whether the assignment of part-time Quality & Safety Officers in this respect is sufficient.

Safety Related Groups

In addition to the aforementioned line and staff functions related to safety, the following groups/teams within Skyguide have been identified:

- Regional Investigation Teams (RIT);
- the OPS Safety Group (OSG); and
- the Safety Steering Group (SSG);

There are two *Regional Investigation Teams (RIT)*, one for the Zurich and one for the Geneva control centre. Each RIT consists of two persons (full-time), and their main task is to gather all factual information (radar & voice retrieval, as well as relevant reports) concerning safety relevant occurrences. The RITs are relaying the assembled information to the appropriate investigation authority, in all cases to the internal investigating bodies within Skyguide, and in case of serious incidents and accidents to the AAIB. Internal incident analysis can be done by
the RIT itself, or by others such as unit chiefs, training responsibles, OSG members, or a mix of
those, depending of the type of occurrence at hand.

The *OPS Safety Group (OSG)* has been recently established, in the context of the ESARR
programme implementation. It is a working group mandated by the Head of Operations, and
chaired by the operations manager in collaboration with the Safety Manager. It is formed by six
ATCos from the military, Zurich and Geneva ATC, which are entitled as safety officers for their
unit. Main duties concern the periodical analysis of occurrences in the operational domain,
evaluation of proposed improvements from Safety Improvement Reports, the production of unit
safety letters describing occurrences that happened in their unit and issuing, and in collaboration
with Safety Management, proposals for corrective or preventive measures for safety
improvement.

The *Safety Steering Group* has also been recently established, in the context of the ESARR
programme implementation. It consists of the heads of Operations, Technics, Quality & Safety
Management, the CEO and the Corporate Secretary (see the organigram of Skyguide in figure
7-1). Skyguide’s Safety Steering Group is responsible for the overall coordination of safety
activities within the company. The SSG meets approximately bi-monthly to review safety issues
and decide on the appropriate measures to be taken.

**Operational personnel**

Air traffic controllers are trained in-house by Skyguide. The first part of the training (basic
training) is conducted at Skyguide’s own training center (STC) in Zurich. This lasts one year
and is followed by unit training of two and a half years at the place of employment, i.e., mainly
Geneva and Zurich. Recruitment and training rates were maintained in 2001, 81 trainees were
selected from 500 applicants, and 43 trainees completed their on-the-job training. Not only
Swiss ab-initio trainees but also foreign controllers are trained. Graduates of the air traffic
control training curriculum of Skyguide are approved and licensed by the FOCA.

It appears that, in spite of all present training efforts, Skyguide currently is still suffering from a
shortage in qualified air traffic controllers. This shortage is still a result of economy measures
taken in the time frame 1998-1999. Under pressure of representatives of Swissair and Crossair
in the board of (then) Swisscontrol, highest priority was assigned to improve punctuality, reduce
delays and avoid increase of the ATC charges in support of the national airlines. In this process
training of new air traffic controllers did not receive sufficient priority to keep up with growing
demand. Skyguide is now trying to catch-up by using its training capacity to the full extent. The
bottleneck in the training throughput is not the basic training capacity, but the limited volume for on-the-job training.

Concerning the qualification of air traffic controllers, activities are on-going to bring the current licensing programme in agreement with the governing Eurocontrol requirements (ESARR 5, ref. 132), concerning the qualification of ATM services' personnel. In this context a team, consisting of Skyguide and FOCA representatives, has been composed (the Swiss ATCO Licensing Programme (SALIP) team) to prepare implementation of ESARR5 for Air Traffic Controllers.

**Technical personnel**

Concern has been expressed with respect to the level of expertise of air traffic service technicians/engineers. This personnel is tasked with developing requirements, and with introducing, maintaining and phasing out technical equipment related to ATM, such as navigation means (Instrument Landing Systems, VHF Omnidirectional radio Range beacons, etc.), surveillance means (primary, secondary and approach radar), communication means and meteorological information provisions (Runway Visual Range, temperature).

Many experienced technicians and engineers have left Skyguide due to early retirement in the recent past. New personnel still needs extensive training, since university training does not fully prepare for the speciality of air traffic service technicians. There appears to be insufficient experienced personnel available for on-the-job training. Technical career opportunities within Skyguide are perceived less promising, causing many young technicians/engineers to leave after a few years. This is a short period compared to the period of say two years needed to gain sufficient experience for working independently on the installations, or several more years for becoming a supervisor or real specialist. Young technicians/engineers also seem to feel specialising is not as good for their career as learning for instance project management skills.

As a result more and more technical expertise is lost. The ability to assess what industry delivers is being lost and dependence on industry increases. Moreover, it is noted that the licensing and certification situation is asymmetric with respect to air traffic service technical personnel and equipment: In contrast with pilots, aircraft mechanics and controllers, the air traffic service technical personnel is not licensed. Similarly, aircraft and avionics are certified, while ground equipment, such as a newly installed radar, is not.

It should be noted that in the context of ESARR5 requirements of Eurocontrol also technical personnel will be addressed. A working group between Skyguide and FOCA has been established to prepare the implementation of ESARR5 for technical personnel.
7.3 The safety management system of Skyguide

7.3.1 The safety policy

Below, Skyguide’s Safety Policy has been inserted:

Table 7-1 The Skyguide Safety Policy

<table>
<thead>
<tr>
<th>Purpose, Principles, Description, Implementation, Integration and Development</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Purpose</td>
</tr>
<tr>
<td>1.1 The objective of the ‘Skyguide’ Safety Management System is to reduce the company’s contribution to the risk of a serious or risk bearing incident or accident as low as is reasonably practicable.</td>
</tr>
<tr>
<td>1.2 High-risk areas will be avoided or mitigated through the introduction of appropriate measures.</td>
</tr>
<tr>
<td>1.3 Acceptable risk areas will be continuously monitored in order that they do not increase.</td>
</tr>
<tr>
<td>2. Principles</td>
</tr>
<tr>
<td>2.1 The safety of Air Navigation will be given the highest priority. An explicit, pro-active approach to Safety Management will ensure reasonable assurance of maintaining optimum levels of safety in the development, implementation and continued function of the ‘Skyguide’ operation.</td>
</tr>
<tr>
<td>2.2 All staff have an individual responsibility for their own actions whilst Managers are responsible for the Safety Performance of their own divisions.</td>
</tr>
<tr>
<td>2.3 All staff members performing activities with safety related implications will be adequately trained, motivated and competent to undertake the tasks required of them, and properly licensed where appropriate.</td>
</tr>
<tr>
<td>3. Description</td>
</tr>
<tr>
<td>3.1 Quantitative Safety Levels – meeting appropriate and agreed target levels of safety – will be derived for all systems.</td>
</tr>
<tr>
<td>3.2 New systems and changes to existing systems, operations and procedures (including Engineering systems) will be regularly assessed for their safety significance and safety criticality. The results of these safety assessments will be documented in an appropriate manner allied to the requirements of the established quality environment.</td>
</tr>
<tr>
<td>3.3 To provided Safety Assurance, Safety Audits will be performed routinely in order to confirm conformance with applicable parts of the Safety Management System and to provide assurance to Managers that continued operations and risks are identified, conform to appropriate safety levels and being adequately managed.</td>
</tr>
<tr>
<td>3.4 Reflecting best Safety Practice – these Safety Audits will enable appropriate measures to be taken for the attainment and maintenance of the agreed Target Safety Levels.</td>
</tr>
<tr>
<td>3.5 Air Navigation Service operational and technical occurrences which may be considered to have significant safety implications will be investigated in a timely and appropriate manner and any necessary corrective action taken. Findings from the investigative process will be used in the verification of previous Safety Assessments.</td>
</tr>
<tr>
<td>3.6 A Safety Culture will be promoted which will aim, amongst other objectives, at disclosing mistakes and motivating all staff members to endeavour to constantly improve safety through their own individual contributions. An integral part of this enhancement may be the adoption of a unique and non punitive company confidential reporting scheme.</td>
</tr>
</tbody>
</table>
3.7 An enhanced Safety Culture will ensure that lessons and experience gained from safety related investigative processes will be widely distributed and actioned to minimise the residual reoccurrence.

4. Implementation
4.1 The implementation of the 'Skyguide' Safety Management System will be in accordance with the principles established by the 'HELCO' Military and Civil Operations integration process, in addition to being compatible with the standards and requirements demanded by EUROCONTROL, the International Civil Aviation Organisation (ICAO) and the Federal Office of Civil Aviation (FOCA).

5. Integration and Development
5.1 The Safety Management System together with the QMS forms an integral part of the Skyguide Corporate Management System. The safety-policy and the quality-policy are governing documents for the implementation of a company-wide Corporate Management System.

Skyguide

F. Moor, DM

Federal Office for Civil Aviation

A. Castle-Mason, DMS

R. Aebersold

Safety Management/Safety Policy/V1.0

October, 23rd 2001

As shown, Skyguide's safety policy has been signed by the present Head of Quality and Safety Management, the former Safety Manager and FOCA (not by the CEO).

In this sense it is an agreement between Skyguide and FOCA. Approval by FOCA means that in principle this element of Skyguide's safety management system is considered compliant with regulations.

In general, the safety policy statement of Skyguide is assessed as a fairly complete and clear description of objectives and principles outlining the policy. Most essential elements constituting a solid safety policy are addressed.

Nevertheless some elements could be expressed better or in stronger statements.

For instance, the safety policy does not precisely define the intent of maintaining or improvement of current safety performance, rather assurance of maintaining optimum levels of safety. Also the use of different phrases, like "reducing .. risk .. to as low as reasonable practicable", "safety .. will be given highest priority", and "assurance of maintaining optimum levels of safety" may become meaningless, in the absence of further definition, as to what is precisely meant.
The safety policy does not contain a quantitative objective of the overall safety performance level, although it is indicated that quantitative target levels of safety will be derived. It should be noted, that Skyguide is also subjected to quantitative targets, specified by the owners of Skyguide to measure and monitor safety performance (Regulator Kennzahlen, ref. 207).

These targets are:
- No accidents (partially) caused by Skyguide; and
- The number of incidents (partially) cause by Skyguide should not increase with respect to the average over the previous five years, on the basis of AAIB reports.

For reasons of consistency and clarity it should be considered to refer to these targets within the safety policy of Skyguide, in order to reflect that the current safety policy is in agreement with the strategic objectives of the owner.

Furthermore, it has been stated that all staff has an individual responsibility for their own actions and managers are responsible for the safety performance of their own divisions. However, there is no statement about who is ultimately accountable for safety in the organisation. Also it would be worthwhile to add a statement to reflect that external suppliers must satisfy the organisation’s relevant safety management standards and safety requirements.

### 7.3.2 Safety monitoring

Skyguide uses several, mostly complementary, ways of reporting and analysis in order to monitor safety within the company. These are:
- Operational Internal Reports (OIR);
- Air Traffic Incident Reports (ATIR); and
- Safety Improvement Reports (SIR).

**Operational Internal Reports**

The Operational Internal Report (OIR) is requested to be used by all controllers to report all occurrences even if the estimated severity of the occurrence was that it had no safety significance. The OIR is used to get an overview of the most common risks in Skyguide’s airspace. The OIR form defines a clear list of reportable occurrences (a.o. inadequate separation, near CFIT, runway incursion, etc.) and leaves room for others.
The OIR form has recently been redesigned to make it easier to file. OIR forms are available at all operational units and can also be filed electronically via Intranet.

Although the reporting of safety significant occurrences is reasonably well defined, it is indicated in various interviews that some occurrences may not be reported.

A reason for this is that in the present legal context, controllers are not protected from judicial prosecution that may follow in response to reported occurrences. Within the Swiss legal framework there are no arrangements to allow confidential reporting of incidents with proper safeguards for the reporting party or person. This may lead to significant reluctance to file occurrence reports, because, in the end, this may contribute to a penal case against the reporting controller. Both in Zurich and in Geneva several such cases against controllers are apparently in process.

Also there are indications that reports of safety significant occurrences may be filtered at a higher level. Sometimes the severity of an incident is apparently downgraded to avoid having to report to AAIB, thus making the occurrence a Skyguide internal issue.

Clearly, the above mentioned aspects degrade the value of the reporting system within Skyguide.

**Air Traffic Incident Reports (ATIR)**

A particular type of occurrence is the so-called AIRPROX (aircraft proximity). AIRPROXes are classified according to collision risk:

- Risk A: high collision risk;
- Risk B: possible collision risk;
- Risk C: no collision risk; and
- Risk D: not possible to determine risk anymore.

By legal procedure, AIRPROXes are reported separately by means of ATIRs (Air Traffic Incident Reports) and sent to the AAIB for investigation.

AAIB provides the annual statistics on these AIRPROXes, see for instance "AAIB Statistik 2001", ref. 70.

These statistics, among others, are used by Skyguide to assess its safety performance in relation to the targets set in the "Regulator-Kennzahlen" (ref. 207).

In this context it should be noted that, according to AAIB statistics, in the last 3 years the number of AIRPROX reports has significantly increased. Whereas in the time-frame 1992-1999 the reported number of AIRPROXES varied between 1 and 2 per 100,000 IFR flights, in the time-frame 2000-2002 this rate increased to 3.5 to 4. Alarming is also the fact that the number
of AIRPOXES of category A has seen an even higher percentual increase (in the order of 400%). As will be discussed in paragraph 10.5, there are reasons to believe that this large increase in incidents is to some extent caused by a reporting bias. It is however unlikely that the total increase in incidents can be attributed to this effect.

A remark should be made here that the targets set in the "Regulator-Kennzahlen" , are defined as the number of occurrences with (partial) responsibility of Skyguide. However, AAIB statistics do not discriminate within their annual statistical report whether Skyguide involvement was present or not. Strictly spoken, the AAIB statistics can therefore not be used to monitor safety performance of Skyguide in conformance with the definition in the "Regulator-Kennzahlen".

Safety Improvement Report (SIR)
As part of the implementation of the ESARR-2 requirements, it is, as of 1 January 2003, possible for operational and technical people to file safety relevant problems or unsatisfactory states by a Safety Improvement Report (SIR). The SIR is only oriented to safety matters. SIR is not dedicated to occurrences. Upon request, a report will be treated as confidential. The SIR is implemented as a part of the safety management system, in order to create a vehicle for operational and technical personnel to express safety concerns and suggest safety improvements.

Safety management addresses the issued reports to the responsible managers, who are accountable for the changes needed.

Staff have been informed about SIRs and encouraged to submit these. In the first two months of 2003, 31 reports were received by safety management, one confidential. This is an encouraging response.

Tool Kit for ATM Investigation (TOKAI)
For the collection, storage and processing of incident and accident data Skyguide has been using a self-developed system, using EXCEL worksheets.

However, as of the beginning of 2003 a new tool has been introduced in order to support the process required of States, under "ESARR 2" (ref. 129) requirements, to report their annual safety data to Eurocontrol. This tool is the so-called “Tool Kit for ATM Investigation” (TOKAI). TOKAI has been developed by Eurocontrol. It has been designed to assist in carrying out the tasks related to the investigation of safety occurrences—from notification of occurrences, through investigation activities, to exchange and reporting.

TOKAI is more than a database management system for incident data. It contains embedded tools that permit: 1) Air traffic management staff to report occurrences, 2) local investigators to
develop remedial actions, 3) safety departments to investigate and develop statistics on groups of occurrences, 4) regulators to develop remedial policies.

In this sense implementation TOKAI is regarded as a positive development within Skyguide, and a valuable element of the safety management system that is in development.

**Annual Safety Report**

In the context of safety monitoring the corporate Safety Manager issues an annual safety report, describing the occurrence statistics and yearly trends, the status of safety management implementation and the statistics from TriNet and military evaluations.

The annual safety report is considered as a positive initiative, providing valuable and unambiguous information to Skyguide management and board of directors concerning yearly safety performance and safety trends.

### 7.3.3 Threat identification

**The audit process**

In general there are several ways in which an organisation can identify potential safety threats to its operations.

An important safety management principle in this respect is to have regular safety audits, reviews or surveys within the organisation and to ensure that agreed actions are implemented. For this reason ICAO recommends in "ICAO Doc 9426" (ref. 156) the conduct of regular ATS evaluations to ensure that the service provision is maintained at the highest standard, and that all units and personnel apply policies, standards, rules, procedures and separation minima in an approved manner.

To perform this audit process there is currently a tri-national agreement between the Air Navigation Service providers of Switzerland, Germany and Austria. This agreement concerns the establishment of a TriNational Evaluation Team (TriNET) that has become effective in 1998. Main objective of this agreement is to conduct mutual audits of the participating organisations (i.e. Austro Control, DFS Deutsche Flugsicherung and Skyguide). The tri-national character of the audit process helps to assure that audits are independent and objective, and to harmonize the application of procedures and regulations for the provision of air navigation services.

TriNET evaluations are planned annually, although it may be decided to perform ad-hoc evaluations as well.

The evaluations address:
• safety, efficiency and quality of applied operational procedures;
• assignment of human resources, design of working positions and training (performance and
  behaviour of individual personnel are not included in the evaluations); and
• effectiveness and efficiency of systems in use and design of technical equipment.

All operational units are evaluated at least once every two years. Given the large number of
units, the evaluations may be focused on specific aspects. The selection of such aspects will be
by arrangement of the appropriate boards of management, which may be based on the results of
previous evaluations or on consultation with the TRiNET members.
A TriNET team consists of:
• a lead auditor (from the organisation where the evaluation takes place);
• a co-auditor (from one of the other organisations); and
• one or more unit auditors, which are members of the unit being evaluated.
For each conducted TriNET evaluation, a detailed report is prepared containing:
• a management summary;
• a detailed description of the conducted evaluation;
• the findings; and
• the problem table.
The problem tables are also stored in a data base.

The TriNET auditors have several years experience as an air traffic controller or equivalent
knowledge gained through training and experience in ANS.
A TriNET evaluation may identify “problems”, concerning deviations from international or
national regulations/ directives/ set parameters and/ or established facts having a negative effect
on the safety of air traffic, or the quality/ performance/ efficiency of the air navigation services.
If an evaluation identifies problems, these are classified according to their safety impact, and
a mechanism of safety actions in response to these problems has been defined.

Based on the observations above, and further detailed information, the audit process as carried
out by TriNET appears to be well structured and effective. TriNET does at present not audit
Technics departments, but this will be initiated in the near future.

Risk portfolio
In the context of safety management, it has to be emphasised that audit processes are effective
to show and manage the continued compliance of the organisation with governing rules and
established procedures and to identify potential shortcoming in this respect.
However, it is also a key safety management principle to assess safety threats to the organisation's operation, as may result from external factors (e.g. increased traffic) or changes in procedures or equipment.

In this context, it is a sound practice to maintain a risk portfolio, which inventories the potential threats to the organisation's operations. Such a risk portfolio is considered an important management instrument to harmonise management's view on most relevant risks and to decide which risk need further assessment or require specific risk mitigating actions.

Within Skyguide it is considered the task of the Safety Steering Group to manage this risk portfolio. However, no clear evidence has been found that a risk portfolio is managed in a structured manner (i.e on the basis of probability of occurrence and severity of the consequences). Responses at various management levels indicate quite different topics as main safety threats. As an example, issues mentioned as most significant threats varied between "human behaviour", "runway incursions" and "absence of confidential reporting system". Therefore, a harmonised and well-founded perception at management level of main threats to the organisation and its operations is not clearly established.

As a consequence there also appear to be no clear priorities of safety issues to be addressed, and most decisions concerning subjects that need further safety assessment appear to be made on rather ad-hoc basis.

Evidence shows that to some extent the AAIB is stepping into this void by analysing trends and causes in AIRPROX incidents, as well as other ATC related accidents. A recent review of AAIB, concerning recent incidents and accidents, signals several safety shortcoming within the Swiss ATC system, pertaining to lack of coordination, technical and installation problems and management problems. Specific issues mentioned are: over-burdening of ATCO's during single manned operations, the failing use of the STCA system and the (previous) lack of a Minimum Safe Altitude Warning System .

As these are real and well-founded threats to the safety of Skyguide's operations they should be taken seriously and be assessed within Skyguide's risk portfolio.

7.3.4 Risk assessment

Implementation of risk assessment procedures

Eurocontrol’s Safety Regulation Commission has prepared the requirement "ESARR 4" (Risk assessment and mitigation in ATM, ref. 131), which concerns the use of risk assessment and mitigation, including hazard identification, in air traffic management (ATM), when introducing and/or planning changes to the ATM System.
This requirement shall apply to all providers of ATM services in respect of those parts of the ATM system for which they have managerial control. The provisions of this requirement are to become effective before May 2004.

Skyguide has committed itself to the implementation of risk management according to these "ESARR 4" requirements. For this reason the Center of Competence incorporates a risk management entity, which is tasked with implementation of a Skyguide risk management system based on requirements of "ESARR 4" and the introduction of this process within the operational departments.

Clearly, formal risk management within Skyguide is a new discipline that still has to be fully developed, practically from scratch.

A head of Risk Management – and currently the only person in this group – has been appointed in September 2002. No other experience in conducting safety assessments conform ESARR requirements is available at Skyguide. Therefore the entire implementation process has to be managed and performed by a single person.

Nevertheless, based on available information, it appears that firm initial steps have been taken. A risk management policy has been defined, describing the scope of work in 2003/2004 for initial implementation of a risk management system according to "ESARR 4". This includes the context and reason for doing safety assessments, the present situation, the cultural change needed for implementation, the way to do it, basic assumptions, principles and responsibilities.

Also a working plan has been prepared presenting the concrete actions conducted to implement a company-wide risk management system. Furthermore a presentation package has been composed that can be used for training and to introduce the system within the operational departments.

Finally four cases (two operational and two more technical ones) have been identified by the Safety Steering Group for which formal safety assessments will be made. These cases enable "learning by doing" and serve as test cases to demonstrate the functioning of the risk management process. The operational cases are managed and executed by the risk manager himself. These cases concern the so-called Zurich Adaptation Program (ZAP) and a case for track deviation during missed approach runway 14 in Zurich (TWR-ZRH).

The first case (ZAP) concerns a safety assessment of changed ATM procedures, as a consequence of the new Staatvertrag with Germany. This appears a complex safety case, with in addition some political aspects; it is therefore considered an ambitious initial application of the risk assessment methodology.

It should be remembered that the risk assessment methodology within Skyguide is still in a pioneering phase, and failure to bring a highly visible and complex case to an acceptable end might jeopardise the acceptance of the methodology within Skyguide.
Previous approach
As mentioned formal risk assessment is still in an initial state within Skyguide. The methodology still has to prove itself and has to gain acceptance within the company in order to be effective.
Therefore, a valid question remains how the risk assessment processes have been performed within the recent past and during the current transitional period.
As in many organisations not yet having formal safety management systems and the associated organisational set-up, safety has been primarily embedded within the operational and technical departments. As such, safety performance depends to a large extent on the result of the local safety culture, the individual capabilities and commitment to safety. In that sense it is difficult to judge the quality of risk assessments that are performed at a local level, because it would require the analysis of a large number of ad-hoc cases.
However, in individual cases the safety implications of certain operations or equipment have not been sufficiently assessed.
A clear example of this can be found in the assessment by AAIB of the Skyguide radar systems in response to several incidents (Schlussbericht über die Radarsysteme von Skyguide, ref. 74). It is indicative of insufficient safety management at local level, that shortcomings identified in the AAIB report could remain unnoticed within the organisation.
Another example is the introduction of single manned operations in Upper Sector by air traffic control in Zurich in the beginning of 2001. It is beyond the scope of the current investigation to judge whether these operations are unsafe or not. However, at least these operations have been introduced without performing a proper risk assessment.
A final example to be mentioned concerns the on-going differences in operational procedures between Zurich and Geneva air traffic controllers, in particular the use of the Short Term Conflict Alert (STCA) system. The use of STCA has apparently developed differently between both control centres. Different parameter settings appear to be used. Whereas one centre uses it as a last safety net, the other uses it as an assisting tool, where aural alerts are switched off during day-time in order to reduce nuisance alerts. From a safety viewpoint the use of different procedures within one company is regarded as undesirable. Clearly a company-wide and harmonised safety management process is required to avoid such inconsistencies.

7.3.5 Safety actions

General
Safety actions are actions taken either in response to safety occurrences (incidents and accidents) in order to avoid re-ocurrence, or in response to potential safety threats in order to mitigate the associated risks.
Also the dissemination of safety relevant information within the company is considered a relevant and necessary safety action.

The investigation of safety significant occurrences is mainly the responsibility of line management within Skyguide. Actual investigation is delegated to the so-called OPS Safety Group (OSG, see Para. 7.1), consisting of six air traffic controllers (designated as safety officers). The OSG produces unit safety letters describing the occurrences and issue recommendations or corrective measures, in collaboration with Heads of Operations and Safety Management. The OSG also reports results of investigations to the Safety Steering Group, that assesses the investigation results and ultimately decides on corrective actions to be taken. Monitoring of implementation of corrective actions and assessment whether the actions indeed solve the identified deficiency appears to be a responsibility of the Head of Quality & Safety. Due to the fairly recent instantiation of the Quality & Safety department, it could not be fully assessed how this responsibility is exercised in practice.

The impression exists that only a certain portion of the occurrences is investigated in practice. This impression is confirmed by the observation of the Safety Management department that there is a lack of personnel for internal investigation.

Also, it has been established that in the recent past the process for disseminating “lessons learned” from hazardous occurrences had not been explicitly defined. Apparently dissemination occurred only at local level by means of the unit safety letters, on a rather ad-hoc basis. These individual processes for dissemination of safety relevant information were not documented and company guidelines on this issue did not exist.

However, a positive development is that from March 2003 Skyguide will publish a quarterly Safety Bulletin informing operational and technical staff about safety activities. The bulletin also contains lessons learned. The Safety Bulletin is considered a valuable tool for disseminating safety relevant information within the organisation.

**Safety actions related to TriNET**

If a problem demands immediate corrective action to maintain air traffic safety, the lead auditor shall, after consultation of the head of the unit that is evaluated, notify the appropriate management of the ANS organisation without delay.

As part of the reporting of an evaluation, a problem table is submitted to the head of the evaluated unit. The head of this unit is responsible for solving identified problems, within set deadlines. The head reports quarterly about the resolution of the problem until completion or
until it is determined that completion of individual measures is not possible. If the solution is not within the units area of responsibility, the head of the unit shall arrange for the appropriate body to resolve the problem.

**Risk mitigating actions**

In a well-developed risk management system it can be expected that safety actions are taken in response to findings of safety assessments in order to mitigate identified risks to as low as reasonably practicable. Within the safety policy of Skyguide this strategy is explicitly mentioned. However, the identification of safety actions as result of the risk management process is still in an initial stage within Skyguide. The first safety cases that are now on-going have still to prove their effectiveness.

Upto the current period of transition the general practice has been that definition of safety actions to mitigate risks of the introduction of new, or changes to, systems or procedures was primarily the local responsibility of operational departments. This may lead to inconsistencies between processes and procedures between various departments. In particular this has been noted between the Zurich and Geneva control centers. This has resulted in differences between both control centers in for instance the use of the Short Term Conflict Alert system, as well as in the assessment of the introduction of single manned operations.

**Safety actions in response to safety objectives of Skyguide's owners**

Within the "Regulator Kennzahlen" (ref. 207) safety performance indicators and their associated target level have been defined by the owners of Skyguide, represented by the Secretary General of DETEC and DDPS.

An important indicator in this respect is that the number of incidents with Skyguide involvement should not increase in the time-frame 2001-2003, relative to the five preceding years (i.e. 1996-2000). According to the "Regulator Kennzahlen" (version dd. August 29, 2002), these statistics should be based on the statistics reported by AAIB. Although this appears to be an objective criterion, in practice the application of this indicator is not practicable, because the AAIB does not present the number of incidents with Skyguide involvement in its yearly statistical overview.

Nevertheless, the report of the Skyguide Board concerning the achievement of the strategic objectives over 2001 (ref. 205) presents a target of less than 26.6 incidents per year (as the average over 1996-2000). It is unclear where this target originates from, but because it cannot be based on AAIB statistics, it has been apparently based on internal Skyguide statistical data. However, by reviewing the actual statistical data from Skyguide, the presented target number of 26.6 incidents could not be reconstructed. Statistical data provided to the REACH investigation (from 1998 onwards) shows an average number of around 15 (airprox) incidents with Skyguide
involvement over the timeframe 1998-2000. Unfortunately, no Skyguide statistics were made available over the timeframe 1996-1997, but the number of around 15 incidents is expected to be fairly representative for the period 1996-2000.

If we would use in comparison the total number of airprox incidents as reported by the AAIB, the average number of incidents is 27.2 in the time period (1996-2000). Clearly these are all reported incidents and not only those with Skyguide involvement.

In conclusion, the safety target as specified by the owners of Skyguide appears not to be well defined. Moreover, the origin of actual quantitative target is not clear. The number, presented as safety target (less than 26.6 incidents per year) appears to be very high, so that safety performance in subsequent years may compare favourably. Therefore, in the report of the board of directors of Skyguide, concerning the achievement of the strategic objectives in 2001 ("Bericht des Verwaltungsrates 2001", ref. 205), a positive safety trend has been reported, indicating that the number of incidents in 2001 decreased to 22, as compared to the target of 26.6.

This finding is fully in contrast with actual numbers of reported incidents that, according to both AAIB statistics and internal Skyguide statistics, show a rising trend (see para. 10.5).

Also noticeable is that in the associated report of DETEC to the General Secretaries of DETEC and DDPS, concerning Skyguide’s achievement of strategic objectives over 2001 (ref. 114\(^{13}\)) a positive safety trend has been reported. It has been presented that in 2001 22 incidents with Skyguide involvement were observed, in comparison with a target of 22.6 incidents, as average over the preceding five years. As this target should be similar to the target as reported in the “Bericht des Verwaltungsrates” it is apparently a typographical error (22.6 instead of 26.6). However, it is evident that also in the DETEC report the indicated trend is presented as more favourable, than would appear from actual statistics. Clearly this may have led to a false impression that no specific safety actions would be required.

### 7.4 Evaluation of safety management at Skyguide

**Safety organisation**

After the appointment of the new CEO in March 2001, the safety organisation of Skyguide has been distinctly changed. Safety and quality management has moved from a line-organisational function to a staff function, and as such reports directly to the CEO. Safety accountability within Skyguide has been made explicit and transparent.

\(^{13}\) Bericht des GS UVEK und des GS VBS über die erreicht der Strategischen Ziele von Skyguide im Geschäftsjahr 2001.
Safety management and risk management have been introduced as separate organisational entities that are part of the Quality & Safety department, and as such show commitment of executive management to implement and conduct safety management and risk management processes as an essential part of their business.

The new organisational set-up is considered to represent a significant improvement, because it reflects a clear recognition of the importance of quality and safety management for the company. Nevertheless, it also has been established that safety management at present –despite good intentions and substantial development- is still in a developing stage and does not progress as planned. Current efforts are mainly directed to show compliance with governing Eurocontrol regulations (ESARRS). In its present phase of development, safety and risk management as yet cannot be considered as fully effective and operational tools to control safety within Skyguide. 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, appear insufficient to deliver an effective safety management system within the required time-frame.

It should be noted that several European sister organisations do have several years of experience in various safety management activities, especially in risk assessment. Nevertheless they are at present working hard and with substantially more resources to get their safety management system and risk assessment and mitigation compliant with "ESARR 3" and "ESARR 4". But, even in such a position, it appears still a considerable task to reach full compliance.

**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.

**Operational personnel**

In general, the operational personnel of Skyguide appear to be sufficiently and professionally trained by means of the in-house training curriculum. However, in light of the current high demand for Air Traffic Controllers within Skyguide the training capacity appears to fall short.

It is noted that the lack of capacity is not caused by Skyguide’s training school, but by on-the-job training capacity.

The lack of training capacity is assessed as a serious problem, because operational departments are considered to be already understaffed (particularly in terms of the number of qualified Air Traffic Controllers), as is confirmed by results of the benchmark study (see Appendix B).
This understaffing may lead to serious consequences. Apart from a bottleneck in on-the-job training, also the regular refresher training cannot always be provided in satisfactory manner, due to a lack of available air traffic controllers. Understaffing is leading to high workload within the operational departments. Based on internal correspondence, available to this investigation, understaffing has on some occasions even lead to deployment of operational personnel to tasks for which they were insufficiently qualified. Furthermore, understaffing has lead to the introduction of single manned operations in certain sectors, without properly assessing the safety impacts of such operation. A final consequence of understaffing is that the operational resources and expertise are only scarcely available to the implementation of Skyguide's safety management system, and the conduct of risk assessments. Without sufficient commitment and active participation of operational personnel, the safety management and risk assessment activities of Skyguide will degrade to merely a compliance effort, and will not deliver the intended safety benefits. Therefore it is urgently needed to reduce the shortage in air traffic controllers within the shortest possible time-frame.

**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.

**Technical personnel**

The concern for a decreasing level of technical expertise and for the asymmetry of licensing and certification of air traffic service technical personnel and equipment seems reasonable. Statistical evidence for this concern has not been produced, but in a pro-active safety culture that a mature safety management system lives in, significant safety concerns are to be dealt with appropriately. Therefore due attention should be given to qualifications and career opportunities of technical personnel within Skyguide. In this respect licensing of technical personnel appears to be a potential solution to 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 ESARR5 requirements for Technical Personnel.
Safety policy
The safety policy, as presented in Paragraph 7.2.1, is a clear and complete description of the company's vision and strategy towards achieving a satisfactory level of safety. Some shortcomings in the safety policy have been identified. They pertain to the lack of specification of who has the final accountability for safety within the organisation, and also to the lack of a statement that extends the safety policy to sub-contractors.

Safety monitoring
In general the basic safety occurrence reporting mechanisms appear to be in place within Skyguide, by virtue of the availability of Operational Internal Reports, Air Traffic Incident Reports and Safety Improvement Reports. Safety monitoring, based on these reports, appears to have still an ad-hoc character.

A major improvement in this respect is expected by the introduction of the TOKAI system, which will harmonise and structure the safety monitoring and incident investigation process.

In general, a major flaw to the overall monitoring process is the poor reporting culture within Skyguide. Within the Swiss legal framework, confidential reporting of safety occurrences is not supported. Therefore, reporting controllers remain vulnerable to judicial prosecution, as consequence of their reports. This creates a strong reluctance of controllers to report all safety relevant occurrences.

**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].

Threat identification
A significant contribution to the identification of potential safety threats, due to organisational or procedural shortcomings, is provided by the TriNET auditing programme.

This tri-national auditing programme is a cooperation of the Air Navigation Service providers of Germany, Austria and Switzerland in order to mutually audit their organisations.

The TriNET auditing programme appears to be organised well and effective.

Apart from the results from the audit programme, threat identification within Skyguide shows to some extent an ad-hoc character. Skyguide maintains currently no harmonised risk portfolio that identifies and prioritises potential threats, arising from external factors or changes in operational procedures.
Evidence shows that the AAIB to some extent tries to fill the void left by Skyguide, by actively monitoring safety of the ATC system and identification of emerging safety threats. However the internal process within Skyguide should be strengthened and not be dependent on activities deployed by AAIB. It is believed that the emerging safety management system will improve this situation. However, the importance of maintaining a structured risk portfolio is emphasised here.

**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.

**Risk assessment**
Formal risk assessment within Skyguide is still in an early stage. Firm initial steps have been taken, and a number of safety cases have been initiated. However, the task of introducing formal risk management and associated procedures has been assigned to a single person with very limited support from within Skyguide or from FOCA. This effort is considered a gross under-estimation of the effort that is required. Experience at several European sister organisations shows that the introduction of a formal risk assessment and mitigation process is a multi-year effort in which multi-disciplinary experience has to be built up and acceptance has to be gained not only within the own organisation but also with regulatory bodies.
Without increased staff and sufficient operational support of risk management within Skyguide it is expected not to be feasible to introduce meaningful risk management conform ESARR requirements within the timeframe as required by Eurocontrol, or indeed keep pace with the operational decision making processes it must support. Without further commitment and support of operational departments a real risk exists that implementation of safety and risk management reduces to an effort of demonstrating mere compliance with Eurocontrol requirements, and does not evolve into an effective and accepted process to control risks within Skyguide.

**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.
8 The impact of the aviation safety policy – how the airlines manage aviation 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 Safety management at SWISS International Airlines

8.2.1 Organisation

SWISS International Airlines (noted as SWISS hereafter) is at present the flag carrier of Switzerland. In that respect the company has succeeded Swissair, that went bankrupt and ceased operations in October 2001. SWISS has been established by means of a process in which Crossair (a former Swissair subsidiary) effectively took-over Swissair's operations and aircraft, with support of a large capital injection, mainly from private investors, the Swiss Confederation and the Cantons. The shareholder structure shows that the company is owned for about 2/3 by institutional investors, 20% by the Swiss Confederation, 12% by Cantons and communities and the remainder by private individuals.

The current fleet of SWISS shows a significant reduction (~50 aircraft) relative to the combined fleets of Swissair and Crossair before the merger.

The current fleet (March 2003) of Swiss consists of a mixture of long-, medium- and short-haul aircraft, 112 in total, from five different manufacturers. Within this fleet 50 aircraft were previously operated by Swissair, and the remaining 62 by Crossair.

The organisation of SWISS, with emphasis on the safety activities within the organisation is shown in figure 8-1 below.
As shown a dedicated safety department or safety manager, at the same hierarchical level as the Chief Operation Officer or the Quality Manager, is not recognised within the current organisational structure. Safety activities within SWISS are mainly concentrated within the Flight Operations division. A Safety department has been set-up, headed by a Vice-President Safety that has a staff function to Chief Operations Officer. The Safety department within SWISS consists of four groups, dedicated to Safety Awareness, Flight Data Evaluation, Flight Safety Investigation, and Cabin Safety. Leaders of the four groups report to the head of the Safety department (VP safety), who in turn reports to the Chief Operations Officer.

Hence it appears that there may be some hierarchical barrier for safety information flowing to highest management levels, because the VP safety is not positioned in the direct reporting line to the CEO.

Yet, the highest (CEO) management level within SWISS has recognised safety as a top priority within the organisation needing direct attention. For this reason, several measures have been taken to assure that safety issues are not blocked by hierarchical barriers. One of these measures
is to assign special authority to the VP Safety to directly contact and advise the board and the CEO concerning safety relevant issues.

Another measure has been to install a so-called Swiss Safety Advisory Board (SSAB) consisting of a number of independent external (foreign) safety experts. The SSAB reports directly to the CEO.

A further organisational measure is that the CEO of SWISS has adopted the formal function of accountable manager for safety. The VP Safety of SWISS has therefore direct access to the CEO. Safety occurrences are reported on a monthly base to the CEO, and potential remedies are signed up by him. Also the Chairman of the Board is informed by the VP Safety, in bilateral consultation, concerning safety issues on a regular basis.

From the above it may be concluded that communication lines for safety relevant issues within SWISS are well established up to the highest management level. This is, as an example, further underlined by the fact the safety manager has been allowed to run seminars for all SWISS management executives, including the Executive Board, to raise their awareness on safety impacts and criteria of commercial decisions.

The VP Safety of SWISS is an experienced ex-Swissair pilot (former chief pilot Boeing 747), and former head of the flight safety department of Swissair. The VP Safety is therefore well qualified for this function. As the former safety manager of Swissair he can be regarded as a strong advocate of introducing the Swissair safety culture and procedures within SWISS.

The main challenge is to harmonise safety cultures of Crossair and Swissair into a single safety culture, where it is aimed to match the former Swissair level of safety performance, without enforcing undue processes and procedures on the regional fleet.

The Flight Safety division of SWISS consists of 15 persons, of which four are from former Crossair. Most of them are working on a part-time assignment to the flight safety department, so that in total around 8 full time equivalents are employed. In comparison with other major airlines this can be considered as reasonable for the flight safety department. However, taking into account the specific problems, arising from merging two quite different air operators and associated fleets and pilot corpses, the current size of the flight safety department is considered to be fairly small.

8.2.2 The SWISS safety policy

The general safety policy of SWISS has been worded in the Operations Manual A (OM-A) of SWISS.
In essence it reads:

- **SWISS strives to achieve maximum safety and cost-efficiency;**
- **SWISS promotes a corporate culture in which safety is a matter of course in all thoughts and actions of the employees.**

Evidently, this policy incorporates an objective to balance safety and costs, that weakens in itself the priority of flight safety relative to commercial pressures. While it is obvious that decisions regarding safety must be balanced with their consequences for other aspects of the airline operations, this should be a responsibility of the management and not be part of the safety policy itself.

In general terms the SWISS safety policy statement lacks a number of clearly defined safety objectives that can serve as guiding principles for the organisation. Especially, in light of the endeavour to harmonise safety processes and procedures of two different companies into one organisation, the policy description is missing a strong statement concerning the organisation's intentions to maintain or improve safety performance, and to implement and endorse an effective and formal safety management system.

The safety policy does not reflect the wholehearted commitment to safety of senior management. This may hamper the effectiveness of safety programmes within SWISS. However, during personal conversations with senior management commitment to safety as an absolute priority has been clearly expressed.

This has been backed by several specific actions taken by senior management to improve safety, such as the establishment of the Swiss Safety Advisory Board, safety briefings to the executive board, the take-over of Swissair procedures and processes into the SWISS flight safety programme, and the introduction of flight data monitoring systems within the regional fleet.

### 8.2.3 Safety monitoring at SWISS

Safety monitoring processes implemented at SWISS are largely derived from the proven and mature processes at Swissair.

Safety monitoring at SWISS has been based on three main activities:

1. Safety Reporting
2. Flight Data Monitoring
3. Flight Safety Investigation

These three activities are reflected in the organisation of the flight safety department.
Safety Reporting
The safety reporting system appears to be well developed. It has been partly based on the requirements of JAR OPS 1.420. Two types of incident reports are discriminated: Occurrence Reports (OR) and Air Safety Reports (ASR). ORs in general concern non-safety related incidents that still should not go unnoticed. ASRs concern safety related incidents that need a further flight safety investigation. A sub-set of the ASR list of reportable incidents count as "serious incidents" according to international definitions (ICAO Annex 13). Reports falling in this sub-set will be reported to the AAIB, for further assessment. The reporting procedure, including a clear definition of incident categories, has been described in the operations manual, as well as in a quick reference guide to each pilot. All ASR's are stored into a database and processed by the chief pilot of the involved aircraft type. The incident investigating process is monitored by the VP flight safety and supported by the flight safety team. Results are disseminated through a monthly update report that summarises all incidents and calculates a so-called monthly Flight Safety Index (FSI), based on frequency and severity of occurrences and the associated number of flight operations. This index is used to signal general safety trends. From available reports the FSI shows no adverse safety trend when the situation under Swissair and SWISS is compared.

In addition the Flight Safety division issues a quarterly safety letter to flight crews in order to disseminate safety relevant information to flight crews, and a cabin safety letter for the cabin crews.

In general the reporting system is regarded as a well developed system. Main potential danger to the system is the reporting culture itself. Clearly, the former Crossair pilot community has not been accustomed to the Swissair reporting procedures and therefore may under-report. As reaction this may also affect the willingness of ex-Swissair pilots to report. Signs that reporting levels indeed started to decrease within SWISS have been recognised by the VP Safety. Initiatives to improve and harmonise reporting practices have been taken by special attention for the reporting culture in SWISS' Safety Bulletin, and the introduction of a fleet-wide reporting form, including reporting instructions.

Flight Data Monitoring
Flight data monitoring is a modern technique to analyse flight operational data gained from so-called quick access recorders. Flight data monitoring is used to enhance the level of safe operations by analysing flight data and learn from events that have occurred in operational practice. Swissair has been one of the pioneers in this field, and performed flight data monitoring on a routine basis. This system has been now transferred to SWISS. Within Crossair no such system did exist. The Crossair fleet had not been equipped with the required quick access recorders. Despite some reluctance from the ex-Crossair pilot corps, it has been a major
positive safety initiative of SWISS management to install the required quick access recorders within the entire regional fleet. It should be noted that such systems are at present not required by governing requirements, although they are recommended by ICAO Annex 6. From a safety standpoint it is therefore encouraging to observe that senior management of SWISS is committed to this investment, beyond and above current regulatory requirements, in financially difficult circumstances.

Flight Safety Investigation
A staff of four persons, two from ex-Swissair and two from ex-Crossair, has been tasked with internal flight safety investigation. Their main tasks are:

- to provide a centre of competence for internal incident investigation
- to investigate serious incidents in co-operation with AAIB
- to support fleet chief pilots in investigating minor incidents
- to initiate proactive investigation activities on potential weak points

In conclusion it appears that safety monitoring practices within SWISS are in place, in accordance with governing requirements. For a new organisation, like SWISS, it can be expected that it requires some time before a uniform reporting attitude is present within the organisation. However, using the Swissair procedures as a baseline provides a solid starting point. Nevertheless, harmonising reporting practices between both (ex-Swissair and ex-Crossair) pilot corpses remains a crucial condition for success and will need further attention within SWISS.

8.2.4 Threat identification, risk assessment and safety actions
An essential element of safety management is the process to identify potential safety threats, perform an assessment of the significance of the associated risk (i.e. the combination of probability and severity of a given hazard), and take the appropriate actions to mitigate risks. Within an airline, threats are usually identified based on operational experience (reactive) or on anticipation (pro-active). The first appears to be well established within Swiss. Based on results from the safety monitoring processes, safety trends are monitored using a flight safety index, but also using the number of incidents and results from associated investigations, number of technical errors, etc.

In order to assess the status of SWISS safety, a safety management board (SWISS Safety Board, SSB) has been established. The SSB is headed by the Managing Director Operations, and includes heads of the Operations and Technical department, the safety, security and quality officers, and further all functional safety responsibles (from Operations, Maintenance, Training,
Ground Operations, etc) within SWISS. Also the external maintenance provider SRTechnics is represented in the board, and if required additional specialists are called in.

Duties of the SSB are:
- to review all incident reports to ensure that appropriate action is taken;
- to assess results of internal accident and incident investigations, as well as external accident reports compiled by the relevant authorities. The SSB has the authority to approve final reports and formulate recommendations to the accountable manager and nominated postholders;
- to provide advice and recommendations and pass on proposals to reduce risk and prevent accidents in SWISS operations;
- to examine the status of SWISS safety in general.

The SSB has a quarterly meeting schedule.
Due to its composition and authority the SSB appears to be a powerful instrument within the safety management process of SWISS.

In addition to this reactive risk assessment, it is for SWISS especially relevant to assess risks also in a pro-active manner. Due to the fact that SWISS is a new organisation, it can be expected that organisational issues within the company may lead to various latent safety implications.

In this respect the establishment of the SWISS Safety Advisory Board (SSAB) is regarded as a good initiative in order to signal potential threats, that may result from internal or external developments.

Available documentation shows that the SSAB has highlighted several safety concerns and recommended several safety actions. Main safety concerns identified are the continued antagonism between the regional and long haul pilot groups, the regional fleet pilot selection process and regional fleet flight data monitoring programme.

Based on information available to the REACH investigation team, it appears that there are continuing and wide-spread concerns, especially about the regional fleet pilot selection process. This pertains to the pilots recruited by Crossair as direct-entry captains during the time of rapid expansion in the late 1990’s. These include pilots with a wide age range, many different nationalities, varying English language skills, and with different flight operational backgrounds. This may lead –or according to some has lead- to problems in the regional fleet, mainly related to human factors and crew pairing.

It appears that management at SWISS is responsive to these threats, and has taken actions to mitigate the involved risks. So, a programme has been initiated to re-screen all SWISS pilots in order to ensure they conform to SWISS' standards. Also the entire regional fleet will be retrofitted with Flight Data Monitoring systems. However, the effort to integrate the regional and
long haul fleet pilots into a single pilot corps still remains in a dead-lock situation, due to many practicalities of joining two groups of very different composition in seniority and experience. This situation is further aggravated by pending lay-offs of pilots. This undesirable situation has been recognised by SWISS management, but for the time being, the continued existence of two different pilot groups has been accepted, pending further negotiations with the unions.

8.2.5 Evaluation of SWISS safety management
Safety management at SWISS is still in a transitional phase. The character of safety management of the two companies (Swissair and Crossair) out of which SWISS has been formed was quite different. Swissair has been known to have an excellent safety management organisation that was at least on par with those of the major European international air carriers. In contrast at Crossair, as a low-cost and fast growing regional carrier, safety management appeared to have been performed at a minimal compliance standard. After the take-over of Swissair -in the aftermath of its bankruptcy- by Crossair, and the subsequent formation of the new carrier SWISS, management functions within SWISS fell mainly to former Crossair managers, including the function of the CEO. This implied a certain risk that the former Crossair safety culture, and safety management procedures, would be transplanted into SWISS.

However, the new management of SWISS has clearly recognised safety as a first priority, and has decided to take-over much of the Swissair safety management heritage into the new organisation. Unfortunately, this strategy is not clearly reflected by the written safety policy statement of 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.

In light of the desired implementation of safety management conform Swissair standards, the experienced former head of safety at Swissair has been given the same position within SWISS. The SWISS flight safety team also consists mainly of former Swissair personnel (11 out of 15). As far as could be established the safety management procedures and processes of SWISS have been indeed largely copied from Swissair.
There are also signs that these safety management processes are transgressing into the regional fleet of SWISS. For instance flight data monitoring systems are now retro-fitted in the regional fleet.

Clearly two different safety cultures cannot be merged overnight. However, it appears that senior management is well aware of this fact, and has taken appropriate actions to monitor progress and highlight potential bottlenecks. The establishment of an independent SWISS Safety Advisory Board is considered a good initiative in this respect.

In conclusion it is felt that many positive elements are available to achieve a high safety standard at SWISS. However there remain some concrete threats that will need continuous attention of SWISS management.

The most critical issue in this respect is the current controversy between the two separate pilot corpses (the ex-Crossair regional pilots, and the ex-Swissair pilots), concerning their mutual position and labour agreements with SWISS. Especially in light of pending lay-offs and fleet reductions, the internal uncertainties will put pilots under high strain, and have the potential to increase operational risks.

Therefore, SWISS management should consider it as highest priority to resolve this issue as soon as possible.

In this context it is noted that the present situation at SWISS is not entirely unique. The processes of deregulation and liberalisation within the aviation sector have lead to an increasing number of airlines being merged with or taken over by other airlines. Therefore substantial experience does exist with the effects on flight crews by such commercial developments.

Well-known issues in this respect are:

- Mixing of flight crew from different cultural and national backgrounds;
- Merging of company cultures when one airline takes over or merges with another;
- Commercial pressures arising from greater competition.

Potential consequences of these issues for flight safety have been identified at many airlines that have been involved in mergers and take-overs. Also methods and procedures to mitigate the associated risks have been devised in many cases, see for instance ref. 148.

SWISS management is therefore well advised to learn from the experiences at other airlines in order to find practical solutions for the present problems within the pilot corpses of SWISS.

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.
8.3 Safety Management at easyJet

8.3.1 Safety Organisation
EasyJet Switzerland is a fairly small air operator that operates 5 Boeing 737-300 aircraft, registered in Switzerland. EasyJet Switzerland is a subsidiary of easyJet UK, and operates as an independent air operator with a Swiss AOC licence, under Swiss law. The organisation chart of easyJet Switzerland is shown in figure 8-2.

![Organigram easyJet Switzerland](image)

As shown in this figure the safety officers (flight crew and cabin crew) have staff functions directly below the chief executive. The chief executive acts as accountable manager of safety, and the safety officers report directly to him. Quality management and safety management are separate functions within easyJet. Apart from other quality functions the quality manager assures the functioning of the safety management system by regular audits. A survey of these audit results is discussed in a yearly management review meeting.

The present safety officer for the flight crew is adequately qualified for his function. He holds a university degree in engineering, and has worked for some years as a PANS-OPS specialist at the FOCA, and as such has experience with ICAO regulations and safety studies (though
primarily in the obstacle clearance area). Since 1996 he holds an airline transport pilot licence and is at present a Captain on the Boeing 737.

8.3.2 The easyJet Safety Policy
The easyJet safety policy and objectives have been specified, and signed-up by easyJet's Chief Executive, in a dedicated document describing the safety management system.

The stated safety policy expresses the objective to at least meet, and where possible to exceed, minimum statutory and mandatory requirements for aviation safety.

The safety policy explicitly states management commitment to safety by providing leadership and management style to meet safety goals. As essential elements of the safety management system it is mentioned:

- to make safety a condition of employment to ensure personal commitment
- to create an environment where people care for safety through communication and a trusting culture
- to have safety improvement programmes
- to provide information, instruction, training and supervision as is necessary to promote safety
- to review own and other's accidents and incidents to maximise learning opportunities

The policy statement of easyJet appears to be greatly in line with what can be expected from a mature and well designed safety policy (see chapter 3), and therefore indicates that this element of safety management has been sufficiently developed.

8.3.3 Safety Monitoring at easyJet
EasyJet does not employ a flight data analysis programme within its current fleet, and therefore does not satisfy the recommendation of ICAO Annex 6 (Part I, par. 3.2.2) to have such programme implemented as of January 2002.

Therefore, safety monitoring at easyJet is mainly based on the Air Safety Reporting system. This Air Safety Reporting system is used by flight and cabin crews, as well as ground handling staff to report safety relevant occurrences. The list of occurrences and incidents that have to be reported are clearly described within the company's operations manual A. All Air Safety Reports (ASRs) are filed into, and processed through a software package, called WINBASIS. This software package – developed by British Airways - is a widely used tool within the airline industry and is considered state-of-the-art for processing ASR's.

Each postholder (i.e. chief pilot, chief engineer, flight and ground operations managers) is responsible to address the ASR's concerning his department and has to provide a response to the Quality Manager.
Acceptance of satisfactory action in response to an ASR, and subsequent closure of the ASR is a centralised responsibility within easyJet and resides with the safety manager of easyJet UK in Luton. Each month the ASRs are presented to a Safety Action Group in Luton, where ASRs are reviewed. The accountable manager and safety officer of easyJet SWISS take part in these meetings, and so gain a wider exposure to safety related events of the entire easyJet fleet. Once a year during a Management Review Meeting trends of ASR's are presented to the accountable manager and the respective postholders.

The safety management system of easyJet is regularly audited by the quality manager, and results are also subject of the Management Review Meeting. As an example, available documentation has shown that these audits have been effective in highlighting a downward trend in reporting levels. This has lead to renewed focus on improving the reporting culture within easyJet.

Dissemination of safety relevant information of general interest is provided by a crew safety letter that is issued four times a year.

In conclusion safety monitoring within easyJet appears to be a fairly well developed system. Despite the fact that easyJet is a fairly small organisation, the safety monitoring practices and procedures appear to be on par with major airlines, apart from the existence of a flight data monitoring programme.

### 8.3.4 Threat identification, risk assessment and safety actions

Within the easyJet Safety Management manual it has been recognised to have a proactive –as well as reactive – approach to the management of safety.

The reactive approach is well served by the structured safety monitoring process of easyJet, and a Safety Action Review Process is in place to ensure the engineering and operational teams display sufficient actions in response to ASRs.

Within the Safety management manual hazard identification and risk management are mentioned as proactive methods. It is specified that process owners and line managers are responsible of applying these methods in order to evaluate the safety implications of new or changed systems or procedures, before they are introduced.

In general it appears that the actual application of these methods within easyJet Switzerland is not yet well developed. No clear examples could be provided of assessments carried out according to this methodology. However it is clear that easyJet Switzerland benefits from experience at easyJet UK, and that easyJet UK carries out safety assessments on behalf of easyJet Swiss.
It should be noted that most strategic decisions, e.g. concerning fleet renewal or route structures, are taken under responsibility of easyJet UK. The associated safety assessments are then carried out by easyJet UK. However, further evaluation of these safety assessments is considered to be outside the scope of the present investigation.

8.4 Evaluation of Safety Management at easyJet

Safety management within easyJet is well organised. Due to synergy between easyJet Switzerland and easyJet UK, the safety management process is considered to be quite mature. There is a well defined safety policy, the safety reporting system is functioning, safety actions are defined and implementation of risk mitigating actions is monitored through a formal Safety Action Review Process.

A point of critique may be the fact that a flight data monitoring system not yet has been implemented for the current fleet, as has been recommended by ICAO Annex 6. It is considered a task of FOCA to require the implementation of flight data monitoring systems within the fleets of Swiss registered AOC holders and supervise implementation of such systems in accordance with ICAO Annex 6.

It is understood that on own initiative easyJet will start the implementation of a flight data monitoring programme with the introduction of the Airbus A319 within its fleet.

**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.

8.5 Conclusions in relation to safety management at airlines in Switzerland

Switzerland has 24 commercial airlines holding a so-called Air Operators Certificate. Within the REACH investigation only two airlines have been selected to give a general impression of safety management at the airlines in Switzerland, viz. SWISS and easyJet Switzerland.

Although this is a rather limited sample it is still considered representative, as it includes by far the largest airline of Switzerland (SWISS) that alone is responsible for transporting around 75% of the total volume of passengers, carried by Swiss AOC holders. In addition easyJet can be seen as representative for a low-cost regional airline and new entrant on the Swiss market.

**The main and general conclusion is that the safety management process at both airlines is reasonably well developed. At 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.

At SWISS, safety management is still in a build-up phase, but definitely developing in the direction of the former and highly regarded Swissair system. Nevertheless SWISS is confronted with the specific problems of joining two different safety cultures and operational processes. While these problems are addressed some extent by SWISS’ management, by taking specific actions, such as introduction of a Safety Advisory Board and screening of the entire pilot corps, the current controversy between both pilot corpses remains worrisome, and has the potential to increase operational risks.

Moreover, the current financial pressures may ultimately have an effect on the safety priorities within the company and the level to which safety management is further developed according to former Swissair standards. Clearly, this calls for close monitoring and surveillance of SWISS by the FOCA in order to safeguard against potential erosion of safety standards at SWISS.

A well developed safety management system also involves well developed relations with the safety oversight authority FOCA. It is in the interest of safety at SWISS to ensure good external oversight. The relations between FOCA and Swissair in the past, and in particular the dominance of Swissair herein, were not conducive to such relationships. As a consequence SWISS has a role to play in bringing about a stronger role of FOCA as a safety regulator and should behave accordingly.
9 The impact of the aviation safety policy – how the airports manage aviation 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).

9.2 Safety Management at Zurich airport

9.2.1 Organisation
Zurich Airport is operated by a company, called Unique. Unique was formed, in 1999, out of a merger of two companies that jointly operated Zurich airport. Stocks of the company are owned by the Canton of Zurich (49%) and the city of Zurich (5%). The remainder is in private hands. In terms of passengers, Zurich is the tenth largest airport in Europe, processing around 21 million passengers in 2001. One of the company's principal business activities is in the field of safety and security. The company attends to operational safety and security at Zurich airport and provides (or manages the provision of) emergency services such as the Airport fire brigade, medical emergency teams, snow removal and runway cleaning services.

A organisation diagram, with focus on safety activities of the company, is shown in figure 19-1.
As appears in figure 9-1 safety is mainly addressed within the Operations division. Within this division safety issues are mainly addressed by the Safety and Security department, and to some extent by the Flight Ops department.

The organisation of Unique does not include the formal function of Operational Safety Manager.

In terms of safety management this is considered a rather traditional organisation, where safety management is primarily embedded within the operational departments.

Reporting proceeds via hierarchical lines through the Chief Operations to the CEO.

Unique does not hold an airport certificate, as stipulated in the regulations of ICAO Annex 14. According to para. 1.3 of this Annex states shall certify aerodromes used for international operations, as of 27 November 2003. However, currently such certification has not yet been planned.
A further requirement of ICAO Annex 14 is that as of 24 November 2005, a certified aerodrome shall have in operation a safety management system. At present, Unique does not have such a safety management system implemented. However, first contacts and consultations with FOCA to discuss regulatory conditions and requirements for implementation of a safety management system have been planned.

9.2.2 The Zurich airport safety policy
Unique has not laid down a clearly written policy statement concerning safety. There is no aerodrome manual available for Zurich airport, as is recommended by ICAO Annex 14 (para. 1.3.6). In this respect Zurich airport is not yet on par with several main airports within Europe that have prepared an aerodrome manual, describing amongst others the airport's organisation and management including a safety management system.

Vision and objectives towards safety, and the endorsement thereof by senior management, are therefore not made explicit.

Within Unique safety management has been embedded within various departments, under the Operations division. The focal department with respect to safety within this division is the department for Airport Authority & OPS safety. This department has been certified according to 9001/2000 (process oriented model), and as such maintains a Quality Manual, describing the processes within the department. This manual contains a statement concerning safety objectives of the department. However, this statement expresses merely the intention to improve measurable safety, and to extend expert knowledge. As such it lacks the characteristics to serve as a true safety policy for the company.

9.2.3 Safety Monitoring
Monitoring of safety is mainly conducted by statistics kept within specific departments.
Records of safety statistics are kept in the field of bird strikes, foreign object damage, ramp safety, and runway incursions.

Unique Zurich airport employs an extensive management information system. However, mentioned safety statistics are not yet incorporated within this system.
Safety trends are primarily monitored by the responsible departments, and relevant safety information is relayed through the Head of Operations to senior management, in order to support management decisions. In the absence of a dedicated safety manager and a well-developed safety management system this bottom-up process has a somewhat ad-hoc character.
9.2.4 Threat identification, risk assessment and safety actions

As mentioned, Zurich airport does not yet operate a safety management system in conformance with ICAO Annex 14 requirements. However, a few years ago Unique has introduced a so-called risk management system, and has assigned a risk manager as responsible for the system. From the available information, it appears that the risk management system is primarily an instrument to manage financial risks of the company.

This can be concluded from the stated objectives and basic principles of the system, being:

- an instrument to corporate governance
- a contribution to assure compliance with rules and regulations
- a minimisation of number and impact of undesired events
- a minimisation of costs or profit reductions of undesired events
- a contribution to the assurance of existence, profit and rentability
- a corporate image
- a competitive advantage

The focus on financial aspects is further highlighted by the fact that the function of Chief Risk Officer within the organisation is assigned to the Chief Financial Officer.

Nevertheless, the risk management system of Unique Zurich airport appears to integrate all aspects of risk as much as possible. For this purpose, the system recognises next to financial risks (i.e., property-related risks (f.i. invested capital), money risk (f.i. cash and earnings), and intangible-asset related risks (f.i. image and goodwill)), also person-related risks, such as life and health.

In this sense, the risk management system has some features of a safety management system as intended by ICAO. It recognises a similar process of activities, specified as risk awareness, hazard identification, risk analysis, risk handling and risk controlling & feedback.

The risk management system of Unique Zurich airport is quite unique in the sense that it integrates all corporate risks into a single risk portfolio and provides information to the company's management information system. The risk portfolio is reviewed regularly (each four months). In total, this risk portfolio contained about 140 risks at the beginning of 2003.

Risks are prioritised using a matrix identifying probability and risks in terms of potential costs to the company. Main risks identified in this way are:

- the critical situation at SWISS, as main user of Zurich airport
- the consequences of the state treaty with Germany
- the Iraq war
- runway incursions
- financing of investments on the airport
Chapter 9 The impact of the aviation safety policy – how the airports manage aviation safety

From this prioritized list of risks it can be concluded that main risks are perceived in the area of business developments. Only as fourth priority a real safety risk has been identified. Based on this observation it can be concluded that the risk assessment system cannot be regarded as a formal replacement or instantiation of a true safety management system. By mixing various types of risks, real safety risks may be downplayed in light of business related risks. If safety is considered to be first priority within the operations of Unique Zurich airport, then safety related issues should not have to compete for attention with business related issues. Therefore the implementation of a dedicated Safety Management System, according to ICAO Annex 14 is still recommended.

Despite the observation above it appears that safety issues are well addressed at the operational level within Unique Zurich airport. Within the operations department there is a broad base of expertise and experience. The current Head of Operations is a former Swissair Chief Pilot, and the current Head of Safety and Security is a former Air Traffic Controller. Therefore, the Operations Department benefits from valuable expertise in airline and ATC operations. Also this contributes to a well-developed information network and information exchange between the airport, airlines and Skyguide. By the existence of various inter-organisational working groups, initiated and headed by Unique, information on safety relevant issues, such as bird strikes and runway incursions, is regularly exchanged and processed.

From available information it appears that management is responsive to adverse safety trends as signaled by the Operations Department. As an example, rapid response was shown to two runway incursion incidents, occurring in December 2002, at Zurich airport. This resulted into immediate improvements at the specific spot of one of the incidents, the initiation of a runway safety study in 2003, and the instantiation of a runway safety group in corporation with relevant partners (FOCA, Skyguide and airlines). Another example is the substantial investment in refurbishing runway 16, in order to reduce the risks of Foreign Object Damage.

9.2.5 Evaluation of Safety Management at Zurich airport

Unique Zurich airport has not yet implemented a formal safety management system, as recommended by ICAO standards. Therefore, most elements of a proper safety management system cannot be readily identified. There is no clear safety policy, the function of safety manager is not recognized within the organisation, and it is not clearly defined who is the accountable manager for safety within the organisation. Therefore, safety management within Unique has a somewhat ad-hoc character, and mainly depends on the individual safety culture and safety practices within the operational department.
In general it appears that available expertise and the governing safety culture at operational level is satisfactory. This means that the operational department is responsive to safety issues. Unique has implemented a so-called risk management system. This system is however mainly aimed in identifying financial and business risk, and should not be considered as a replacement of a safety management system.

Some initiatives, in the form of first meetings with the FOCA, are currently underway to implement a safety management system in accordance ICAO standards. However, Unique appears to deploy a rather passive attitude towards this issue, and is awaiting guidelines from the FOCA.

9.3 Safety Management at Geneva airport

9.3.1 Organisation
Geneva International Airport (GIA) is the second largest airport in Switzerland, processing around 7.5 million passengers in 2001. The airport is fully owned by the Canton of Geneva and the operation of GIA belongs to an autonomous public establishment operated under control of an administrative board. Daily management is under responsibility of the director general.

An organisation diagram of the management structure is shown in figure 9-2.
From the organisation diagram, figure 9-2, it appears that the function of safety manager is not explicitly recognised within GIA's organisation. Safety within GIA is mainly the domain of the Operations department. The Operations department provides several safety related functions to the airport users. These mainly pertain to safety of operations on the apron and a safe traffic flow on the airfield. Within the operations department also statistics for all airport air traffic are maintained.

In terms of safety management this is considered a rather traditional organisation, where safety management is primarily embedded within the operational departments. Reporting proceeds via hierarchical lines through the Head of Operations and Director Technique & Operations to the General Director.

GIA does not hold an airport certificate, as stipulated in the regulations of ICAO Annex 14. According to paragraph 1.3 of this Annex states shall certify aerodromes used for international operations, as of 27 November 2003. A further requirement of ICAO Annex 14 is that as of 24
November 2005, a certified aerodrome shall have in operation a safety management system. At present, GIA does not have such a safety management system implemented. Attitude of GIA towards aerodrome certification and introduction of a formal safety management system is quite passive and appears to await initiatives from FOCA.

9.3.2 The Geneva airport safety policy
GIA has not laid down a clearly written policy statement concerning safety. There is no aerodrome manual available for GIA, as is recommended by ICAO Annex 14 (1.3.6). In this respect GIA is not yet on par with several main airports within Europe that have prepared an aerodrome manual, describing amongst others the airport's organisation and management including a safety management system. Vision and objectives towards safety, and the endorsement thereof by senior management, are therefore not made explicit.
Within GIA safety management has been embedded within the Operations department. In general safety instructions are only reflected in specific operational manuals, like f.i. the apron tower manual and the runway manual. These instructions are basically derived and adapted from the international rules as from ICAO Annex 14. Senior management has not specified clear safety targets or objectives. The Operations department is currently ISO9001 certified, and this is considered by GIA management sufficient to assure that satisfactory safety levels are met.

9.3.3 Safety Monitoring
Safety statistics are maintained within the Operations Division. In the absence of formal safety management procedures, safety monitoring appears to occur on an ad-hoc basis, using the available statistics. For instance statistics on bird strikes are gathered.

9.3.4 Threat identification, risk assessment and safety actions
Since there is no formal safety management system implemented at GIA, the key elements of such a system cannot be readily recognized within the organisation. It appears that within GIA there is a rather intuitive approach towards safety management that due to the relative small size of the organisation seems reasonably efficient. As an example it can be noticed that bird strike risks are dealt with in an appropriate way. Bird strike reports are gathered and analysed. Trends in bird strike risks are identified (showing a substantial increase in recent years). This has lead to several safety actions, such as:
• The recruitment of a full-time prevention officer
• Ecological and bird study of the airport site
• Set up of monitoring procedures
• Staff training

This particular example shows that in an intuitive way essential safety management principles are followed. However it is not clear how this approach is followed in other safety relevant areas of GIA's operations.

9.3.5 Evaluation of Safety Management at Geneva airport
Geneva airport has not yet implemented a formal safety management system, as recommended by ICAO Annex 14 standards. Therefore, most elements of a proper safety management system cannot be readily identified. There is no clear safety policy, the function of safety manager is not recognized within the organisation, and it is not clearly defined who is the accountable manager for safety within the organisation.

Therefore, safety management within Geneva has a somewhat ad-hoc character, and mainly depends on the individual safety culture and safety practices within the operational department.

Intentions to implement a safety management system according ICAO standards have been identified. However, Geneva airport appears to have a rather passive attitude towards this issue, and is awaiting instructions and initiatives from FOCA to guide them in the safety management implementation trajectory.

9.4 Conclusions in relation to safety management at airports in Switzerland
It is concluded that both airports that have been assessed in the context of the REACH investigation are currently lacking in the availability of a formal safety management system, according to ICAO Annex 14 standards.

As consequence both airports do 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 is primarily embedded within the operational departments. There is no formal safety manager who co-ordinates and monitors the various departments with
respect to safety issues and potential safety trends. Therefore, management of safety at both airports has a somewhat ad-hoc character.

Nevertheless, specific examples show that, in general, a positive safety culture does exist, and that sufficient expertise is available to identify safety issues and take corrective safety actions if necessary.

However, a formal approach to safety management is urgently needed in order to clearly define management's accountability and commitment for safety and to enable active control of safety performance at the airport in a structured way.

At both airports it has been recognised that compliance with safety management requirements in accordance with ICAO standards is an upcoming requirement.

**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.
10 The policy outcomes – how safe is aviation in Switzerland?

10.1 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 10 is about Policy Outcomes.

10.2 General
The previous chapters have described how aviation safety policies are set and implemented in Switzerland. The outcome is the development in aviation safety in Switzerland over the last two decades.

Clearly, for this assessment it is necessary that safety performance indicators be defined that truly reflect the level of aviation safety in Switzerland. In addition a reliable source of statistical information concerning these safety performance indicators has to be available in order to support any assessment of safety performance for a particular state. It should be noted that statistical exercises with commonly used safety performance indicators can be misleading. One should be well aware that the probability of an aircraft accident is very low. It can be pure coincidence that in one year some accidents occur and in another none. Therefore apparent trends may actually be the result of a random process, and care should be taken when attributing safety trends to, for instance, shortcomings in the definition or implementation of a safety policy without proper verification of the statistical significance of identified trends.

In light of the above there are only few safety performance parameters that meet the mentioned requirements for providing meaningful results. Commonly accepted safety performance indicators in this respect are the so-called accident and incident rates, representing the number of incidents and accidents per flight or flight hour.

These rates provide more meaningful information regarding the safety level than annual trends in absolute number of accidents and incidents, because they are compensated for variations in traffic volume.
In the present study an assessment of accident and incident rates has been made based on two main data sources, viz. the NLR Air Safety Database and statistical data reported by the AAIB Switzerland. Discussed will be the trends in accident rate in Switzerland, as compared to global and European trends. Moreover trends in the occurrences of air proximity (Airprox) events are discussed in order to get an impression of safety developments in air traffic management.

10.3 Aviation safety trend in Switzerland
One of the tasks of the Swiss Aviation Accident Investigation Bureau (AAIB) is to keep records on aviation accidents and incidents in Switzerland. These data are reported annually (see for instance for 2002, ref. 70). The focus of the present investigation is on safety of commercial aviation. Therefore, the presented data concern accidents and serious incidents with Swiss registered aircraft with a take-off mass of more than 5,700 kg.

The definition of accident and serious incident has not been specifically described in the publication of the AAIB, but it appears to be related to events with a level of severity that requires an official investigation by the Bureau.

The AAIB also provides the associated number of total flight hours of the Swiss registered fleet that is required to calculate the rate in terms of events per flight-hour.

Unfortunately, the publication of the AAIB does not provide the number of flight hours of the last three years. These numbers have been estimated using the average utilisation of Swiss registered aircraft.

Based on the raw data of the AAIB the rate of accidents and serious incidents can be calculated for each reporting year. Results are shown in the figure 10-1.
Based on the presented data no significant safety trends can be identified. Statistical tests show no significant difference (95% confidence) in the year by year comparison. This is caused by the low number of yearly events in combination with the modest number of flight hours. Statistical significance can however be improved by grouping events over multi-year periods. The next figure shows the results if the accident rate is calculated over a 4 year period.
As shown in figure 10-2 the trend in accident rate is better reflected by this way of data processing. Statistical tests show that differences in accident rate among subsequent time frames between 1979 and 1998 are insignificant. However, when comparing the accident rate in the time frame 1999-2002 with the rate in previous periods the difference is statistically significant with 95% confidence. This means that the safety of commercial aviation has deteriorated significantly in the period 1999-2002 and that it is very unlikely (probability of less than 5 %) that this is caused by coincidence.

10.4 International comparison

Another way of assessing the level of aviation safety in Switzerland is by comparison with the accident rate of other states. For this it is necessary to use internationally agreed definitions and a reliable source of international statistical data. In this context an accident has been defined according to ICAO Annex 13. That means the accident sample includes both fatal and non-fatal accidents. Data from the NLR Air Safety Database (ref. 181-182) have been used. The data in this database are composed of several different and complementary data sources including Airclaims, ICAO, AvSoft, aircraft manufacturers, accident investigation boards and others.
In order to get an indication of the operational safety level for Swiss registered aircraft with sufficient statistical significance, accident rates have been estimated for two larger periods; namely 1980-1989 and 1990-2002. Selection of smaller periods would lead to statistical less satisfactory results.

The result is shown in figure 10-3 for passenger, cargo and business aircraft operations for aircraft with a maximum take-off mass of 5,700 kg or higher.

A comparison is shown of world-wide accident rates with the accident rates for the three European benchmark states and Switzerland. On a world-wide scale the accident rate has clearly decreased in the period 1990-2002 compared to the period 1980-1989. There are a number of reasons for this decrease. For instance, the introduction of modern aircraft that started in the early 1980s really became significant in the 1990s when numerous operators across the world modernized their fleets. These modern new generation aircraft have a better safety performance than earlier designs. During the 1990s numerous safety initiatives were started. Although it is
difficult to actually quantify the improvement in safety due to these initiatives, it is generally believed that they had an overall positive contribution. Similar improvements are also noticeable for operators from France and the Netherlands, whereas German operators did not show a significant change. Accident rates for operators from Switzerland however show an opposite trend. In the time-frame 1980-1989 Switzerland shows excellent aviation performance, out-performing other states substantially. However, while other states show favourable trends in aviation safety in the period 1990-2002, the situation in Switzerland clearly degraded within this period. This means that Switzerland has lost its exemplary status in terms of aviation safety performance, and has become a state with an average safety record, on a European scale. The negative safety performance in Switzerland is mainly a result of a series of accidents at the end of time-frame 1990-2002. Clearly this has more than negated the potential positive effects of international safety initiatives that improved safety in other states. The mentioned safety trends cannot be attributed to coincidence. Statistical tests show with over 95% confidence that the negative safety trend in Switzerland is significant and therefore is expected to be the result of some underlying cause.

In order to show the development of the safety trend in Switzerland as clearly as possible a second analysis has been made based on the same statistical data, but now in direct comparison with the safety trend as experienced in the benchmark states (France, Germany and the Netherlands) as well as with the worldwide aviation safety trend. By grouping the data for the benchmark states it is possible to use data over shorter time periods without substantial effect on the statistical significance of the results. For this analysis data has been grouped over 6-year periods. In this way a clear impression of the safety trends over the last 24 years can be obtained. The result is shown in figure 10-4. As is evident from this figure the world-wide accident rate has continuously decreased over the past 24 years. Also in the benchmark states a similar decreasing trend in the number of accidents is shown, especially during the last 18 years. However, for Switzerland an opposite trend is shown again. Whereas the safety record in the time frame '79-'84 was excellent, the accident rate slowly moved to the level as achieved in the benchmark states. During the last 6-year period the accident rate in Switzerland even appears to have surpassed that of the benchmark states. However, statistical tests show that in the time frame '97-'02 the difference in accident rate between the benchmark states and Switzerland cannot be determined with 95% confidence.
Chapter 10 The policy outcomes – how safe is aviation in Switzerland?

Accident rate by Operator Domicile

Passenger, cargo and business operations
max takeoff weight > 5,700 kg

Figure 10-4 Safety trend in Switzerland in comparison with benchmark states and worldwide

10.5 ATM safety trend in Switzerland

In general it is difficult to assess Air Traffic Management (ATM) safety trends on a national or international scale. The reason for this is that there are few well-defined safety performance indicators related to ATM. Of course, safety related occurrences, such as air proximity events, runway incursions, level busts, etc., are reported. However, there have been in the recent past no clear, and internationally accepted, definitions of what constitutes such events. Therefore what is reported and what not varies widely among states. Moreover the willingness of air traffic controllers to report certain events can differ substantially from state to state.

For this reason ATM related incident rates cannot be compared among states in an absolute sense.

It is expected that the introduction of the TOKAI database and toolkit by Skyguide and other Air navigation Service Providers within the Eurocontrol region may harmonise the reporting and investigation process in the future. However, for the present investigation results of TOKAI are not yet available.
The only safety performance indicator related to ATM that is consistently reported and publicly made available in Switzerland over a significant time period, is the so-called Airprox rate. That is the number of reported air proximities (Airprox) per 100,000 instrument (IFR) flights. Air proximities within Swiss airspace are reported by air traffic controllers or pilots to the Swiss AAIB by means of an ATIR (Air Traffic Incident Report), in case two or more aircraft unintentionally get close to each other. The Airproxes are categorised in accordance with their level of severity.

In general the Swiss AAIB only investigates the most severe Airproxes (i.e. with a high collision risk). The Swiss AAIB maintains records concerning the total number of reported Airproxes, categorised by severity, and publicises the ATIR Airprox statistics in their annual accident and incident statistical report (ref. 68-70). So, in order to get an impression of the trends in ATM safety in Switzerland the number of Airproxes, as reported to the Swiss AAIB has been used. In general it is found that the total number of reported Airproxes in Swiss controlled airspace has risen significantly over the last three years (2000-2002). In the time period 1992-1998 usually between 10 and 20 Airproxes were reported annually, whereas in the last three year around 50 were reported each year.

It should be noted that this increase in Airprox reports coincides with the introduction of the mandated installation (per January 1, 2000) of so-called Airborne Collision Avoidance Systems (ACAS) within Europe. It is expected that due to the mandated carriage of this equipment the probability of Airprox reports has increased because flight crews are alerted to air proximity events that otherwise might have gone unnoticed or unreported. Also, the introduction of the Short Term Conflict Alert (STCA) may have made controllers more aware of potential conflicts. Therefore the rise in the total number of reported Airproxes cannot be directly considered to be an indication of degrading safety performance, but may be a consequence of a reporting bias.

Therefore, it may be more useful to look at the rate of Airproxes with a high collision risk. It is less likely that events in this category will go unnoticed or unreported, even in the absence of a TCAS system, because these are serious incidents that require a formal investigation by the AAIB. On the other hand it should be noted that until October 1999, Airprox ATIR reports were all sent to FOCA for further processing and investigation. However, after that data the procedure was changed and all Airprox ATIRs were sent to the AAIB. From this date the AAIB had to process the reports and had to decide which events were serious enough for further investigation. In this process it is possible that FOCA and AAIB used different criteria, leading to changes in the number of incidents, classified as "high risk". A possible indication that this effect is actually present can be derived from the fact that that in the time frame 1992-1998
usually 10%-30% of the total reports was classified as "high risk", while from 1999 this percentage increased to around 30%-40%.

Nevertheless if we analyse the trend in ATM incident rate the following can be observed. Based on the AAIB data the development (over the last decade) of the "high risk" Airprox incident rate is shown in the figure 10-5. In order to improve statistical significance, the data have been grouped over two year periods.

As shown, the Airprox rate shows a marked increase within the last four years as compared with the period before. Statistical tests show with over 95% confidence that this difference is statistically significant, and thus cannot be attributed to chance.

As mentioned earlier the Airprox rate in Swiss controlled airspace cannot be compared with figures from other states in an absolute sense. Nevertheless it is observed, that on a European scale, based on reports from Eurocontrol and annual reports of ANS providers in the benchmark states, the Airprox rate has been more or less constant, or even slightly decreasing, over recent years.

As discussed it cannot be excluded that the change in "high risk" Airprox rate in Switzerland has been caused to some extent by a reporting bias. However it is not likely that the sharp increase in ATM incidents can be fully attributed to this effect. Therefore, it appears that ATM safety has seen over recent years a similar negative safety trend as the aircraft accident rate as discussed in the previous paragraphs. This negative ATM safety trend in Switzerland is in contrast with other European states, where a neutral or positive development is seen.

Explanations for this increase could be that traffic has grown strongly, that the Eurocontrol Central Flow Management Unit was not yet well able to provide a suitable traffic load to the Swiss sectors, and that some capacity enhancement measures were introduced that may have produced more airprox events.
10.6 The effectiveness of Swiss aviation safety policy

In previous chapters of this report it has been established that the Swiss aviation safety policy has not been well developed. If one can speak of a policy, it is merely a reflection of a general desire to stay in tune with developments in other Western-European states. The statistics, as presented in this chapter, indicate that aviation safety trends in Switzerland during the last decade have been quite opposite to developments in other Western-European states.

In a statistical sense this negative trend has been identified with a high level of confidence. In the last decade Switzerland has forfeited its leadership in safety performance that it had in the time period 1980-1990. On European scale aviation safety performance in Switzerland is characterized as mediocre over the last decade, while a series of accidents and incidents over the last four years are an indication that safety developments in Switzerland do follow a progressing negative trend.

Clearly this development is in breach with the general Swiss aviation safety policy, which has as its objective to be on par with international performance. For this reason the outcome of the Swiss aviation policy is considered as unsatisfactory. The policy itself has shown to be ineffective in dealing with changes and threats that have occurred to the Swiss air transportation system within the last decade.
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 of the Policy Outcomes.

11.2 FOCA
If safety would be an item in government and department policies, a need would be present to receive feedback on the extent to which the policy targets are being met. It would then seem reasonable that FOCA does report on the state of the industry with regard to safety to the Department and the Government. This would particularly apply to information that only FOCA does possess such as information on audit findings on compliance. While such information would not formally constitute outcome data (data on accidents and incidents) it would certainly constitute safety performance indicators that could be used pro-actively instead of reactively.

As safety is not a specific policy item however, FOCA does not report on the state of the industry with regard to safety in their annual report other than providing a mere replication of the data provided by AAIB. FOCA is also not being asked by DETEC to provide such information.

11.3 AAIB

11.3.1 The organisation, processes and facilities of AAIB

11.3.1.1 General
AAIB is the accident investigation authority of Switzerland. AAIB has a single office near Bern Airport. AAIB conducts the investigation of accidents and serious incidents for the purpose of
accident prevention. On average, AAIB investigates 36 accidents and serious incidents\textsuperscript{14} per year.

11.3.1.2 Legal basis

The legal status of AAIB is governed by the "Verordnung über die Untersuchung von Flugunfällen und schweren Vorfällen (VFU)" of 23 November 1994 (Issue of 12 Oktober 1999), which is based upon Artikel 24–26c of the Luftfahrtgesetzes of 21 December 1948 (LFG), 748.126.3.

Administratively, AAIB resides under the General Secretariat of the federal Department of Environment, Traffic, Energy and Communication (DETEC). AAIB has, for all practical purposes, the independent position as stipulated by the law. These Swiss laws constitute the national implementation of ICAO Annex 13.

A noteworthy matter is the fact that Switzerland has filed a difference with ICAO regarding the national implementation of the ICAO annex. The difference filed concerns the rather essential provision 5.12 in the ICAO annex that stipulates that evidence given in the course of an investigation by the accident investigation authorities for the purpose of accident prevention shall not be admissible as evidence in a criminal or civil case before a court of law. This provision is of key importance because it will allow witnesses to fully and freely co-operate with the AAIB investigation without fear of retribution. The difference filed by the Swiss government means that this ‘protection’ is not available to witnesses and hence they may elect not to give evidence other than in response to questions by department of justice officials.

While Switzerland is not a member of the European Union, Switzerland and the EU have established an agreement (ref. 259) to the effect that much European legislation becomes mandatory in Switzerland. The European Commission and Parliament have recently ratified a new directive governing occurrence reporting in civil aviation. The new directive also holds provisions for the establishment of a so-called voluntary incident reporting programme. Such a programme would allow people to voluntarily report safety relevant incidents in such a way that their identity is protected and eventually removed from the records. The essence of this part of the EU directive is in accordance with the accident prevention chapter of ICAO Annex 13.

There is no intention in the Swiss government to utilise the provisions in the EU Directive to implement a voluntary reporting programme. This will constitute a missed opportunity, also in view of the increasing role of the Swiss Office of the Federal Eterny in the legal aftermath of accidents and incidents. As such, and also bearing in mind that Switzerland has filed a difference with ICAO regarding the use of evidence given to AAIB in civil or criminal cases, it

\textsuperscript{14} Exclusive of ATIRS.
does not reflect a pro-active stance towards accident prevention in the legal basis for accident and incident investigation in Switzerland.

Further information with regard to the removal of the exemption to Annex 13 and the need to establish a voluntary occurrence reporting programme is provided in Appendix F.

11.3.1.3 Personnel
A group of five qualified accident investigators and three administrators conduct the work of AAIB. The investigators are recruited from the aviation community in Switzerland and hence have gained experience in aviation before joining AAIB.

All investigators receive training in aircraft accident investigation at Cranfield University in the United Kingdom. The Cranfield course is one of the leading training courses for accident investigators in the world. Further on-the-job training is provided in an informal manner. Investigators are given the authority to act as the Investigator in Charge by the Head of AAIB.

Of the five investigators, two are very experienced and have been active as investigators at AAIB for over ten years. The other three are less experienced as investigators (between 1 and 4 years). The recent spate of accidents in Switzerland has of course accelerated the build-up of experience and hence the AAIB group of investigators may be considered well prepared to conduct the duties of AAIB.

The investigators of AAIB all hold pilots licences and are current in various types of fixed wing aircraft and helicopters. While current piloting experience on light aircraft is useful to an accident investigator, it is the currency on larger transport category aircraft that provides exposure to airline and other commercial operations. This is particularly useful to the investigator tasked with accidents and serious incidents involving transport category aircraft. AAIB is fortunate to employ four investigators holding current air transport category (ATPL) and helicopter licenses.

In addition to the investigators, an extensive group of some forty external experts in various fields has been assembled by AAIB. These experts are called upon as the need arises. Most experts have quite recently retired from the aviation sector. They provide specific expertise that is difficult or impossible for the AAIB investigators to attain on-the-job.
Chapter 11 Feedback of the safety outcomes to the national policy – the role of AAIB, EFUK and FOCA

11.3.1.4 Investigation procedures and results

11.3.1.4.1 Independence
AAIB does not commit investigators to investigations involving operators with whom they have any significant relationship, for example because they currently perform pilot duties for these operators or because they have been previously employed by these operators. The external experts too are not called in for assistance on accidents involving operators to whom they are related in any way that could potentially be detrimental to their judgement. The need to ensure that investigators do not work on cases involving interests to whom they are in some way related may, in a given case, mean that the best expertise available can not be put to use in the investigation. For a relatively small authority, which, for a given discipline, often relies on the expertise of single expert, this may sometimes pose quite a handicap.

11.3.1.4.2 Timeliness
A total of 178 accidents have occurred in the 1998 - 2002 timeframe, or about 36 per year. Of these 178 accidents, 38 (about 20 %) occurred outside of Switzerland. The local authorities usually conduct these investigations, and AAIB may, in accordance with Annex 13, participate as the accredited representative of Switzerland. The effort involved with these foreign cases varies from full participation, such as with Swissair 111, to very minor involvement. The investigation reports about half of the accidents in Switzerland were completed and published within the 18 month period suggested by the law. The average completion time for AAIB investigations in the 1998-2002 timeframe was about 18 months. About 1 of every 6 reports subsequently enters into the recourse process through EFUK. While a 6 month completion period is suggested in the law for EFUK, in practice, most of the reports submitted to EFUK took longer to complete. The average completion time for EFUK is about 11 months. Over the last four years the number of major accidents and serious incidents, notably the Swissair Flight 111, Crossair Flight 498 near Nassenwil, Crossair Flight 3597 near Bassersdorf and the midair accident near Ueberlingen, Germany, strained AAIB beyond its capacity. This is why the 18 month period was exceeded more often in investigations. Assuming that the recent series of accidents is not representative of the average frequency of accidents to be expected in the future, staffing levels at AAIB appear to be sufficient to ensure timely completion of the investigations. Nevertheless, it is worrisome to see that of the four major accidents involving Swiss interests over the last four years, no final accident investigation reports were made public by the

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15 These are accidents to aircraft ranging from (many) gliders and small private aircraft to (fewer) large intercontinental jetliners
16 This accident occurred near Halifax, Canada on 2 September 1998. While the Canadian Transportation Safety Board therefore led the investigation, a significant effort was made by AAIB in assisting the Canadian Authorities in accordance with Annex 13.
17 The final accident investigation report of Swissair Flight 111 was made public in February of 2003, more than four years after the accident date.
18 The German accident investigation authorities lead this investigation. In view of the involvement of Skyguide, the Swiss ANS provider, AAIB is assisting the German authorities.
beginning of 2003. As regards the two major Crossair accidents near Nassenwil and Bassersdorf that were investigated under the authority of the AAIB, it took 36\textsuperscript{18} months to complete the report of the Nassenwil case, and no final report is yet available 18 months after the Bassersdorf case. While intermediate reports have been published to ensure that important safety messages are being spread, this delay in reporting is detrimental to the management of safety because some of the organisations involved may elect to await the formal final report before taking action upon the findings. FOCA, being the main addressee of AAIB’s Safety Recommendations, is not obliged to act upon the intermediate reports by law, but in practice treats the intermediate report safety recommendations as if they were final, thus alleviating the consequences of the delay in the publication of final reports.

In the benchmark states, formal completion periods for investigation reports are resp. 16, 34 and 31 months in Germany, France and the Netherlands. Actual completions periods in the benchmarks states vary considerably but tend to be longer. The time needed for the recourse process through EFUK is not needed elsewhere, since such a procedure is unique to Switzerland.

11.3.1.4.3 Quality
The quality of the AAIB investigation as judged from their findings and reports is good. Appropriate attention is given to the technical operational and organisational aspects of the investigation. AAIB obviously benefits from their well-established network of external experts and the considerable experience of their investigators in charge. The AAIB reports seem to be somewhat concise in comparison to the reports from the benchmark states.

11.3.1.4.4 Investigation strategy
The Swiss AAIB uses a scenario-based investigation strategy. This is an approach in which, in the early stages of the investigation, a number of possible accident scenarios are generated through a brainstorm session with a large representation from the investigation team. These scenarios are being used to focus the investigation efforts on particular aspects. As more evidence becomes available, the list of possible scenarios is reduced by discarding the scenarios that are invalid in view of the evidence. This process is continued until a most likely scenario is left. Thereafter, appropriate validation efforts are made. The alternative procedure to this scenario-based approach is to first collect all evidence and investigate any aspect that could potentially be of relevance, and then, based on a large amount of evidence, derive the most likely scenario and causal and contributing factors. This approach constitutes more of a “brute

\textsuperscript{18} This report is now still not published because it is subject to a recourse procedure through EFUK. The EFUK procedure takes about 11 months on average.
force” method. While it is more thorough and carries a smaller risk of an inappropriately biased investigation, it is usually not an option to smaller states. Only the larger authorities possess the resources to follow this approach. The scenario based procedure is efficient and can produce equally good results, provided that well experienced, truly independent staff are conducting it, together with a fairly large group of well qualified specialists, preferably from the different interests that are entitled to be a part of the investigation in accordance with Annex 13. In AAIB, these conditions are fulfilled and hence the scenario-based approach is an adequate strategy.

11.3.1.5 Network
AAIB is relatively well staffed. Nevertheless, like any accident investigation authority in a relatively small state, handling a major accident will strain resources to their limits. Also, it is difficult, and sometimes not reasonably feasible for smaller states to possess and maintain cutting edge expertise in all relevant disciplines. The necessary expertise can in many cases be found in the air transport sector of the nation involved. For this reason, and as a practical solution, some smaller authorities attract experts from the air transport sector for the duration of the investigation. This is a good solution, but the use of these experts may sometimes be less desirable in view of the need to ensure independence. The handicap of being a smaller authority also comes into play when specialised facilities are needed, such as equipment for the recovery and analysis of data from Flight Data Recorders, Cockpit Voice recorders and non-volatile memories from avionics. Also, special facilities for further analysis such as aircraft simulators, wind tunnels and aircraft performance & handling software are often not at the disposal of the investigators in their own state.

To relieve these disadvantages of being a relatively small authority such as AAIB, a well developed network of contacts in the accident investigation authorities of other nations is very important. Such a network may help to provide expertise and facilities and will thus help the authority to strengthen its independence and capabilities. The network of AAIB appears to be well developed. Good contacts exist with the main authorities in Europe (AIB – UK, BEA – France, BFU-Germany). These contacts are not institutionalised and hence are based on personal contacts, in the case of AAIB mainly at the level of the head of AAIB.

11.3.1.6 Facilities
The facilities that are at the disposal of AAIB to conduct their investigation are state of the art. AAIB is well provided with the necessary offices, vehicles and other equipment to conduct their tasks. AAIB has no laboratories of its own. Therefore, AAIB relies on the facilities of a university for the forensic aspects of the investigation, such as establishing possible traces of
medication in the body tissues of accident victims. Foreign facilities such as those of BFU of Germany and BEA of France are used to conduct the read-out and analysis of flight recorders. AAIB does possess and operate their own software tools (RAPS) for the analysis of data from Flight Data Recorder, which is a quite advanced capability for a smaller authority. There is some dependence on aircraft, engine and equipment manufacturers for specific technical assistance such as retrieving data from memory chips in aircraft equipment. This use of the manufacturer for such tasks is common, also in the benchmark states. Access to aircraft or simulators is found without difficulty in Switzerland or abroad. Of course the use of third party facilities requires funding. The same is true for the use of the services of the external experts of AAIB. As the need arises, and within reason, AAIB is adequately funded by DETEC to cover these expenses. The fact that the Department of Justice is building up a stronger ability to investigate aviation accidents and incidents may mean that the use of University facilities could become less desirable in some cases in the future. While in many states it is quite common to share objective evidence with the police authorities in the course of an investigation, conflicts of interest might arise regarding the way in which a particular piece of evidence is being treated by the university lab. It is however reasonable to expect that in the vast majority of cases this is not an issue.

### 11.3.2 Communication

External communications by AAIB serve two main purposes, (1) to keep the interested parties, including the government and political parties, and the general public informed about the accident and the investigation and (2) to ensure that relevant safety information is fed back to the organisations that carry a responsibility in aviation safety. This latter group is to be served with short term information that might be of immediate importance to safety and longer term information, as well as recommendations for implementation in due time. In accordance with the law, reports and recommendations are addressed to FOCA.

The law also tasks AAIB to produce safety statistics. These statistics currently are presented as tables containing relevant data. This is important but of limited further utility. Deriving additional insight in these data, for example regarding trends in causal factors, would require further analysis. Such analysis is currently not conducted, also as this is a subject of debate between AAIB and FOCA.

AAIB maintains a well developed website where all pertinent information can be found. The information on the website is well maintained bearing in mind the overload of AAIB in recent times.
AAIB meets their obligations regarding the reporting of accidents to ICAO ADREP.

AAIB employs various means to get their message across, including the public media. Considerable discontent exists in the Swiss aviation sector about AAIB’s policy and conduct in this regard. This matter is contemplated further in the analysis paragraph.

11.3.3 Authority
There is broad agreement throughout the Swiss airtransport sector and government on the excellent technical and operational expertise and investigative capabilities of AAIB. While there are differences of opinion on the Safety Recommendations of AAIB, there is agreement on the correctness and completeness of the causal factors and contributing factors as identified by AAIB. The authority of AAIB is however negatively affected by the communication strategies of AAIB. As a consequence, the overall authority of AAIB with the organisations that are in a position to make change to the air transport system, is less than might be expected on the basis of the investigative competence of AAIB alone.

The authority of AAIB is further compromised by the recourse process through EFUK. This matter is discussed further in the analysis.

11.3.4 The relation to government agencies

The relation to DETEC
Formally speaking, the relation between AAIB and DETEC is only of an administrative nature. AAIB formally comes under DETEC and receives its funding also from DETEC. The facilities and operational freedom of AAIB, for example in training & travel for the investigators, in AAIB’s ability to provide adequate allowances to their external advisors and to use third party services as deemed necessary, is evidence of the fact that DETEC provides ample financial support to the activities of AAIB. Regularly, DETEC is forced to mediate between FOCA and AAIB and to respond to direct communications between AAIB and the Minister of DETEC. In view of the limited domain knowledge on aviation operations, technology and regulation available at DETEC, this mediation role weighs heavily upon DETEC. DETEC has confidence in the accident investigation capabilities of AAIB, but experiences the constant debate between AAIB and FOCA as a serious problem that must be resolved. The quality of the relation between DETEC and AAIB can be characterised as ‘poor’ at this point in time.
The relation to FOCA

The accident investigation reports of AAIB are addressed to FOCA. FOCA is responsible for taking a position on the AAIB Safety Recommendations and for the implementation of the Recommendations. Hence, FOCA is an important element in the closure of the safety feedback loop. Nevertheless, the relation between AAIB and FOCA, in particular at the management level, is very poor. In the opinion of AAIB, the implementation of the Safety Recommendations by FOCA is unsatisfactory and hence important safety risks identified by AAIB are not being resolved, thus remaining a threat to the safety of air transport in Switzerland. In the opinion of FOCA, AAIB does not conduct its role in accordance with its role as stipulated in the law. In the opinion of FOCA, AAIB acts as if they were an oversight authority for the implementation by FOCA of the Safety Recommendations, thus extending their role beyond their legal scope of investigating accidents and making safety recommendations. While some progress has been achieved in normalising the AAIB-FOCA relation, in particular through efforts by FOCA, large differences of opinion remain unresolved. This is well characterised by the rate of implementation of AAIB safety recommendations regarding accidents with large commercial aircraft (beyond 5,7 tonnes MTOW). The relation between AAIB and FOCA can be characterised as unacceptably dysfunctional in view of the important role of FOCA in the implementation of AAIB recommendations.

11.3.5 Accident investigation in Switzerland in comparison to the benchmark states

The characteristics and performance of the accident investigation authorities in the benchmark states Germany, France and the Netherlands have been investigated in order to provide some perspective to the findings with regard to AAIB.

Germany: Bundesstelle für Flugunfalluntersuchung BFU-GE

The AAIB-GE is organised into four divisions: investigation (Investigation of Accidents and Incidents), Special Division 1 (flight recorders, avionics lab, wreckage hanger, technical assistance), Special Division 2 (analysis and accident prevention), Special division 3 (administration). The investigation division consists of 22 people (incl. division head and assistants) who are all accident investigators, the Special Division 1 consists of 5 people, the Special Division 2 consists of 6 people and the Special division 3 has 6 persons. In addition to these people the AAIB has about 100 persons available for field investigations. These are known as "Beauftragte". These people are employed within the aviation sector. The AAIB-GE has agreements with these people and their employers so that they are available for ad-hoc field investigations. The field investigators send their findings to the AAIB investigator, who then makes his report.
Most of the expertise required for basic accident investigation is available within the AAIB itself. However, external experts are sometimes used for weather expertise or materials analysis. No information is available on how many occasions these external experts were used. About 300 aviation accidents occur annually in Germany. These include large commercial aircraft, general aviation, helicopters, balloons, and sailplanes. The AAIB-GE conducts formal investigations in about 15% of these accidents. The average time between the accident date and date of publication of the report is around 16 months\(^{19}\) and is increasing slightly. Investigations involving large commercial aircraft are only about 10% of all investigations conducted. The AAIB-GE formally reports to the German Ministry of Transport. Safety recommendations are made to those organisations involved and include all actors in aviation (e.g. LBA, DFS, manufactures, foreign aviation organisations, airports, ICAO etc.). Responses to the recommendation are given by the involved organisations and are monitored and reported by the AAIB-GE. On average there are about two safety recommendations per investigated occurrence. However the number of recommendations can be different depending on the type of event and the consequences. Most recommendations concern procedures, organisation and regulations. About 80% of the recommendations made by the AAIB-GE are implemented by the organisations involved. This implementation rate is the same for those accidents involving aircraft in the weight category of 5700 kg and higher. Sometimes small differences are proposed by the involved organisations. Most safety recommendations made by AAIB-GE are described in great detail and seem to be feasible most of the time.

The AAIB-GE has a special division dealing with analysis and accident prevention. They make, amongst others, a special safety magazine (Flugsicherheitsinformation) dealing with relevant safety problems.

**France: Bureau Enquêtes-Accidents BEA**

The BEA is organised into a number of departments including public affairs, investigation, safety analysis, engineering, and administration. The BEA has 83 staff members, of whom 30 are **investigators** and 10 are **investigative assistants**. The BEA can make use of a large group of qualified Civil Aviation personnel, known as Field Investigators. The BEA can, on its own authority, call upon the assistance of the Civil Aviation Authority (DGAC) the Ministry of Defence, the Meteorological Service, industrial groups, shippers and other professionals. The BEA is involved in about 700 events a year. Furthermore BEA often offers assistance to investigations regarding accidents that have occurred outside French territory. Approximately 300 accidents occur annually on French territory, which include large commercial aircraft, general aviation, helicopters, ultra-lights, balloons, and sailplanes. About 3% of all these accidents involve commercial operated aircraft. Full investigations are conducted for a small number of these accidents, usually those involving public transport.

number of accidents: the BEA publishes about 15-20 accident investigation reports per year. The average time between the accident date and date of publication of the report is around 34 months\(^{20}\).

The BEA formally reports to the Ministry of Transport. Safety recommendations are made to those organisations involved and include all actors in aviation (e.g. DGAC, manufactures, foreign aviation organisations, airports, ICAO etc.). The organisation in charge of answering and implementing the safety recommendations, is La Direction Générale de l'Aviation Civile DGAC. The BEA monitors the status of their safety recommendations. On average there are about two safety recommendations made by the BEA per investigated occurrence. However, the number of recommendations may differ considerably depending on the type of event and the consequences. Most recommendations concern procedures, organisation and regulations. Most safety recommendations made by BEA are concise and clear. The safety recommendations made by the BEA are considered feasible in most of the cases.

The BEA has in-house expertise and equipment for CVR/FDR readout and analysis, and for materials research. The BEA also makes use from the expertise offered by the Centre d'Essais des Propulseurs, Centre D'Essais Aeronautique de Toulouse and other organisations on which about 15% of BEA's annual expenses (excluding salaries and costs of establishments) is spent.

France has filed an exemption to paragraph 5.12 of Annex 13 to the effect that data from flight data recorders and other evidence are not protected from use in court cases. The judicial investigation takes precedence over the accident investigation by BEA in fatal accidents. Several other limitations exist, for instance with regard to the performance of autopsies.

The BEA runs a programme called the REC (Recueil d'Événements Confidentiel - Confidential Event Reporting System), in charge of collecting confidential events. Its current framework deals with all activities related to General Aviation (training, aerial work, helicopters, ultra lights, gliders etc).

The mission of the REC unit consists of collecting reports of minor incidents or the relation of events that occurs separately, and formalizing them in order to facilitate their exploitation by the aviation community on a large scale. This entity works thanks to the voluntary input of aviation users who concur to enhance safety. They have the possibility to report on an event which is not subject to a mandatory procedure but which is likely to procure useful information on the prevention of accidents.

The author of such a report is granted the following guaranties:

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\(^{20}\) Based on reports published in 2001 and counting only one report for each accident. This year may be not representative because of the Concorde accident.
confidentiality of the report;
- deletion of information regarding its source before recording and exploiting the data of the event;
- systematic feedback;
- application of article L 722.2 of the Civil Aviation Code.

As stated in Article L 722.2 of the Civil Aviation Code, any person involved in an incident, which spontaneously and with no delay reports it to the BEA, is protected from any disciplinary or administrative sanction, except in case of deliberate or repeated offences to safety rules. This Article appears in Book 7 of the Civil Aviation Code in accordance with the Law n° 99-243 of 29 March 1999, which follows the European Directive 94/56/CE and sets up the new regime for technical aircraft accident investigation.

The Netherlands: Raad voor de Transportveiligheid RvTV
The activities of the RvTV are not limited to aviation only. As being a transport safety agency, accident investigations are conducted for all means of transportation (shipping, railroad traffic, road transport, and aviation). The review presented here is limited to the aviation sector of the investigation agency. There are about 140 aviation occurrences reported to the RvTV per year. The RvTV investigates about 10-15 accidents per year of which the majority (80%) are (non-commercial) general aviation type of aircraft. The average time between the accident date and date of publication of the report is around 31 months and is declining slightly. In 2001 the RvTV assisted in 6 accidents that occurred abroad with either Dutch registered aircraft or aircraft designed by Fokker. On average the RvTV makes two safety recommendations per investigated accident. In the period 1999-2000, the RvTV made 20 safety recommendations of which 18 were accepted. No reaction was received on the 2 remaining recommendations. The RvTV reports to the Ministry of Transport. According to Dutch law a reaction to a recommendation must made to the Ministry of Transport within one year. A copy of the reaction should be sent to the RvTV. The RvTV does not monitor the implementation of its recommendation nor is it required to do so. Safety recommendations are made to those organisations involved and include all actors in aviation. Most recommendations concern procedures, organisation and regulations. Most safety recommendations made by the RvTV are concise and clear. The safety recommendations made by the RvTV are considered feasible in most of the cases. The RvTV has 6 investigators within the aviation division. Outside expertise is often required on for instance materials research, flight data & cockpit voice recorder readouts, flight reconstruction and other areas. Based on information from the exploitation account it is estimated that about 15% of the total personnel hour costs are due the hire of external experts.
The Netherlands have not filed exemptions to ICAO Annex 13.

No specific provisions are available in Dutch law to facilitate voluntary reporting programmes.

**Switzerland: Büro für Flugunfalluntersuchungen AAIB-CH**

On average 240 occurrences are reported to the AAIB per year. The AAIB-CH investigates about 30-40 accidents and serious incidents per year, including occurrences with Swiss registered aircraft outside of Switzerland. The majority concerns accidents with aircraft with a maximum takeoff weight of less than 5700 kg. The average time between the accident date and date of publication of the report is around 18 months$^{21}$. This time was however much shorter in 1999 and has been increasing strongly since then due to a number of major accidents and the adoption of additional duties, such as the investigation of Airprox reports. In most other states, a separate airprox committee often investigates these events. The AAIB has 5 **investigators** and 3 administrative employees. External expertise is sometimes required. For example the AAIB does not have the hardware for downloading Flight Data Recorders, which requires the support of an external party. However, AAIB-CH does have FDR analysis software to analyse the data themselves. From the exploitation account of 2002, it was estimated that external experts made about 10% of the total hours logged by the investigators. The AAIB-CH reports to the FOCA. On average there are about two safety recommendations per investigated occurrence. However the number of recommendations can be different depending on the type of event and the consequences. Responses to the recommendation are given by the FOCA (normally after consultation with the involved organisations). These responses are monitored and reported by the AAIB-CH. About 85% of all safety recommendations made by the AAIB were partly or completely accepted. However, for those accidents involving aircraft in the weight category of 5700 kg and higher the implementation rate is much lower namely 62% according to FOCA. In 43% of these cases however, the AAIB considers the actual implementation of the recommendations not satisfactory. Most recommendations concern procedures, organisation and regulations. Most safety recommendations made by AAIB-CH are concise and clear. However, it is sometimes not clearly set out by the AAIB-CH what it is trying to achieve through a particular recommendation. In some cases the recommendations concerned issues (e.g. international regulations) on which the FOCA has little influence.

The AAIB-CH publishes an annual report with information on the safety statistics in Switzerland.

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$^{21}$ Based on reports published between 1999 and May of 2003, including reports that were published by EFUK, the impact of EFUK on the average is negligible.
### Discussion

The table below summarises the data provided in the previous paragraphs.

*Table 11-0 Comparison of characteristics of accident investigation agencies*

<table>
<thead>
<tr>
<th></th>
<th>Swiss AAIB</th>
<th>German AAIB</th>
<th>France BEA</th>
<th>Dutch RvTV</th>
</tr>
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<tr>
<td>Number of occurrences reported to</td>
<td>240</td>
<td>300</td>
<td>700</td>
<td>140</td>
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<tr>
<td>Number of occurrences investigated</td>
<td>36</td>
<td>44</td>
<td>300</td>
<td>14</td>
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<td>Number of reports per year</td>
<td>36</td>
<td>44</td>
<td>18</td>
<td>14</td>
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<tr>
<td>Number of investigators</td>
<td>5</td>
<td>22</td>
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<td>6</td>
</tr>
<tr>
<td>Number of other staff</td>
<td>3 +experts</td>
<td>17</td>
<td>43</td>
<td>3</td>
</tr>
<tr>
<td>Number of field reps</td>
<td>0</td>
<td>100</td>
<td>many</td>
<td>0</td>
</tr>
<tr>
<td>Third party support [in % of own resources]</td>
<td>10%</td>
<td>n/a</td>
<td>15%</td>
<td>30%</td>
</tr>
<tr>
<td>Average reporting time [months]</td>
<td>18</td>
<td>16</td>
<td>34</td>
<td>31</td>
</tr>
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<td>Exception to Annex 13 para. 5.12</td>
<td>yes</td>
<td>no</td>
<td>yes</td>
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<td>Legal provisions for voluntary reporting</td>
<td>no</td>
<td>no</td>
<td>yes</td>
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<tr>
<td>Analysis capability &amp; special studies</td>
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<td>Investigates Airprox reports</td>
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<td>no</td>
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</tr>
<tr>
<td>Occurrences per investigator excl. field reps</td>
<td>48,0</td>
<td>13,6</td>
<td>17,5</td>
<td>23,3</td>
</tr>
<tr>
<td>Investigation reports per investigator</td>
<td>7,2</td>
<td>2,0</td>
<td>0,5</td>
<td>2,3</td>
</tr>
</tbody>
</table>

All four accident investigation agencies work according to the standards and recommended practices provided in ICAO Annex 13. The BFU-GE, RvTV and the BEA (as being EU members states) also must comply with EU Directive (94/56/CE) which outlines the legal framework for accident investigations. The agency conducting the investigation should release the final report in the shortest possible time and, if possible, within twelve months of the date of the occurrence. Especially major accidents can take more time than the twelve months recommended by ICAO. The German and Swiss AAIB perform comparatively well in this regard. With reporting times between 16 and 18 months on average, they are about twice as fast as the French and Dutch agencies.

All four accident investigation agencies investigate aviation accidents and incidents. The type of incidents investigated can differ amongst the different agencies. This is mainly due to the fact that the definition of an incident as given by ICAO in Annex 13, is very general and is interpreted differently by the investigation agencies. There can also be other reasons. For instance, the AAIB-CH investigates numerous airprox incidents. In Germany and the Netherlands a special committee investigates most of these airprox incidents. While such a committee does exist in Switzerland the investigation of airprox incidents is part of the task of the AAIB-CH. On the other hand, whereas the French, the German and the Dutch authorities do investigate accidents with Balloons and ULM's, the AAIB-CH does not. When trying to
compare productivity, it must be kept in mind that the treatment given to reported occurrences may differ considerably between authorities. Where some may write short reports on smaller accidents and incidents, others may just produce a short notification. Nevertheless, taking into account the differences mentioned above, the number of reported occurrences per investigator does provide some insight in productivity. In this regard, the productivity of AAIB-CH is at least twice that of the other authorities. Also when looking at the larger occurrences for which investigation reports are produced, and also bearing in mind that the scope of reports may differ considerably between occurrences and between authorities, the productivity of AAIB-CH exceeds that of the other authorities by a wide margin. Considering the fact that the amount of external support hired by AAIB is also less than for the other authorities, AAIB performs very well in this regard.

The reports written by all four accident investigation agencies are generally considered to be of good quality with well presented results and analysis.

The safety recommendations made by the four reviewed investigation agencies are comparable in terms of the level of detail, type of recommendations, and the addressed organisations. Also the average number of recommendations made per accident is the same for all four investigation agencies. Not all recommendations made by the accident investigation agencies were implemented. According to ICAO Annex 13 there is no obligation for a recipient to implement the safety recommendations they have received. In case of no action taken a recipient should state its reasons for doing so, as was the case in all four states review here. Some recommendations were not implemented because they were considered impractical or the cost involved could not be justified in terms of the expected safety benefits. Normally an accident investigation agency does not have the resources and/or required knowledge to carry out a full cost-benefit analysis of every recommendation it makes. About 85% of all safety recommendations made by AAIB-CH are implemented, which is comparable to the implementation rates of AAIB-GE and the RvTV (no information was available regarding the implementation of BEA recommendations). This implementation rate is also comparable to other states such the United Kingdom (80%), Australia (80%), and the United States (78%). However, the AAIB-CH has in general a much lower implementation rate for its recommendations made regarding accidents involving aircraft in the weight category of 5700 kg and higher.

11.3.6 Analysis
The purpose of this analysis is to reflect on the effectiveness and efficiency of AAIB in their efforts to provide the safety feedback element of the public policy process. Measures are
proposed that could be taken to resolve the difficulties identified and to further strengthen the feedback element of the public policy.

11.3.6.1 Introduction

No evidence was found, nor were opinions expressed, indicating that interests not related to the promotion of safety are driving the investigations and recommendations of AAIB. While much dispute exists regarding the conduct and recommendations of AAIB, there seems to be agreement that nothing but a relentless drive to improve safety and a genuine concern over perceived safety deficiencies is underlying AAIB’s work. The strong ambition for safety reflected by the conduct of AAIB, and in particular by the head of AAIB, is not inappropriate and should be considered an asset to aviation safety in Switzerland instead of a threat.

This is however not to say that there is no criticism regarding the role of AAIB in the opinions expressed and indeed in this analysis. The effectiveness of AAIB is not only determined by the competence of the investigators, but also by how effective AAIB is in achieving a positive impact on safety. Achieving such a positive impact places strong demands on AAIB's ability to formulate effective recommendations and their relationship with government and the industry. This relationship is of vital importance to accomplish the impact on safety through the implementation of recommendations.

The effectiveness of AAIB is currently impeded because a high level of animosity exists between AAIB, the aviation sector and, in particular, the regulator. A sense of partnership is lacking and energies are being spent to work against each other where the contrary should be the case. A confrontational model is now driving the way part of the actors in Swiss aviation and AAIB deal with each other. In this approach, safety issues are sometimes dealt with not because of an intrinsic motivation to do so, but because of pressure asserted by the accident investigation authorities through various means. While this approach can work, it is highly frustrating to all parties involved and it edges on being counterproductive. This state of affairs is undesirable in a relatively small but advanced aviation sector such as the Swiss, where the opportunities to learn from accidents and incidents tend to be few and wide apart. The current situation is particularly difficult for DETEC as it has to mediate a constant stream of debate between AAIB and FOCA. It is therefore in the interest of all involved and in the interest of safety that a more efficient approach replaces the current confrontational one.

Recognising the fact that no improvements to the investigative capabilities and efficiency of AAIB are necessary, five remaining areas of improvement have been identified. Improvements
in these areas are expected to strengthen the essential feedback element of the public policy, among others by achieving a better implementation rate of AAIB safety recommendations:

- Removing institutional obstacles;
- Improving relationships between AAIB and the aviation sector;
- Developing balanced safety recommendations;
- Strengthening accountabilities for the implementation of safety recommendations;
- Expanding pro-active safety efforts.

These areas of improvement, together with proposed solutions, are discussed in the next chapters.

**11.3.6.2 Removing institutional obstacles**

Two institutional factors, regarding the roles of FOCA and EFUK, impede the effectiveness of AAIB.

AAIB is required by law to report to FOCA. FOCA is responsible for the implementation of the AAIB recommendations. This presents a number of difficulties:

- As the regulator may well be implicated in the causation of accidents, it is not desirable that AAIB reports to the regulator. In view of such possible cases, the report should be addressed to higher authority to which the regulator is accountable. The report of AAIB constitutes the closure of the public policy cycle that starts at the level of the government. Therefore, the reporting line must be adapted accordingly.

- Within the current FOCA, while safety is considered the top priority, the promotion of aviation prevails in operational decision making, in accordance with the guidance of DETEC. Therefore, FOCA could in some cases, particularly when there is a significant regulatory burden, be reluctant in implementing recommendations.

- By addressing all recommendations to FOCA, a regulatory solution is sought for safety improvements that may be better served by other types of initiatives. Also, FOCA tends find it difficult to take action if the regulations are such that the safety intervention proposed by AAIB is not required by law. As long as FOCA is not yet a safety regulator, also charged with the promotion of safety, it is unlikely that FOCA will be pro-active in taking non-regulatory promotive action.
• The fact that FOCA is responsible for the implementation of AAIB recommendation places undue responsibilities on the shoulders of FOCA whereas the actors in the aviation sector may remain passive unless regulatory action is upon them. If AAIB were to explicitly address recommendations to the parties that are best placed to take remedial action, these recommendation could be considered valuable input into the safety management systems of the actors involved, and the role of FOCA would be to monitor how the safety management process of the actors deals with the input.

• If AAIB were to report also to other organisations than FOCA, this would eventually increase their accountability towards those actors with regard to the feasibility of the recommendations without compromising AAIB's independence. In the current situation, the indirect relation between AAIB and the industry is counterproductive, and presents needless difficulties for FOCA.

In order to remove the obstacles identified above, a number of measures are recommended in chapter 11.5. The main drive of these recommendations is to change the reporting line of AAIB from FOCA to the Minister of Transport and to address safety recommendations to the organisations best placed to take remedial action rather than exclusively to FOCA.

The second institutional obstacle concerns the role of EFUK. Chapter 11.4 provides a detailed explanation of why the recourse process through EFUK has negative consequences for the effectiveness of the safety feedback.

11.3.6.3 Improving relationships between AAIB and the aviation sector

The problem
Whereas there is broad support for the essential role of AAIB in aviation safety, and uniform praise for the technical, operational and analytical competence of AAIB, there is equally uniform criticism of the role of the AAIB leadership in promoting safety actions in Switzerland. Strong negative opinions regarding AAIB's conduct are expressed throughout government and the industry. Several specific accounts of allegedly inappropriate conduct of the leadership of AAIB were presented, but these were not investigated in the REACH study.

In a highly professional environment like aviation, where people tend to take great pride in their jobs, and are under a constant pressure to achieve a delicate balance between safety, economy and other constraints, it is not uncommon for some strained relationships to develop. It is however not normal that relationships between AAIB and their partners in a considerable part of
the aviation sector become strained to the extent of being dysfunctional. It is not reasonable to assume that an organised insurgency exists against the AAIB, or that many persons involved in safety share traits that are incompatible with the role of AAIB in the promotion of safety. Therefore, the current unsatisfactory state of affairs suggests that AAIB's conduct is such that fruitful relationships do not sufficiently develop and prosper. This hampers the effectiveness of the work of AAIB.

Part of the conduct of AAIB to utilise other means than just their interface to FOCA to achieve implementation of recommendations, is governed by a lack of confidence in the competence of FOCA. In the current legal framework, AAIB is fully dependent on FOCA to achieve the necessary impact on safety, as the investigation report and all recommendations are addressed to FOCA for implementation. In the perception of AAIB, considerable effort is being spent to identify safety deficiencies and to develop recommendations to resolve these, only to then rely on an ineffective process to achieve the potential improvement of safety. (Recommendations in the previous chapter address this matter).

Many persons mentioned as the cause of their annoyance the fact that AAIB acts beyond its formal mandate. Part of the conduct of AAIB is perceived by these persons as reflecting a self-assigned role of AAIB that is in fact not theirs. While such rationales sound quite reasonable, it is unlikely that that is indeed causing the annoyance. If the same person would support the objective that AAIB pursues in that particular case, he or she would probably not care whether AAIB is actually mandated to do so or not. Pointing to a formal matter like an exceedance of mandate is more likely to reflect discontent with the objective of AAIB or the way it is being delivered. This does however not make the existing discontent less relevant, because it may well be partially or wholly due to the fact that the mode and/or style of action of AAIB is inadequate. This study has not investigated whether or not the mandate of AAIB was actually exceeded in the alleged cases.

Many people also stated that while the competence of AAIB is very good, communication is very poor. Here too, it is important to note that people often refer to communication failures when their actual concern is not the communicative style, but the content of the message being delivered. It is quite common to project communication difficulties in case of conflicts because it spares the technical competence and sincerity of the effort of the accused.

Notwithstanding the considerations above, there is ample indication of the fact that the mode and/or style of actions of AAIB to prompt remedial action on safety deficiencies found, are
such that they inflict serious damage to the appreciation of AAIB in the aviation sector both at company level and at the level of aviation personnel.

**Solutions**

It is very important that AAIB, even though it may sometimes have a message that is not particularly welcome in parts of the aviation sector, maintains good professional relationships with the aviation sector, including the government agencies. Solutions must be found to resolve this matter. As the leadership of AAIB is the main interface between AAIB and the aviation sector, possible solutions implicate his position.

Since AAIB is a very small organisation that is highly dependent on the unique expert skill and experience of its personnel, the people cannot be regarded separately from the organisation. This is particularly true for the head of AAIB, who is the driving force and the Investigator in Charge for all major accidents. AAIB is not solely dependent on its leadership as it employs a number of well qualified investigators. It is certain, however, that the involvement of the most senior investigator is imperative to retain the competence of AAIB at its current high level.

In view of that consideration, several solutions are thinkable, two of which are introduced below.

A small Aircraft Accident Investigation Board could be established, composed of independent aviation experts with the purpose of adding checks and balances to the AAIB process and communications. This board should have appropriate Terms of Reference, at least to the effect that the reports of AAIB are subject to board approval, and the chairman of the board is the formal representative of AAIB.

Alternatively, AAIB could be integrated with another independent Swiss organisation charged with transportation safety to become a Swiss Transportation Safety Board. Such multi-modal boards have been established in other states over the last decade. For example, the Australian accident investigation authority (BASI) has become a part of Australian Transportation Safety Board ATSB, the same happened in Canada and in the Netherlands.

Implementation of these solutions also has a bearing on the discussions in the next chapter on EFUK. A board as introduced above will to some extent provide the same additional layer of

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22 Apart from practical benefits such as the use of shared resources, the benefit of such integration for the technical and operational investigation capabilities are limited. From the perspective of the investigation itself, integration into a European aircraft accident investigation board would be more beneficial. But since Switzerland is not a member of the EU, and because such a European board does not exist today, a national transportation safety board is to be preferred.
checks & balances, the difference being that a board will not introduce delays, it will not imply the wrong purpose of the investigation as it does not act in response to external requests and, as it will be part AAIB, it will not compromise the authority of AAIB.

11.3.6.4 Improving the process for developing safety recommendations
According to the analysis of AAIB, less than 57% or the AAIB recommendations are implemented satisfactorily. This is a low implementation rate when compared with other states. Low implementation rates mean that the impact on safety of the work of AAIB is insufficient.

As there is also common praise for the technical, operational and analytical competence of AAIB to get the facts right that underlie the recommendations, the discontent that is widely present with regard to the recommendations must primarily be connected to the judgmental aspects of the work of AAIB. The judgmental aspects of the work of AAIB concern mainly the seriousness of safety deficiencies found, and the determination of what constitutes a balanced corrective action. ‘Balanced’ here refers to the need to weigh the safety benefits of a corrective measure against the impact of that measure in terms of cost, capacity, punctuality, the regulatory burden, the environment, etc. This need to find a balanced action is legitimate in view of the fact that limited resources are available for safety. If AAIB identifies safety deficiencies the resolution of which does not justify the associated cost, it is unlikely that the industry will autonomously adopt and implement the AAIB recommendation, nor that that FOCA will make such recommendations mandatory. Hence the safety deficiency as identified by AAIB is not resolved.

As the recommendations are the result of a judgement process, it is not possible to objectively decide what is a balanced recommendation and what is not, not even, as is sometimes suggested, if a formal cost-benefit analysis is conducted. Guidance in the ICAO Manual of Accident Investigation provides limited direction\textsuperscript{23}, and the guidance available in other manuals, such as that from the NTSB, provides guidance that is in itself judgmental\textsuperscript{24}.

This is in fact where the national safety policy, the role of the regulator, the safety policies of the actors, the safety culture, the skills of the AAIB to convince and promote, the media, and many other influences all become important. It is a field of tension that cannot not be formally resolved, as it constitutes the way all the forces in aviation combine to result in the level of safety as it exists today.

\textsuperscript{23} From the ICAO Accident Investigation Manual: Recommendations should be made in general or specific terms in regard to matters arising from the investigation whether they be directly associated with causal factors or have been prompted by other factors in the investigation.
\textsuperscript{24} e.g. “from a practical standpoint, is the proposed action reasonable and justifiable”
The fact that there is no objective way to determine what is right and wrong or what exactly constitutes a balanced safety measure, explains why it is difficult to resolve the difference of opinion that exists between AAIB and FOCA regarding the extent to which AAIB recommendations have been implemented satisfactorily. In particular when looking at recommendations regarding commercial aircraft, FOCA estimates implementation rate at about 60% whereas AAIB states about 20%. Regardless of who is right, implementation scores between 20% and 60% are too low. It basically means that the effectiveness of the work of AAIB is insufficient.

Implementation rates around the world are around 80%, thus indicating the full implementation of all recommendations does not occur anywhere. As it is the task of the accident investigation organisation to achieve a maximum benefit for safety, their recommendations should reflect a reasonably strong ambition, which makes such an implementation rate acceptable and even desirable. From that perspective, 80% seems a healthy equilibrium and may serve as a good target for the Swiss aviation sector.

In view of the above, it is imperative for AAIB to develop recommendations such that they have a reasonable chance of being implemented. As this involves a judgement call, AAIB should seek the benefit of a second opinion for this purpose, without compromising their independence in any way. This support in developing balanced recommendation can be provided by the collective wisdom of the board as will be proposed in the recommendations. As the board is part of AAIB, its involvement for this purpose preserves AAIB’s independence.

Apart from the need to ensure that proper checks & balances are part of the process to develop recommendations, the way the recommendations are formulated also plays a role in the implementation rate. AAIB recommendations tend to be rather prescriptive with regard to the solutions that could be considered to resolve an identified safety deficiency. This is an approach that does not reflect an inadequate understanding of how to develop recommendations but it is evidence of adaptive behaviour to the current situation in Switzerland, where the regulator is primarily a facilitator and the sector parties are not held directly responsible for the way they use AAIB input.

It is wholly understandable, particularly in this current Swiss context, that the AAIB is tempted to prescribe a solution in its recommendation. Solutions are clear and thus leave little room for interpretation or mis-understanding. The recipient has no choice but to implement the safety improvement measure as recommended. In underdeveloped safety cultures, where the recipient may not be motivated to use the recommendations of AAIB as valuable input into their SMS, but instead look for ways to “get away” with a token effort, this is rather common. It makes it
difficult to shy away from any serious action. If the safety measure is not implemented as recommended, the accident investigation authority will judge the implementation as unsatisfactory, thus putting the responsibility on the recipients or the authorities.

Such an approach is however inappropriate in a well developed safety culture because it does deprive the final beneficiary of the effort, being the travelling public, of the very considerable collective wisdom of the sector parties with regard to what are the best ways to achieve the desired result. While the identification and assessment of safety risks and the formulation of recommendations to resolve these risks are certainly tasks of AAIB, the determination of which safety measures are the most cost-beneficial is clearly best determined by the industry and the regulatory authorities. This is why AAIB recommendations should be very clear with regard to what is the reason for the recommendation and what is its objective and expected result, but they should not be prescriptive with regard to solutions. It is up to the recipient of the recommendation to determine how the needed result can best be achieved.

It is obvious that a development into that direction does place a great responsibility upon the organisations addressed by AAIB recommendations. Therefore, an improvement in the way safety recommendations are developed must be met by appropriate measures to get a stronger safety regulator and to increase the accountability of the sector parties with regard to their response to AAIB recommendations.

**11.3.6.5 Strengthening accountabilities for the implementation of recommendations**

Improving implementation rates is not only a matter of writing balanced and well formulated recommendations. The organisations to whom the recommendations are addresses should also be made more accountable for their implementation efforts.

One way of doing that is to address safety recommendations specifically to the organisations that are in a position to make the necessary changes. This requires institutional re-design as was discussed in Chapter 5.

AAIB is already required by law to keep a public record of their recommendations. This obligation is, however, limited to an annual summary with respect to the replies of FOCA. This role should be expanded to involve also other addressees of AAIB recommendations and AAIB's judgement of the implementation status of the recommendations. In view of the apparent sensitivities around exceedance of mandate it is necessary to reflect that expanded obligation in the law.
The fact that accident investigation authorities keep track of the implementation status of their recommendations and in their communication strategy clearly identify which recommendations receive inadequate attention is common practice in the more advanced aviation communities. NTSB of the United States, ATSB, and AAIB of Germany for example keep public records of the implementation status of their recommendations. The US NTSB regularly publishes a so-called 'Most Wanted' list of safety recommendations that are considered by the NTSB to have a high priority while implementation is unsatisfactory. It is noteworthy that the US NTSB has recently decided not to publish a new version of their Most Wanted list because they find the effectiveness of mere publication of this list insufficient. NTSB plans to present plans soon to take stronger action to promote implementation.

As accident investigation authorities become more pro-active in promoting their safety recommendations, the potential for tensions between the accident investigation authority and the aviation sector actors grows. It is therefore imperative that efforts to make the addressees of recommendations more accountable are also met by efforts to make the accident investigation authority more accountable. One way of achieving that is to define, publish and use clear guidelines with regard to the judgement by AAIB of the implementation status of recommendations. Another necessary condition is to ensure the presence of appropriate checks & balances in the associated AAIB processes.

11.3.6.6 Expanding pro-active safety efforts
The current safety feedback loop in the Swiss public policy for aviation safety still very much depends on the occurrence of accidents to improve safety. Tasking AAIB to act more as an independent safety watchdog on behalf of the government, asking them to publish safety statistics and results of analysis of these data, could strengthen the pro-active element of the public policy, in accordance with modern safety management philosophies. It would however still depend on accidents and serious incidents to work. Truly pro-active work will necessitate AAIB and other organisations such as FOCA, to use other means to identify safety threats before accidents happen. Of particular importance in this realm are the ICAO recommendations on accident prevention and the provisions of the recently ratified EU Directive with regard to Incident Reporting.

Implementing the changes to AAIB recommended later in this chapter to improve the current accident and incident driven work of AAIB may make take several years to implement, and implementing these recommendations should come before the expansion into more pro-active efforts. But work must already commence to put in place the legal provisions required to
strengthen the ability to identify risks before accidents happen. Further information regarding the need for voluntary occurrence reporting programmes is given in Appendix F.

Pro-active safety work is not automatically invoked by accidents in accordance with AAIB's legal obligation to investigate. There is a degree of freedom in choosing subjects or pro-active work. In this area, the need for strict independence is less great and in fact it would be necessary that AAIB would also consider the safety concerns voiced in the industry in setting priorities for pro-active safety work. In order to prevent any threat to AAIB’s independence, the supervisory board of AAIB could play a role in this by approving AAIB’s pro-active work programme and by suggesting subjects to AAIB. This does thus require improved relationships with the industry. Such relationships should involve consultation of AAIB with the industry. Consultation should be intended such as to ensure that the industry is afforded an adequate opportunity for meaningful two-way interaction, while at the same time preserving the independent role of AAIB and preventing any level of capture of AAIB by the industry.

11.4 Die Eidgenossische Flugunfallkommission EFUK

11.4.1 Introduction
Die Eidgenossische Flugunfallkommission EFUK is an integral part, together with AAIB, of the Swiss implementation of ICAO Annex 13. EFUK provides a possibility for recourse on the investigation report of AAIB. This possibility is regularly used by persons or organisations who are implicated in the accident causation or subject to accident consequences.

11.4.2 Legal basis
The Swiss Verordnung SR: 748.126.3 - V of 23 November 1994 - Untersuchung von Flugunfällen und schweren Vorfällen (VFU) under reference to Artikel 24-26c of the Luftfahrtgesetzes of 21 December 1948 provides the legal basis of EFUK.

EFUK has no other powers than to investigate the correctness and completeness of the findings and conclusions of the AAIB investigation as reported, and to either declare the AAIB report as final or write the final report. AAIB recommendations are exempt of recourse through EFUK. EFUK may demand additional effort by AAIB or perform its own investigation, including the inspection of evidence, hearing witnesses, and conducting flight trials, etc. Recourse against the findings of EFUK is not possible.
The law stipulates that the proceedings of EFUK shall be in accordance with Annex 13. Annex 13 states that accident investigation only serves the purpose of accident prevention. The proceedings of EFUK have no further legal consequences. No blame or guilt is appointed.

Nevertheless, both EFUK and DETEC indicated that the decision of EFUK will have a bearing on possible civil or criminal cases that may follow outside of the accident investigation process conducted by AAIB and EFUK.

It has proven rather difficult to establish what led to the inclusion of EFUK in the Swiss law. Common wisdom in Switzerland has it that there is no underlying provision in the constitution that demands that every public body like the AAIB, that has the power to decide on matters that could potentially harm the interests of the people involved, must be subject to a recourse mechanism. The most recent text regarding the legal provisions for EFUK dates from October 1994 and states that EFUK is tasked with the recourse procedure. No rationale is offered.

EFUK reports are regularly used in court cases. As Switzerland has filed an exemption to ICAO Annex 13 (art. 5.12 Non-disclosure of records) the evidence gathered by AAIB (such as witness accounts and data from Flight Data Recorders) is also admissible in court cases.

11.4.3 Organisation & processes of EFUK
According to the law EFUK has five members including one president, appointed by the Minister of Transport. Membership of EFUK is a part-time occupation that, on averages, takes some four days per month. Over time, DETEC and EFUK have been successful in appointing members of EFUK that are well qualified and dedicated to their duties in the interest of aviation safety in Switzerland. Members have various relevant backgrounds in law, technology and aviation. Members tend to be active professional pilots. Employees of FOCA are excluded from membership of EFUK by law. Members do not receive specific training as accident investigators. EFUK members are all well qualified for the job. At the time of this study, the commission had four members including the president of the commission and one vacancy. One current member is expected to leave the commission soon. As members of EFUK have their main occupation in the Swiss aviation sector, they do occasionally, in the interest of impartiality, not participate in EFUK proceedings. The current lack of EFUK members may result in EFUK operating at marginal strength.

Considering the fact that EFUK members are not professional accident investigators and spend only a few days per month on their job as a member of EFUK, it is not reasonably feasible to maintain the same level of investigative proficiency as the AAIB investigators. This is also not
necessary because the members of EFUK are not required to conduct hands-on investigations. If necessary, EFUK has the authority to task AAIB with additional investigation work. On the other hand, the part time character of EFUK membership allows members to bring the knowledge and experience of their primary job in law or aviation, often as professional pilots, to their EFUK duties.

Requests for recourse must be submitted to EFUK within 30 days after the AAIB report has been finished, by people or organisations with a reasonable interest in the results of the AAIB investigation. The request must be founded, and EFUK may elect to reject the request. EFUK sessions are not public. EFUK proceedings should be finished within six months.

If the EFUK decides that the AAIB investigation and report must indeed be amended in accordance with the request (but based on EFUK's own considerations and possible investigation), the final report will be produced by EFUK. If EFUK finds that the AAIB investigation and report are correct and complete, the AAIB report becomes the final report.

11.4.4 Performance of EFUK
Analysis of data over the period 1996 – 2003 received from EFUK shows the following particulars of the EFUK process:

- EFUK receives about 7 recourse requests per year.

- The number of request for recourse per accident varies from 1 to 3 (average 1,2).

- An average of 4 accidents\(^{25}\) per year are handled by EFUK. Of those recourse actions, the decision by EFUK is “agreed” in about 30% of accidents, “partially agreed” in about 50% of the accidents and “rejected” in about 20% of accidents.

- As EFUK writes the final report for all accidents where the recourse is agreed or partially agreed, a little over 3 final reports are written by EFUK per year.

- The last recourse action completed\(^{26}\) concerns an accident from september of 2000. 14 recourse actions, concerning 10 accidents are yet to be completed. This constitutes a considerable backlog, which illustrates that the resources of EFUK are sometimes insufficient.

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\(^{25}\) More than one request is sometimes submitted regarding the same accident and request are occasionally not awarded by EFUK or withdrawn by the applicant.

\(^{26}\) Status of 11 april of 2003
• A request for recourse is submitted in about 16% of all accidents (1 out of 6).

• Recourse requests submitted well beyond the deadline for submission, which is 30 days after the publication of the AAIB report, are regularly excepted.

• The average time\(^{27}\) needed for recourse action is about 11 months. Procedures can be as short as 6 months, the longest being 28 months. Hence, the period of 6 months for completion as mentioned in the law is in general not achieved.

• The EFUK recourse process on average adds about 84% to the time used for the AAIB investigation (average 13 months\(^{28}\)).

11.4.5 Working relationship with DETEC and AAIB

The EFUK working relationship with AAIB, and in particular with the head of AAIB, has deteriorated to the extent that it must be considered irreversibly dysfunctional. The strained relationship with AAIB has negatively affected the atmosphere in which the work of EFUK is conducted, and since the members of EFUK contribute their services on a part time basis and against a very modest financial reimbursement, this has led members of EFUK to withdraw from the commission or to offer their withdrawal to DETEC. On the other hand, one member of EFUK has given up his position in EFUK to become a member of the pool of AAIB external experts. The working relationship with DETEC is good.

11.4.6 Analysis

There are no provisions in Swiss law other than the law on accident investigation itself, that require a recourse facility in such proceedings as aircraft accident investigation. Hence, the role of EFUK may be reviewed from the perspective of that law and its purpose, which is the prevention of accidents, and not the attribution of blame or guilt.

EFUK and the purpose of accident prevention

Switzerland has ratified the Chicago convention and the ICAO Annexes and implemented it in Swiss law. Switzerland has filed a single exemption to Annex 13. The exemption concerns paragraph 5.12 on non-disclosure of data. This exemption makes evidence collected in accident investigations admissible in court. As no other exemptions to this Annex have been filed, Swiss law must be in compliance with all provisions of Annex 13, except for paragraph 5.12.

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\(^{27}\) Based on the elapsed time between the date of the report of AAIB and the final report by EFUK. This time includes the time used by the requestor, which averages about 2 months, twice the period allowed by the law. Based on data regarding cases from 22 November 1996 until 24 January 2003 (with reports finished)

\(^{28}\) Only for the reports that have been subject to recourse action through EFUK. Average completion time for all AAIB reports from 1998 through 2002 is about 18 months.
Annex 13 is very clear about the purpose of accident investigation. Paragraph 3.1 states that the sole objective of the investigation shall be accident prevention. In order to ensure that prevention is indeed the only interest served by the investigation, the accident investigation board must be independent (para. 5.4). For this reason, AAIB is independent. AAIB serves no interests other than the prevention of accidents.

The interests of a person (or an organisation) could be damaged by the findings of AAIB. It is considered appropriate in such circumstances that this person has a possibility for recourse. EFUK does exist for this reason and this reason alone. It is unlikely that a person would apply for recourse out of a concern that accident prevention is insufficiently achieved due to shortcomings in the AAIB investigation. For that purpose, a recourse body would also not be necessary. Persons applying for recourse do so because they believe their interests are unduly damaged. EFUK exists to enable this person to prevent the possibility that his or her interests are damaged due to deficiencies in the AAIB investigation. Thus, EFUK does serve an interest other than accident prevention, namely the interest of the requester. This is clearly in breach with Annex 13.

This can be illustrated by an example. In a theoretical case, AAIB may have drawn a conclusion, as part of a particular accident scenario. For the purpose of accident prevention, working with most likely scenarios is common practice and a wholly appropriate analytical technique. It could well be possible that the conclusion that supports this most likely scenario cannot be proven. It might even be that the conclusion is poorly substantiated. Nevertheless, for the purpose of accident prevention, there is nothing wrong with this approach. The conclusion could, however, damage the interests of a person or an organisation. This person could then apply for recourse through EFUK. EFUK would have to conclude that the conclusion is indeed not sufficiently justified. Thus the conclusion would be removed and the scenario abolished. Now the investigation could back up into a second, less likely scenario, or be inconclusive. This would not serve the interests of accident prevention. Whether AAIB should determine a most likely scenario based on an insufficiently substantiated conclusion is irrelevant.

The example shows why the possibility of recourse through EFUK, damages the independence of the investigation. The provisions in the Swiss law regarding EFUK are thus in breach with Annex 13.
EFUK and the quality of investigations & reports
EFUK has made relevant changes and additions to AAIB reports. This suggests that the EFUK process is necessary for the quality of the feedback from accident investigation. This could be considered as sufficient justification for the existence of EFUK.

In any investigation however, no matter how well conducted, there will always be areas that could have been investigated more or better. Accident investigation will remain a balancing act between the desire to investigate the accident in the broadest and deepest possible sense and the inevitable limits on time and resources. Difficult decisions with regard to what not to investigate are often necessary in accident investigations. Hence, the fact that EFUK has produced relevant results is in itself not a sufficient justification for their role.

In view of the importance of the AAIB reports for accident prevention, it is imperative to put in place some level of review of the investigation and report. Without EFUK, the investigators would write the report and publish it without any scrutiny from knowledgeable people that have not been directly involved in the investigation. Since investigators are only human, and because to err is human, this is not an ideal situation. The chances that someone from the outside of the investigation spots possible deficiencies are much greater than that the investigators themselves spot their own omission. This observation is not specific to accident investigation; it is universally applicable to investigative work. Therefore, someone other than the investigators themselves should ideally review the report. There is one condition though; the independence of the investigation and the report must be preserved. This condition prevails over other considerations, in accordance with Annex 13. Hence, while review is desirable, it must be administered either internally in AAIB, or externally by an organisation that is also independent and governed by the same law on accident investigation. This could be EFUK. Whether EFUK should indeed fulfil this role, depends on the answer to the question if the advantage of this role for EFUK outweighs the disadvantages of EFUK, and on the question if such an internal AAIB review could work. These questions will be addressed in paragraph 11.5. A practical disadvantage of EFUK for this role is that EFUK only reviews AAIB reports in case of a request for recourse, which in practice means about one out of every six reports. Of these reports, EFUK in normally only reviews the part of the report that is the subject of the request for recourse. Hence, EFUK review concerns only a very limited portion, perhaps about 5% of the work of AAIB. Therefore, the benefit of the review by EFUK is very limited in scope.

EFUK and the strained relationship between AAIB and the aviation actors
The EFUK process could also be considered necessary in view of the fact that the work of AAIB regularly gives rise to discontent in the Swiss aviation sector. While there is nothing
wrong with a healthy tension between AAIB recommendations and the preparedness of aviation actors to implement these recommendations, a reasonably broad acceptance of the work and recommendations of AAIB is essential to achieve the necessary impact on safety. Therefore, this is a legitimate consideration.

There is however strong agreement throughout the industry, and at all levels of government, that the technical and investigative competence of AAIB is excellent. No doubts have been expressed in any of the interviews throughout the Swiss aviation system about the technical and analytical quality of the AAIB investigations and report. The controversy between AAIB and a number of organisations in the Swiss aviation sector, including FOCA, revolves around the recommendations of AAIB and AAIB’s efforts to promote implementation. The mandate of EFUK explicitly states, however, that their investigation may only concern the correctness and completeness of the investigation. The AAIB recommendations are explicitly excluded from the recourse process. Thus, for the part of the AAIB investigation that is subject to possible recourse action, EFUK is not in a position to enhance the quality of accident investigation to an extent that warrants its involvement. And as EFUK cannot touch the part of the AAIB work (recommendations) that is the locus of the discontent regarding AAIB, EFUK is, by law, not in a position to help resolve the damaging effect of the controversy around AAIB. Hence, EFUK is not necessary for this role.

**EFUK and the authority of AAIB**

The possibility of recourse does damage the authority of AAIB, as AAIB does not have "the final say". AAIB reports thus become less relevant, and might be considered a necessary prelude to the real decision made by EFUK. This reduces AAIB’s authority. It is imperative however, that the authority of AAIB is preserved, because it determines the impact of AAIB in the aviation sector.

**EFUK and the timeliness of safety improvement action**

The recourse process adds considerable time (11 months on average) to the period between the accident date and the publication of the final report, thus delaying the safety impact of the accident investigation. Giving primacy to the protection of the interests of involved persons or organisations over the timely protection of the travelling public is not in accordance with sole purpose of accident investigation, which is accident prevention.

**11.4.7 Conclusions with regard to EFUK**

EFUK exists to enable persons or organisations to prevent the possibility that their interests are unduly damaged due to deficiencies in the AAIB investigation. Thus, EFUK does serve an
interest other than accident prevention, namely the interest of the requester. This is in breach with Annex 13.

EFUK has made relevant changes and additions to AAIB investigations and reports. Review by EFUK, and their subsequent additional work, has thus on occasion, improved the quality of learning from accidents and therefore supported accident prevention.

Review of the AAIB reports is considered necessary in view of their importance for accident prevention and the fact that it is quite difficult for the investigators themselves to identify potential shortcomings in the investigation or the report.

EFUK reviews only one out of every six AAIB reports and the reviews are limited to those items of the report for which the recourse was requested.

By law, the EFUK process cannot address the part of the AAIB work (recommendations) that is the locus of the controversy between AAIB and parts of the Swiss aviation sector. Therefore, EFUK is, not in a position to help resolve the damaging effect of the controversy around AAIB. Hence, EFUK is not necessary for this role.

The existence of the recourse process is damaging to the authority of AAIB.

The recourse process through EFUK adds about 11 months (or about 84%) to the time needed to provide the lessons learned from accidents through accident investigation to the aviation community. Preventable accidents could occur as a result. In this regard, the recourse process negatively affects accident prevention.

Based on these conclusions, the disadvantages of EFUK are judged as being much greater than the benefits of EFUK. Recommendations to resolve the disadvantages of EFUK and to provide alternative ways to incorporate the benefits of EFUK are provided in the next chapter.

11.5 Recommendations for improvements to the feedback of the safety outcomes

The following recommendations are made in order to:
• ensure that the public policy loop is closed at the appropriate level;
• underscore the government responsibility for the safety of air transport;
• ensure that regulatory aspects in accident causation receive appropriate treatment;
• strengthen the accountability for safety of all aviation actors;
• ensure that safety recommendations are directed at the organisations that are best placed to take remedial action; and
• promote non-regulatory solutions to safety improvement.

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 an 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 applicable to all recipients of an 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.

In order to improve the relationship between AAIB and the aviation sector, 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 is made.
Chapter 11 Feedback of the safety outcomes to the national policy – the role of AAIB, EFUK and FOCA

**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.

The current review process through EFUK is in breach with ICAO Annex 13 as it does not primarily serve the purpose of accident prevention. Review of AAIB accident investigations and reports is necessary, but the current recourse process is not suitable for that purpose because it considers only a small proportion of the accidents investigated by AAIB. Also, the recourse process through EFUK is not necessary to help resolve the existing controversy around AAIB, it damages the authority of AAIB, and it deprives the aviation sector of vital safety information for too long. The Aircraft Accident Investigation Board as recommended is a more suitable body to ensure the necessary level of review for all AAIB investigations and reports. As it is a part of AAIB it will not compromise the authority and independence of AAIB and it will not take much time.

**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.
Appendix F provides additional information about the removal of the exemption to Annex 13 and voluntary occurrence reporting programmes.

11.6 The change process

The industry is facing difficult times that might also present threats to safety, while the current role of the government in the promotion of safety must be characterised as weak. It is therefore not wise at this point in time to impede the competence of AAIB in their role of watchdog of safety on behalf of the government and the travelling public. It is to be expected that the difficult times for industry will remain for the next few years, and it will take some years to strengthen the role of FOCA in Safety Regulation. Therefore, it is recommended to implement the measures proposed in the previous chapter to improve the effectiveness of AAIB, rather than choosing other solutions that may resolve some of the difficulties described, but also severely weaken the competence of AAIB.

There is, however, no guarantee that the effects of the proposed improvements will be sufficient, and therefore, an evaluation in due time of the results of the recommended measures must be an integral element of the change process. The Swiss aviation community at large, should ultimately be the judge of whether role of AAIB in Swiss aviation is sufficiently effective and efficient, or that further change is necessary. This judgement will not only depend on the technical, operational and analytical competence of AAIB, but also on its relationship with all sector parties. It would seem reasonable to evaluate about two years after the recommendations have been implemented, whether AAIB has successfully adapted to the new situation.

It is to be anticipated that the roles of AAIB and FOCA will change towards more safety promotion over the next couple of years as a result of the implementation of some or all of the recommendations of this study. While mutual objectives will help to build the partnership between FOCA and AAIB, an element of competition could ultimately develop which is counterproductive. Therefore, it is recommended to review the roles of AAIB and FOCA again after a reasonably long period of perhaps five years, in order to assess whether additional changes are necessary.

Given the disturbed relationship between the leadership of AAIB and the other actors in Swiss aviation, support for an expanded role of AAIB in its current set-up will be limited. This could impede the expansion of the role of AAIB that is much needed to strengthen the pro-active element of the safety feedback loop in Switzerland. It is therefore recommended to first
implement the measures aimed at improving the relationship between AAIB and the aviation sector and thereafter expand the tasks of AAIB in the area of pro-active safety promotion.
12 The State of Safety Management in Swiss Aviation and the way ahead

In the previous chapters the various elements of the public policy process around aviation safety management have been reviewed. In this chapter, an overall assessment of the management of aviation safety Switzerland is offered in the light of the main findings on the functioning of each of the elements of the public policy process. Thereafter, some considerations with regard to the possible future improvements of aviation safety management are presented.

12.1 The state of aviation safety management in Switzerland

The main premise of this study is that as safety is the product of a large array of government and industry actors, institutionalised relationships and legislative arrangements, and since no single institutional entity is in charge of all these factors, air transport safety must be achieved through an effective and efficient public policy. The public policy process constitutes of a number of subsequent steps, all of which are necessary for achieving safe air transport. The steps form a chain of processes, which is only as strong as its weakest link. The steps are:

- Setting the policy
- The implementation of the policy
- The outputs of the policy
- The impacts of these outputs on the relevant operators
- The policy outcomes
- Feedback of the outcomes to the policy

Public air transport is extremely safe and Swiss aviation is no exception. For the Swiss traveller, there is no safer way than by air to reach destinations in Europe and further across the globe, regardless of whether national or foreign major airline service is used. Nevertheless, this study has found that the policy outcome, as reflected in the safety statistics of Swiss aviation over the last decade is unsatisfactory as the safety performance of Swiss aviation is declining whereas that of the comparable European states is improving. Where Switzerland was clearly ahead of these states in terms of safety before the nineties, this lead has been lost. There are many reasons for this decline, most of which have not been investigated in depth by this study. The focus of this study has been to assess whether the processes for the management of safety are adequate, assuming that a well functioning safety management system will identify and correct the deficiencies that lead to unsatisfactory safety performance. Conversely, lack of such an adequate safety management system will eventually lead to a decline in safety in view of the threats to safety that are always present in aviation.
Chapter 12 The State of Safety Management in Swiss Aviation and the way ahead

Setting the policy: There is no specific safety policy, nor safety related objectives at the government level or the department level. While safety is identified as the first of three main objectives of FOCA, active policy is not present for safety whereas the other two other objectives (to maintain an efficient airtransport system and to take care of the environment) receive considerable attention and effort. Also, priority of aviation safety over other considerations (eg. with regard to the environment and airport capacity) has not been clearly defined. The implicit objective is to stay on par with comparable European states with regard to safety performance. As the premise of this study is that air transport safety must be achieved through an effective and efficient public policy, and because no policy can be effective without clear objectives and a plan to achieve these, it is obvious that urgent action is required to restore this element to the 'excellent' standard.

The implementation of the policy: This element of the public policy process contains three main parts: the aviation legislation, institutional arrangements and the role of DETEC.

There is certainly room for improvement in the aviation legislation, particularly with regard to the delineation of safety responsibility and with regard to the primacy of learning from accidents for prevention purposes over prosecution. But, while the current law is not supportive of a successful implementation of a safety policy, it does not make it impossible. Overall, the legislation is adequate but it must be improved to allow stronger safety management, particularly in the area of pro-active safety.

The institutional arrangements impede the separation between policy advice and safety regulation, and this is detrimental to a strong role of the safety regulator. Also, the current institutional arrangement impedes the feedback of safety performance to the safety policy, particularly with regard to the regulatory aspects of accident causation.

The role of DETEC in its capacitity as the authority over FOCA is underdeveloped, mainly due to a lack of resources.

Important improvements to this element of the public policy process are necessary.

The outputs of the policy: The outputs of the policy concern the role of the Civil Aviation Authority as a safety regulator. Most of the elements of an effective safety management system are not yet present in FOCA, and regulatory service provision takes precedence over safety regulation. Accountabilities for the promotion of aviation and the assurance of safety are not clearly delineated. While this is not to say that FOCA is not a good regulator, the role of FOCA as a safety regulator is insufficient. FOCA is developing initiatives to strengthen its role as a safety regulator. While the results of these initiatives are not yet present, they certainly constitute important steps towards improvement.
The impacts of the outputs on the relevant operators: The impact of the outputs of the policy on the operators and service providers is not equal for all actors. Generally speaking, the airports have not yet started building a credible safety management system. The air navigation service provider Skyguide has clearly strengthened its efforts to achieve a credible safety management system but are still lagging a number of years behind ANSP's in the benchmark states. Shortages in the number of operational Air Traffic Controllers pose a serious threat to safety if combined with measures to increase capacity to meet demand without formal risk assessments and appropriate controls. The safety management systems of Swiss and EasyJet, while lacking in some relevant aspects, are reasonably well developed. Some threats remain however, particularly with regard to the pilot communities in Swiss that warrant specific safety management attention.

The policy outcomes: The implicit objective of staying on par with comparable European states with regard to safety performance is not being met, as an unfavourable trend is present in safety of Swiss aviation, opposite (and statistically significant) to that in the benchmark states. Therefore, in their current condition the elements of the public policy for safety are not delivering satisfactory outcomes.

Feedback of the outcomes to the policy: A number of deficiencies exist in the feedback loop of aviation safety performance to the policy. These do impede the implementation of recommendations and the timely provision of lessons learned from accidents back to the aviation community. Nevertheless, the existing negative trends and new threats present in Swiss aviation have been successfully identified and fed back to the aviation community. Important institutional and legislative actions remain necessary in to make this element more pro-active.

This report and the synthesis of the main findings of the REACH study as provided above, might leave the impression that the decline in safety performance of Swiss aviation finds its main cause in the weaknesses in Safety Management by the government. This is of course not the case. The principal determinants of safety performance are the airlines, the airports and the air navigation service provider. If these actors would have continued to operate at the standards that led to the superior safety performance of Swiss aviation in the eighties, safety would since then not have declined and this study would not have been conducted. What has been observed is that when safety performance started to deteriorate, the 'safety net' provided by government oversight and safety management should have detected this and should have taken appropriate action to reverse the negative trend by specifically addressing the causes of the decline in safety. This has not happened sufficiently. It can thus be concluded that, as the aviation sector and the government are both implicated in the decline in safety, the government
and the aviation sector must take positive action together. Since the mandate of this study called for a focus on the role of the government, the majority of recommendations concern the role of the government. This should however not be interpreted as prove of fact that the decline in safety performance of Swiss aviation is mainly caused by the government. Safety performance is the cooperative product of the aviation sector and the government together, and any effort to recover from the decline in safety performance that does not give due consideration to this shared responsibility is bound to be insufficiently successful.

12.2 Winning back Switzerland's place among the best in aviation

The previous chapters have shown that the safety performance of Swiss aviation does not meet the implicit safety objectives. Also, it was made clear on various occasions during this study, that expectation levels in the general public as well as in the aviation sector itself in Switzerland are high. Therefore, as a large discrepancy between actual performance and desired performance exists, it would seem that positive action is required to improve the safety performance of Swiss aviation. This study has focussed on safety management as a means to achieve that in a controlled manner.

12.2.1 Improving safety management as a vital means to improve safety performance

Improving safety performance requires the involvement of all actors in an effective and efficient public policy process. As the subsequent steps form a chain of processes, which of course is only as strong as its weakest link, all steps must be restored to the 'Green' status in order for Swiss aviation to bend back into excellent safety performance.

Of course there is always a level of subjectiveness involved in judging what the 'excellent' status for each of the steps. A useful reference for this is provided by the performance of comparable states as is also done in the benchmark exercise of this study.

12.2.2 Aspiration levels for safety performance in Swiss aviation

If the purpose of the current and future safety efforts is to reinstate the exemplary safety record of Swiss aviation, in order to meet the expectations of government policymakers, the general public, and indeed the Swiss aviation sector itself, then the safety initiatives to be developed should be aimed beyond the current best practices in the benchmark states. Thus, instead of setting the safety objectives such that the current deficiencies are removed to let Swiss aviation catch up with the safety levels already present in the benchmark states, a more ambitious aspiration level should be adopted. This is also necessary because safety performance in the benchmarks states as well as world-wide is improving. As it will take some years to reinstate all
elements of safety management in Switzerland to the 'excellent' status, the safety performance reference will have improved from today's levels some years into the future.

**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.

**12.2.3 The window of opportunity for a culture shift**

If the ambitious aspiration level suggested above would be adopted, the challenge ahead is formidable. An essential part of the effort to actually achieve that aspiration level, will have to be a change towards a mature safety culture. But changing cultures is much more difficult than changing procedures or technologies. Achieving such change can be hampered if the change means exchanging a well known situation, with a clear understanding of appropriate behaviours, for an uncertain new one. Further impediments are present if people tend to belief that the current situation is as good as it gets. This may give some insight into why the Swiss safety culture persisted even after it became rather clear from the outside that the existing approach to safety management was no longer appropriate in view of the changes taking place in the Swiss as well as the international air transport landscape. The relationship between the various government and industry actors in Swiss aviation has been, and still is, too much one in which ensuring mutual understanding and awareness is considered sufficient to ensure that safety is assured. A lack of mutual accountability leaves too much room for unresolved safety concerns. However, the current crisis in Swiss aviation, and in the Safety Management of Swiss aviation means that the impediments mentioned above with regard to cultural change are largely removed. Now more than ever there seems to be a common conviction that things must change for the better and that the safety of Swiss aviation holds a large potential for improvement. Therefore, the current crisis must be used as a rare window of opportunity to establish a state-of-the-art safety culture in Swiss aviation. By seizing this opportunity now instead of two years from now, the current crisis is partially turned into an advantage that will help to reinstate the exemplary safety record of Swiss aviation, thus meeting the expectations of Swiss society.
Chapter 12 The State of Safety Management in Swiss Aviation and the way ahead


It is recommended to the government to ensure 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.
# 13 List of referenced documents and background used.

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Appendix A  List of recommendations

All recommendations as provided in the 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 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.

**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.
Appendix A List of recommendations

**Recommendation 6-4: Development of a formal process for safety threat identification**
It is recommended that FOCA develop a formal process to identify safety 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 programme 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 programme 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 its safety management department, and assure adequate support by operational departments for the timely introduction of an ESARR compliant safety management system.
Appendix A List of recommendations

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 programme for Technical Personnel. The eventual set-up of such a programme 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 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.

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.

**Recommendation 8-3: Introduction of flight data monitoring programmes**
It is recommended to FOCA to take appropriate actions to ensure the introduction of flight data monitoring programmes 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 applicable to all recipients of a AAIB recommendations (instead of only FOCA) and to update the list on a regular basis.
Appendix A List of recommendations

**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 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.

**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.
Appendix A List of recommendations

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

It is recommended to the government to ensure 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  Benchmark

B.1  Introduction

For this study, a benchmark exercise has been conducted that can serve as a baseline for comparison of the Swiss aviation system. In general the focus is on the Swiss oversight over the aviation sector in comparison with neighbouring states.

This chapter describes the objective of the benchmark, the method used and the results of the benchmark.

The objective of the benchmark is to provide a reference to appraise safety management within the Swiss air transportation sector in a relative sense.

In particular the benchmark will address the following questions:

- How do the activities in Switzerland to supervise the air transportation sector compare with those of neighbouring countries?
- How does the FOCA, in terms of size and resources, compares to aviation authorities in neighbouring states? and
- How does Skyguide, in terms of size, resources and organisation, compares to air navigation service providers in neighbouring states?

In accordance with the study mandate the situation in Switzerland is compared with that of the neighbouring countries Germany and France. In order to address possible scale effects of being a smaller state amidst larger European countries, also the situation in the Netherlands is taken into account.

In order to address the questions as put forward in the previous section, it is necessary not only to look into the size and resources of the oversight and ATC organisations, but also into the complexity and size of the environment in which they operate. Furthermore the organisation and assigned tasks of involved governmental or (semi-)private institutions needs to be assessed in order to make a fair comparison. Required resources may be strongly dependent on these aspects and therefore should be taken into account.

The method used for the benchmark is to gather as much as possible publicly available information, and to sketch an outside view of the situation in Germany, France and the Netherlands (further called "benchmark countries").

After identification of the required benchmark items, public sources are used to obtain the information. As first source of information, formal publications like annual reports of the different organisations are used. Also information published on the official internet sites of the organisations is used. If the required information could not be traced in this way, personal contact has been made to obtain the required data.
**B.2 Size of the air transportation sector**

In order to give an indication of the relative size and population that is being served by the national air transportation system of the benchmark countries, the respective state surface area and number of inhabitants are presented in table B-1.

*Table B-1 Comparison of size and population in the benchmark countries*

<table>
<thead>
<tr>
<th></th>
<th>Germany</th>
<th>France</th>
<th>The Netherlands</th>
<th>Switzerland</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nr. of inhabitants (2001)</td>
<td>82,350,671</td>
<td>59,925,035</td>
<td>16,067,754</td>
<td>7,301,994</td>
</tr>
<tr>
<td>Surface area (km²)</td>
<td>357,022</td>
<td>543,965</td>
<td>41,526</td>
<td>41,300</td>
</tr>
</tbody>
</table>

The size of the air transportation sector (characterised here in terms of number of scheduled flights, registered aircraft and operators) within the respective countries is presented in table B-2.

*Table B-2 Comparison of characteristics of the air transportation sector*

<table>
<thead>
<tr>
<th></th>
<th>Germany</th>
<th>France</th>
<th>The Netherlands</th>
<th>Switzerland</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of registered civil aircraft</td>
<td>944</td>
<td>702</td>
<td>273</td>
<td>322</td>
</tr>
<tr>
<td>&gt; 8 seats, including freighters (in 2002)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of registered General Aviation aircraft (in 2001)</td>
<td>7591</td>
<td>7430</td>
<td>714</td>
<td>3760</td>
</tr>
<tr>
<td>Number of Commercial Operators (AOC) (per Feb-1-2003)</td>
<td>82</td>
<td>127</td>
<td>34</td>
<td>27</td>
</tr>
<tr>
<td>Number of Corporate Operators</td>
<td>55</td>
<td>45</td>
<td>10</td>
<td>22</td>
</tr>
<tr>
<td>Number of scheduled movements in 2001 (according OAG timetable)</td>
<td>1720000</td>
<td>1676000</td>
<td>432000</td>
<td>496000</td>
</tr>
</tbody>
</table>

Evidently the size of the air transportation sector in Germany and France is by and large of similar magnitude. The Netherlands and Switzerland are in absolute numbers comparable in as far as commercial aviation is concerned. However, the corporate and general aviation sector in Switzerland are much larger in Switzerland.
A more meaningful way to assess the size of the air transportation sector within the benchmark countries is to make a relative comparison. To this end the following table shows the characteristic numbers related to the number of inhabitants per state.

**Table B-3 Comparison of characteristics of the air transportation sector related to the population**

<table>
<thead>
<tr>
<th></th>
<th>Germany</th>
<th>France</th>
<th>The Netherlands</th>
<th>Switzerland</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of AOC-holders per million inhabitants</td>
<td>1</td>
<td>2.1</td>
<td>2.1</td>
<td>3.7</td>
</tr>
<tr>
<td>Number of Corporate Operators per million inhabitants</td>
<td>0.7</td>
<td>0.8</td>
<td>0.6</td>
<td>3</td>
</tr>
<tr>
<td>Number of registered civil aircraft, with more than 8 seats, incl. cargo a/c per million inhabitants</td>
<td>11.5</td>
<td>11.7</td>
<td>17.1</td>
<td>44.1</td>
</tr>
<tr>
<td>Number of General Aviation aircraft per million inhabitants</td>
<td>93</td>
<td>124</td>
<td>45</td>
<td>515</td>
</tr>
</tbody>
</table>

These data show that the air transportation sector in Switzerland is, in relation to the size of the population, significantly larger than in the benchmark countries. Especially striking is the volume of the general aviation sector that is 5 to 10 times as large as in other countries.

When focusing on commercial air transportation the relatively high number of Swiss registered aircraft and Swiss AOC holders is noticeable.

From this it may be concluded that the air transportation sector is of relatively high importance to Switzerland.

### B.3 Aviation authorities

**General**

This paragraph describes the organisation of the governmental bodies, responsible for regulation and oversight over the air transportation sector in the respective benchmark countries. The institutional arrangement in each state is described in summary, as well as the assigned tasks and responsibilities. An attempt has made to compare available resources for the various regulatory organisations, taking into account that assigned tasks and responsibilities can be quite diverse.
Germany: Luftfahrt-Bundesamt (LBA)
In Germany the organisation responsible for regulation and oversight of the air transportation sector is the Luftfahrt-Bundesamt (LBA). It is a Superior Federal Authority located in Braunschweig and directly subordinated to the Federal Ministry of Transport, Building and Housing (BMVBW).

The LBA has about 420 employees. Based on the Luftverkehrsgesetz (Air Traffic Law), the LBA has been charged by the "Gesetz über das Luftfahrt-Bundesamt" (Law on the Luftfahrt-Bundesamt). This law positions the LBA as a pure safety regulator, with as main task to supervise the aviation sector in Germany.

The LBA has no apparent role in aviation policy making in Germany. Issues like international aviation treaties, bi-lateral agreements and route concessions are dealt with at ministerial level.

The main objective of the work of LBA is the prevention of hazards to the safety of aviation. Primary responsibilities of the LBA are:

- Supervision of aviation industry. This supervision is limited to companies designing, manufacturing and maintaining aeronautical products which are subject to approval.
- Supervision over General Aviation (with business and private aeroplanes, helicopters, powered sailplanes, sailplanes, balloons).
- Supervision over commercial air transport operators. The LBA is exclusively responsible for those operating aircraft with a maximum take-off mass of more than 5700 kg or participating in international air traffic. For this purpose the LBA investigates economic capacity, maintenance, flight operations and security measures relating to unlawful interferences.
- Pilot licensing. The LBA is authorised for the supervision of aviation schools, flight simulator training and medical examination centers, for practical and theoretical examinations and the extension of licenses.

In the area of rulemaking the LBA participates in the elaboration of aviation regulations, which are enacted by the BMVBW. Implementation orders are issued by the LBA.

On average the LBA conducts 700 ramp-checks per year, in the context of the SAFA programme. LBA has 8 inspectors for this task (covering ca. 500 ramp-checks) and several federal state inspectors.

France: La Direction Générale de l'Aviation Civile (DGAC)
Within France the central governmental organisation for aviation is the DGAC. It resorts directly under the Ministry of Transport, Housing, Tourism and the Sea
The DGAC is a very large governmental body, with a very wide scope of responsibilities covering practically all aspects of aviation in France. The DGAC comprises the following departments:

- Aeronautical Information Department (SIA);
- Airport Technical Services (STBA);
- Study Centre for Air Navigation (CENA);
- Air Traffic Control Department (SCTA);
- Office for Air Navigation (DNA);
- Civil Aviation Programmes Office (DPAC);
- Office for Air Transportation (DTA);
- Aeronautical Training and Technical Inspections Department (SFACT).

The DGAC has a total of more than 11,000 employees. DGAC considers air transportation safety as its most important responsibility. However, DGAC also considers the assistance to the aeronautical industry (e.g. the French manufacturers, French equipment manufacturers and French engine manufacturers) as one of its essential duties. The DGAC helps the French aeronautical industry to develop and become more competitive.

In practice, safety regulation and oversight is only a small part of DGAC's tasks. The DGAC also has a clear responsibility in defining and implementing French aviation policies to the benefit of the French aviation industry. In contrast with many other European countries, the provision of air navigation services has not been privatised in France and has remained under direct state governance within the DGAC.

Within the DGAC, The Aeronautical Training and Technical Inspections Department (SFACT) is the organisation that is primarily responsible for the supervision of the aviation industry in France. SFACT has about 250 employees. SFACT is involved in certification of aircraft and products, supervision of aircraft operations and maintenance, supervision and licensing of flight crews, and monitoring the implementation of aviation regulations.

So, SFACT can be regarded as the safety regulator within the DGAC.

Inspection and surveillance of air transport companies is delegated to regional offices. On average the 1000 ramp-checks and 1600 safety inspections & audits per year. In total around 110 inspectors are employed for these tasks.

**The Netherlands: Civil Aviation Authority the Netherlands CAA-NL**

The Civil Aviation Authority in the Netherlands (CAA-NL) was reorganised in 2001. It was split into the Aviation Division of the Inspectorate General of Transport, Public Works and Water Management (IVW) and the Directorate General of Civil Aviation (DGL) of the Ministry
of Transport, Public Works and Water Management in order to clearly separate the responsibilities for aviation policy making and policy implementation.

The main task of the Directorate General of Civil Aviation (DGL) is to develop civil aviation policy with the principal aims to promote the aviation safety, to help develop and maintain an efficient aviation network (in terms of airports and airspace), to provide an efficient civil aviation system, and to effectuate and maintain the sustainable development of civil aviation. The DGL has about 100 employees.

The Aviation Division of the Inspectorate General of Transport, Public Works and Water Management (IVW) is responsible for implementing and enforcing aviation policy and regulations, and as such can be regarded as the aviation safety regulator within the Netherlands. The Aviation Division employs about 230 persons. The Aviation Division is divided into two civil aviation agencies: an executive agency and an enforcement agency.

The core tasks of the civil aviation executive agency are:

- Issuing permits and licenses on the basis of national and international rules;
- Inspections and audits in the area of aircraft, infrastructure and air traffic operations;
- Implementation of national aviation policy; and
- Implementation of political and administrative assignments.

The civil aviation enforcement agency is responsible for:

- enforcement of civil aviation policy
- enforcement of legislation regarding safety, noise, and quality of the air in Dutch aviation.

In case of breaching or violating rules, the agency takes corrective measures or gives sanctions. On average the IVW conducts 100 Ramp-Checks and about 150 safety inspections & audits per year (excluding inspection on maintenance organisations). IVW has 10 inspectors to conduct rampchecks and about 25 inspectors for inspections/audits on infrastructure, ATC, training facilities and operators.

Switzerland: Federal Office for Civil Aviation (FOCA)

The FOCA deals with several issues of the aviation sector. The FOCA is responsible for legislation and supervision of the civil aviation sector in Switzerland. The first priority in the strategy of the FOCA is aviation safety. Also a high priority in the FOCA strategy is the competitiveness of the Swiss aviation industry. The FOCA issues certificates to aviation organisations, licenses to e.g. flight crews, and supervises the aviation sector. The FOCA is organised into a number of processes each with its own task (e.g. Flight Training & Licenses, Type Certification etc.). Each process has its own staff of people.
In support of the different processes there are a number of specific competence centres within
the FOCA organisation (e.g. competence centre for legal affairs).
In addition FOCA has its own flight department, operating a number of fixed wing aircraft and
helicopters in order to provide air taxi services to the Swiss government and its departments.
The FOCA has a total of 180\textsuperscript{29} employees.
In 2002 the FOCA conducted 161 ramp-checks and 64 safety inspections & audits. In 2002
FOCA had about 11 inspectors of which 2 conducted ramp-checks.

\textit{Comparison of aviation authorities}

The four reviewed aviation authorities have very different organisational structures, which
makes a comparison difficult. Also the scope of assigned tasks and responsibilities varies
widely. While in France the aviation authority governs practically all aspect of aviation, --
including air navigation services, training, aviation studies, aviation policy, regulation and
oversight--, in Germany the aviation authority has merely the dedicated function of safety
regulator. In the Netherlands the aviation authority has been split into a policy making part and
a regulatory part, while in Switzerland both functions have been unified into a single
organisation.
Despite these substantial differences an attempt has been made to compare the agencies within
each of the benchmark countries that have safety regulation and oversight as their main task.
For France this is the SFACT, supported by regional offices, for Germany the LBA and for the
Netherlands the Aviation Division of IVW.
Based on the assumption that the total package of functions related to safety regulation and
oversight for each of these organisations is more or less comparable, the total number of
employed staff can be used as a reasonable indicator for the available resources for safety
regulation in each state.

However, for the Swiss aviation authority it remains difficult to establish the amount of
available resources for safety regulation and oversight, because the organisation does not
specifically discriminate between regulatory and aviation policy related activities. There is only
a fuzzy dividing line between these activities. It is therefore assumed that the relative
distribution between the efforts for safety regulation and policy making will be more or less
similar as in The Netherlands.
In this respect for The Netherlands it has been established that roughly 30\% of available
resources are devoted to policy making and the remaining 70\% for safety regulation and
oversight. Using a similar proportion for FOCA would indicate that FOCA has around 130
persons employed in regulatory and oversight functions. In this context it should also be

\textsuperscript{29} FOCA currently has some 27 fte of additional staff on a temporary basis.
mentioned that FOCA next to its regulatory and policy making activities also provides air taxi services to the government and its departments. The involved personnel in providing these services should be discounted from available resources for regulatory and policy making activities. Therefore, the availability of 130 persons for safety regulatory and oversight in total appears to be even fairly optimistic.

However, retaining this number the following comparison can be made.

Table B-4 Comparison of staffing of aviation authorities, in relation to safety regulation and oversight.

<table>
<thead>
<tr>
<th></th>
<th>Germany</th>
<th>France</th>
<th>The Netherlands</th>
<th>Switzerland</th>
</tr>
</thead>
<tbody>
<tr>
<td>Estimated total staff employed in safety regulation and oversight</td>
<td>~420(^{30}) (LBA)</td>
<td>~450 (~250 SFACT plus 200 support*)</td>
<td>~230 (IVW-DL)</td>
<td>~130 (FOCA, partially)</td>
</tr>
</tbody>
</table>

\(^*\)Estimated support to SFACT from regional offices and ATM oversight

Based on this comparison it appears that the available personnel resources at FOCA for safety regulation and oversight are fairly small. In regards to oversight over the commercial aviation sector it can be expected that the situation in comparison is even less favourable, in view of the disproportionally large size of the general aviation and corporate aviation sector in Switzerland, requiring its share of attention.

Striking is the difference between The Netherlands and Switzerland, especially if it is noticed that the aviation sector in Switzerland is substantially larger than in the Netherlands. But also in comparison with Germany and France the staffing level in Switzerland to regulate and supervise the commercial aviation sector appears to be low.

Another way of comparing the oversight activities within the benchmark countries is to assess the number of available inspectors and conducted inspections and audits to supervise the air transportation sector.

However, caution should be taken when comparing such numbers between the four oversight organisations. For instance, it could not be established for all four countries how many full-time inspectors there are. In some cases it is known that a person has only a part-time job as an inspector. Also the definition and actual depth of an audit or inspection can vary from state to state. Nevertheless some indication of the inspection levels can be deduced from the available information.

In general one of the few inspection areas where consistent records are maintained are the ramp-checks, which are conducted under the SAFA (Safety Assessment of Foreign Aircraft)

\(^{30}\) Oversight of DFS as there is a separate government unit for that at the level of the ministry. Also, oversight of the German airports is not conducted by LBA but by personnel of the Bündesländer.
initiative. Its should be noted that SAFA ramp inspections are by their nature on-the-spot assessments which can not substitute or replace safety oversight responsibilities of the State of Registry.

The number of performed SAFA checks per state are shown in the following table.

\[
\begin{array}{|c|c|c|c|}
\hline
\text{Number of yearly SAFA checks (2001)} & \text{Germany} & \text{France} & \text{The Netherlands} & \text{Switzerland} \\
\hline
\end{array}
\]

Based on these figures all 4 countries appear to put a fair effort into the SAFA inspection programme that is more or less in correspondence with the volume of air traffic for which they are responsible.

In the field of air operator inspection activities (such as in the areas of dangerous goods, equipment, operations, maintenance, manuals, organisation, security and training) it is difficult to find comparable data for the various countries. For Germany no usable data could be established. In France an average number of around 1600 air operator safety inspections are performed yearly according to the DGAC. Around 110 inspectors are employed in total (i.e. including SAFA inspectors) to conduct these inspections.

In The Netherlands the IVW has indicated to perform around 150 air operator safety inspections & audits annually. The total number of inspectors is around 35. This includes 10 SAFA inspectors and 25 in the field of air operators, ATC, infrastructure and facilities.

In 2002 the FOCA conducted in Switzerland 64 air operator safety inspections and audits. Therefore the operator inspection activities in Switzerland are in comparison fairly poor.

After a recent re-organisation the FOCA assigned 11 inspectors that are specifically directed to supervise air operators, as of beginning 2003. This includes two dedicated SAFA inspectors. This represents a substantial increase of inspection capabilities, but appears to be still a rather small inspection workforce in comparison with the benchmark countries.

**B.4 Air navigation service providers**

In this section, the air traffic service providers of France, Germany, The Netherlands and Switzerland are briefly discussed. For each of the four providers, an overview of the organisation, characteristic numbers related to air traffic service provision and an indication of the development of safety management is given. At the end of the section, an overall evaluation of the Swiss air traffic service provider against the background of the other providers is given.
France: DNA

The primary organisation for providing Air Navigation Services in France is the DNA (Direction de la Navigation Aérienne). DNA is a governmental body that resorts under the DGAC (Direction Générale de l'Aviation Civile), that in turn comes under the Ministère de l'Équipement, des Transports, du Logement, du Tourisme et de la Mer.

Directly attached to the head of DNA are a number of advisers (a general, communication and scientific adviser) and two envoys (chargés de mission), one of them in safety.

Apart from divisions of finance, technical and operational systems and human resources, DNA contains the air traffic control department Service du Contrôle du Trafic Aérien (SCTA), a department of aeronautical information services (SIA), the air navigation study centre CENA and the air navigation technical service department STNA.

The safety manager is located in SCTA, independent of the operational hierarchy and directly accountable to the head of the SCTA. In each of the control centres under the SCTA, a programme head develops and leads the local system for management of quality and safety under the authority of the head of the centre.

The scope of the services of DNA/ SCTA are:

- Only civil aviation (GAT: General Air Traffic), no military operations (OAT: Operational Air Traffic);
- Lower and upper airspace; and
- The size of the airspace controlled is 1,159,347 km².

DNA/ SCTA operates the following types and numbers of air traffic service units:

- 5 Area Control Centres (ACCs);
- 11 Approach control centres (APPs);
- 66 Tower control centres (TWRs); and
- 0 Airport/ Aerodrome Flight Information Service (AFIS) units.

The following table provides some quantitative indications of air traffic control by DNA/ SCTA; the information is based on an Eurocontrol Assessment of Air Traffic Management in Europe during the Calendar Year 2001 (ref. 186) and the DNA Annual report 2001 (ref. 102).

<table>
<thead>
<tr>
<th>controlled IFR flights</th>
<th>controlled IFR km</th>
<th>Total staff</th>
<th>ATCos</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.6 million</td>
<td>$1.2\times10^9$</td>
<td>8,500</td>
<td>3,100</td>
</tr>
</tbody>
</table>

Under the heading “SCTA Safety Policy”, the DGAC Annual report 2001 (ref. 101) mentions that SCTA has set up a safety management system complying with the standards of "ESARR 3".
This system is called SMQS (System for Quality and Safety Management) and aims to provide pro-active, explicit safety management. The safety manager ensures that the provisions of SMQS are applied and collects and proposes the alterations needed for improvement of operations. SCTA sets and regularly re-assesses safety objectives. These objectives meet the requirements by European and French regulatory authorities. Whenever relevant and practicable, the objectives are quantified by indicators. According to the DNA Annual report 2001, the managers responsible for setting up and applying safety and quality management programmes in each of the five French ACCs and in the Paris Airports Air Traffic Operations Directorate, were appointed in 2001.

Germany: DFS Deutsche Flugsicherung GmbH
As a company organised under private law, DFS is 100% owned by the Federal Republic of Germany, which is represented by the Federal Minister of Transport, Building and Housing. DFS has a supervisory board consisting of a Chairman and 2 other members from the Federal Ministry of Transport, Building and Housing, and members from the Federal Ministry of Defence (2), the Ministry of Finance (1), the Unified Services Union (2) and DFS (4). The CEO, who is also Chairman of the board of managing directors, is appointed by the supervisory board, the other members of the board are the managing directors of Human Resources Operations and Engineering. DFS has implemented a new company structure that is in effect from 1 January 2001. In this new structure, there are six business units (Tower; Control Centre; Aeronautical Data Management; Consulting; Communications, Navigation and Surveillance; and Academy) which work together on tasks in a process-oriented way.

The safety manager reports directly to the CEO of DFS. In safety issues the safety management department consults directly with the board of directors. There are safety management functions within the business units; these are linked with the head of the unit and with the safety management unit. The distribution of tasks related to safety management is as follows: while the safety management department is responsible for the framework, development and methodology (of risk assessment and the reporting system, for instance), actual execution is done within the units.

The scope of the services of DFS is:
- Civil aviation (GAT) and military operations (OAT);
- Lower and upper airspace; and
- The size of the airspace controlled is 386,421km².
DFS operates the following types and numbers of air traffic service units:

- 1 Upper Area Control (UAC) centres;
- 2 combined ACC/UAC/APP centres;
- 3 combined ACC/APP centres;
- 1 ACC for OAT; and
- 17 TWRs.

The following indicative numbers are based on ref. 186 and the DFS Annual report 2001:

<table>
<thead>
<tr>
<th>IFR flights</th>
<th>IFR km</th>
<th>Total staff</th>
<th>ATCos</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.6 million</td>
<td>$0.81 \times 10^9$</td>
<td>5,214</td>
<td>1,579</td>
</tr>
</tbody>
</table>

DFS has a formal safety policy since 1996, which was recently (2003) updated due to DFS’ new structure. The development of safety management has received full support by DFS’ management board from the start.

At present, DFS is working to achieve full compliance with "ESARR 3". In the autumn of 2003, the Federal Ministry of Transport, Building and Housing will, together with an external organisation, check compliance.

Within the safety management department there are 13 full-time equivalents (FTE), within the units about 65 FTE's are devoted to the safety management related tasks.

Risk assessment is normal practice within DFS:

- There are internal regulations on how to make a safety case (the corresponding documents are managed by the safety management department);
- Training for building safety cases is provided since about three years, so far 150 people have been trained;
- Risk assessments are performed prior to changes to the ATM system. Moreover, there are about 30 projects per year where risk assessment is involved;
- There is a clear structure for signing (approving/authorising) safety case documents (safety management checks methodology, the operational aspects are dealt with by the unit);
- DFS offers external training and safety consultancy in how to perform risk assessments; and
- The risk assessment methodology is believed to be in accordance with "ESARR 4"; it has been forwarded to the Federal Ministry of Transport, Building and Housing for approval.

DFS has a mandatory, non-punitive reporting framework. In case of an occurrence, the concerning units safety management is immediately informed by means of a short note, as well
as the overall safety management, the CEO and the Federal Ministry of Transport, Building and Housing.

The preliminary investigation gives more details and facts and is performed within weeks. In principle, the reporting system is confidential; the identity of the reporter is not disclosed to outside the unit. However, in case of an accident, protection of confidentiality is not guaranteed. During the years, the reporting system has been generally accepted. Confidence has increased to the extent that the reports are believed to give good insight in the occurrences.

In general safety management is well supported by the controllers. As a matter of fact, four controllers work half time within the safety management department, where they are involved in producing safety letters, the operational aspects of safety cases, with training issues and safety controlling (where for instance the factors contributing to incidents are identified). In spite of the fact that involvement of controllers in risk assessment is not easy due to the general shortage of controllers, sufficient priority is given to this involvement to enable sufficient participation.

Within DFS it is strongly believed that for successful safety management, it is necessary not to restrict oneself to the associated paperwork (such as handbooks, safety objectives), but to work on all aspects of safety management from the beginning. In this respect safety promotion is considered to be essential. DFS started early with training, safety letters, presentations and symposia related to safety management. As an example, three symposia on TCAS were held before the Überlingen accident; Lufthansa and Honeywell were involved.

Finally it is noted that a Critical Incident Stress Management (CISM) programme has been developed by DFS’ Safety Management. The objectives of this programme are:

- Reducing critical incident stress reactions as quickly as possible;
- "Normalisation" of the unusual experience and reaction;
- Reactivating the cognitive functions and processes affected by the incident; and
- Regaining the ability to work as soon as possible.

Studies have shown the programme to be successful in reaching these objectives. CISM is accepted well by DFS’ employees and enjoys high interest from the outside.

*The Netherlands: LVNL*

In the Aviation Law (*Luchtvaartwet* in Dutch) all tasks of LVNL are established. That includes the renewal and exploitation of technical systems, the provision of air traffic information, taking care of the training for air traffic control, air traffic charts and publications. In short, LVNL is responsible for the management of the civil airspace and everything related to it. From 1993, LVNL is an independent organisation performing a task of the government.
In this identity LVNL provides air traffic control by appointment of the Minister of Transport and Water Management. LVNL is accountable to the Minister concerning performance and policy.

LVNL’s supervisory board is chaired by a former Commander in Chief of the Royal Netherlands Air Force/Chief of Staff, and further consists of representatives from KLM, Transavia Airlines, RNlAF, Schiphol Group and the Minister of Transport, Public Works and Water Management.

The CEO/Chairman of the Executive Board and the Vice Chairman, which is the head of the chief executive of ATM, are appointed by the Minister of Transport, Public Works and Water Management. The other members of the Executive Board are the Chief Executives of the directorates of Stakeholder Management, Human Resources Management, Regional Unit and Corporate Resources Management.

The safety manager of LVNL is the head of Corporate Quality and Safety; he reports directly to the CEO. Risk assessment is performed in the department “Performance Analysis” of the Research & Development division, which falls under the directorate of ATM.

The scope of the services of LVNL is:
- Only civil aviation (GAT);
- Lower airspace up to flight level 245; and
- The size of the airspace controlled is 90,324km².

Upper airspace above The Netherlands as well as above Belgium, Luxembourg and the northwestern part of Germany is controlled by Eurocontrol’s Upper Area Control Centre Maastricht.

LVNL operates the following types and numbers of air traffic service units:
- 1 ACC (Amsterdam);
- 4 APPs (Schiphol, Rotterdam, Eelde, Beek);
- 4 TWRs (Schiphol, Rotterdam, Eelde, Beek); and
- 1 AFIS.

The following characteristic numbers are collected from ref. 186.

| Table B-7 Characteristic numbers of Dutch air traffic control |
|-----------------|-------------|-------------|--------|
|                 | IFR flights | IFR km      | Total staff | ATCos |
| LVNL            | 0.55 million| 913         | 216         |
| LVNL + Dutch part of UAC | 0.99 million | 0.16×10⁸ | 278¹       |

¹ Estimated as follows: UAC Centre Maastricht employs 186 ATCos; a roughly guessed third of which are dealing with Dutch airspace
LVNL does not have a formal safety policy document. However, LVNL works according to a documented framework for safety, efficiency and environment that is regularly updated and used as guidance in the analyses. Although several of the processes of safety management are existent, LVNL is not formally striving for "ESARR 3" compliance. National legislation has yet to be developed. LVNL does not have a non-punitive reporting system; as a matter of fact, a controller involved in the so-called Delta incident was recently convicted. Internally, incident reports are de-identified. Since 1998/1999, LVNL had assigned 12 full-time equivalents for incident investigation: 6 people being full-time investigators (being part of the corporate safety and quality department) and about twelve operational people spending half their time. The department of Performance Measurement introduced risk assessments around 1999. At present, the department consists of about 5 – 6 people, which are working on safety, efficiency and environment analyses. LVNL moreover contracts external organisations, which adds around four full-time equivalents to the people performing risk assessments. In the beginning of 2003, LVNL has started co-operation with the Dutch regulator to get the applied methodologies "ESARR 4" compliant.

Switzerland: Skyguide
The Board of Directors is chaired by an attorney at law, the Deputy Chairman is Chief Operations/ Deputy Commander-in-Chief of the Swiss Air Force. The other members are the CEO of Unique, the CEO of Tornos Bechler Ltd, the Chairman of Aerosuisse, the Director of the Federal Office of Finance, and a representative of Skyguide Personnel Associations. The Executive Management consists of the CEO (which is appointed by Board of Directors), the Deputy CEO (which is also the head of Technics), the heads of Operation Switzerland, Operation Military, Human Resources, and Finance and Controlling, and the Corporate Secretary. The safety management functions are in the Centre of Competence, the head of which reports directly to the CEO. This centre contains departments/managers for audit management, safety management (responsible for implementation of "ESARR 2, 3 and 5"), risk management (tasked with implementation of "ESARR 4"), quality management and information management.

The scope of the services of Skyguide is:
• Civil aviation (GAT) and from 1 January 2001 military operations (OAT);
• Lower and upper airspace; and
• The size of the airspace controlled is 63,726 km².
Skyguide operates the following types and numbers of air traffic service units:

- 2 ACCs (Geneva, Zurich);
- 4 APPs (Geneva, Zurich);
- 4 TWRs (Geneva, Zurich, Lugano, Bern); and
- 4 AFISs (Geneva, Zurich, Lugano, Bern).

The following indicative numbers are collected from ref. 186.

<table>
<thead>
<tr>
<th>IFR flights</th>
<th>IFR km</th>
<th>Total staff</th>
<th>ATCos</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.07 million</td>
<td>0.12×10^9</td>
<td>1,057</td>
<td>343</td>
</tr>
</tbody>
</table>

Extensive information and the evaluation of Skyguide’s safety management can be found in Chapter 7. Here we summarise some of the information also identified for the other air traffic service providers.

Skyguide started with a co-ordinated development of safety management in 2001, when the present CEO was appointed. He has assigned the responsibility for the explicit management of safety to a Center of Competence (CoC). The CoC is functioning as of September 2001 as a separate entity, reporting directly to the CEO.

CoC’s Audit Management and Quality Management are well-established parts of the organisation. Safety Management and Risk Management within the CoC are less developed: their management was appointed in 2001 and September 2002, respectively. Both functions are mainly aimed at implementing the governing Eurocontrol Safety Regulatory Requirements. No former experience exists within Skyguide concerning the implementation and conduct of safety management and risk management in conformance with ESARRs, and therefore this know-how has yet to be fully developed.

Evaluation

In this section an overall evaluation of Skyguide against the background of the other providers is given.

Organisation

Skyguide is an organisation similar to DFS and LVNL: all of these service providers are independent and (semi-)privatised organisations, (largely) owned by the government and with a supervisory board with representatives from supervising ministries and private companies, mostly related the national air traffic sector. The French organisation is special with respect to the others: DNA is a full governmental body, resorting under the French aviation authority DGAC. The positions of safety management within DFS, LVNL and Skyguide are similar to:
they are directly linked and accountable to the CEO. Within DNA, the safety manager is linked to the head of SCTA, which resorts under DNA, at the same level as a number of other departments.

**Air traffic control characteristics**

In the following table some of the characteristic numbers for the various ATC providers are summarised.

<table>
<thead>
<tr>
<th>ATC Provider Quantity</th>
<th>DNA</th>
<th>DFS</th>
<th>LVNL</th>
<th>Skyguide</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scope (traffic)</td>
<td>only GAT</td>
<td>GAT and OAT</td>
<td>only GAT</td>
<td>GAT and OAT*</td>
</tr>
<tr>
<td>Scope (airspace)</td>
<td>upper and lower</td>
<td>upper and lower</td>
<td>lower up to FL245</td>
<td>upper and lower</td>
</tr>
<tr>
<td>Size of controlled airspace ($10^6$ km$^2$)</td>
<td>1.2</td>
<td>0.39</td>
<td>0.090</td>
<td>0.064</td>
</tr>
<tr>
<td>Number of IFR flights ($10^6$)</td>
<td>2.6</td>
<td>2.6</td>
<td>0.55</td>
<td>1.1</td>
</tr>
<tr>
<td>Number of IFR km ($10^9$ km)</td>
<td>1.2</td>
<td>0.81</td>
<td>0.16$^*$</td>
<td>0.12</td>
</tr>
<tr>
<td>Total staff</td>
<td>8,453</td>
<td>5,214</td>
<td>913</td>
<td>1,057</td>
</tr>
<tr>
<td>Total ATCos</td>
<td>3,303</td>
<td>1,597</td>
<td>216</td>
<td>343</td>
</tr>
</tbody>
</table>

It is first noted that concerning size of controlled airspace, numbers of IFR flights and kilometres, and numbers and types of control centres, the Swiss situation is most comparable with that of The Netherlands. Two important differences exist though:

- Skyguide controls military operations; LVNL does not; and
- Skyguide controls upper airspace, while this is done by Eurocontrol’s UAC Maastricht for The Netherlands.

With respect to the first difference, it is noted that civil and military ATC have been integrated in Switzerland only since 1 January 2001. This is the main reason to compare data for the year 2000.

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*From 1 January 2001

#In Dutch airspace, including upper airspace controlled by Eurocontrol’s Upper Area Control Centre Maastricht

+Estimated (UAC Maastricht has 186 controllers (2000 figures from ref. 186), an estimated third for traffic in Dutch

*LVNL + the part of UAC Maastricht controlling Dutch upper airspace
Concerning upper area control, the part of UAC Maastricht that deals with traffic in Dutch airspace has been estimated and included in the Dutch figures.

A rough indication of the ATCo staffing level can be obtained from the average number of IFR flights and IFR kilometres that are handled by an ATCO on a yearly base. The following ratios are computed:

**Table B-10 Comparison of IFR flight and IFR kilometres per km² for the year 2000**

<table>
<thead>
<tr>
<th>ATC Provider Quantity</th>
<th>DNA</th>
<th>DFS</th>
<th>LVNL</th>
<th>LVNL + UAC</th>
<th>Skyguide</th>
</tr>
</thead>
<tbody>
<tr>
<td>$10^5$ IFR flight/ATCo</td>
<td>0.79</td>
<td>1.7</td>
<td>2.5</td>
<td>3.5</td>
<td>3.1</td>
</tr>
<tr>
<td>$10^6$ IFR km/ATCo</td>
<td>0.37</td>
<td>0.51</td>
<td>not available</td>
<td>0.57</td>
<td>0.34</td>
</tr>
</tbody>
</table>

The limitations of these data should be kept in mind: an aircraft flying over through upper airspace constitutes a flight, just as an aircraft descending from UAC to ACC, via APP to TWR and ground, which has to be dealt with by several air traffic controllers. Having said that, the data show that the average number of IFR flights yearly handled per ATCo is high in Switzerland, especially as compared to Germany and France. However the average length of the controlled trajectories is relatively short, which will require a relatively high proportion of ATCO co-ordination. Altogether, this is considered as an indicator of a relatively high workload for Swiss ATCOs.

In addition to the number of IFR flights and IFR kilometres, the size of controlled airspace is relevant: a large number of flights and flight kilometres will be harder to accommodate in a smaller area. Indications of IFR flight and IFR kilometre densities are given below:

**Table B-11 Comparison of IFR flights and IFR kilometres per km² for the year 2000**

<table>
<thead>
<tr>
<th>ATC Provider Quantity</th>
<th>DNA</th>
<th>DFS</th>
<th>LVNL</th>
<th>LVNL + UAC</th>
<th>Skyguide</th>
</tr>
</thead>
<tbody>
<tr>
<td>IFR flight/km²</td>
<td>2.3</td>
<td>6.8</td>
<td>6.1</td>
<td>11</td>
<td>17</td>
</tr>
<tr>
<td>$10^3$ IFR km/km²</td>
<td>1.1</td>
<td>2.1</td>
<td>not available</td>
<td>1.8</td>
<td>1.8</td>
</tr>
</tbody>
</table>

Although care should be exercised in interpreting these figures, it is clear that Swiss airspace is relatively small for the number of IFR flights and kilometres. This makes ATCOs’ work harder since the more airspace, the easier it is to solve conflicts. Related to a small area is also that the level of co-ordination between controllers is relatively high.
Apart from the airspace’s area, vertical space is relevant: the more flight levels, the more aircraft can be separated vertically. In this sense, Swiss airspace has the disadvantage of being confined by mountains.

The following issues, hard to catch in the above figures, are also of large influence on the controllers’ workload:

- Number of crossing points/ (potential) conflicts;
- Climbing/ descending traffic, which is more laborious than level traffic;
- Traffic mix: (a mix with a large variation of performances is harder); and
- Distribution of traffic over the day; traffic in peaks is harder than equally distributed traffic.

In this respect, the complexity of the route structure in the Swiss airspace is noted. There are two air traffic route junctions of a complexity comparable to that above Schiphol.

It is concluded that in relation to the amount of controllers and in comparison with France, Germany and The Netherlands, Skyguide handles a high traffic volume, in a confined airspace, in a complex traffic situation. Therefore, the shortages of controllers felt by DFS as well as by LVNL (see their annual reports) are expected to hold for Skyguide as well, probably even at a more serious level.

Safety management

The table below summarises a number of indicators of the relative development of safety management at DFS, LVNL and Skyguide (insufficient material has been obtained for DNA):

**Table B.12 Comparison of safety management characteristics for DFS, LVNL and Skyguide**

<table>
<thead>
<tr>
<th>ATC provider</th>
<th>DFS</th>
<th>LVNL</th>
<th>Skyguide</th>
</tr>
</thead>
<tbody>
<tr>
<td>ESARR 3 compliance</td>
<td>Will be sent to regulator for approval in autumn 2003</td>
<td>Not formally striving for compliance</td>
<td>The end of 2004 is more realistic than November 2003</td>
</tr>
<tr>
<td>Full time equivalents doing work related to safety management</td>
<td>About 80</td>
<td>About 20, including safety analysts from external organisations</td>
<td>About 13; including CoC, auditors, Q+S-officers and incident investigators</td>
</tr>
<tr>
<td>Development of risk assessment</td>
<td>Mature</td>
<td>From around 1999</td>
<td>Started September 2002</td>
</tr>
<tr>
<td>Experience with risk assessment</td>
<td>Doing risk assessments is normal practice. 150</td>
<td>Practice from about 2000, say 5 risk assessments per</td>
<td>Skyguide started 1 September 2002; one</td>
</tr>
</tbody>
</table>
The above data indicate that DFS is ahead of LVNL and Skyguide with respect to safety management: DFS started years before the others and the safety management system will be offered for approval this autumn. This picture is confirmed by DFS’s state of development with respect to risk assessment: there is mature guidance material, there are many trained people, years of experience; doing risk assessments is daily practice.
LVNL appears the second of the three: although formal compliance with ESARR 3 is not strived for at present, doing risk assessments has developed well towards maturity.
Both safety management and risk assessment are rather new to Skyguide. A start with safety management has been made in 2001; developing risk assessment has only started in September 2002. Staffing is low in this respect, especially with respect to risk management.
None of the countries have a non-punitive reporting system in the strict sense. In case of accidents, the controller in concern can be subject to court cases. The level of satisfaction with the reporting system is highest for DFS and lowest at Skyguide.

**B.5 Where is Swiss ATM in the "European Action Group for ATM Safety" Overview?**

Eurocontrol has tasked the so-called High-Level European Action Group for ATM Safety (AGAS), to provide an overview of the safety of Air Traffic Management (ATM) in European (ECAC) states. The results of this overview have been reported in the “Agas Overview of European ATM Safety” (ref. 2). In this section, the position of Swiss ATM in this overview is given.
In the AGAS Overview a number of so-called study areas are defined, which examine different aspects of ATM safety management. Example study areas are:

- Organisational structures for safety;
- Current safety practices; and
- Timely implementation of ESARRs.

To cast light on the developments of the European states with respect to the study areas, question lists have been developed; for instance: “Have ATM safety targets been established in your State?” and “How well established is the safety related reporting system?” The questions can be answered by indicating various discrete stages of maturity (initial, planned developing and mature). Via weight factors reflecting the importance of a question for a study area, the answers are translated to maturity scores for all study areas, indicated with a percentage. An overall maturity score is obtained by averaging over the study areas.

For each of the 42 ECAC states, a questionnaire has been sent to the Air Navigation Service Provider and a similar one to the regulator. The large majority of the questionnaires (89%, respectively 78%) have been answered.

A sketch of the outcomes of the various European states is as follows:

- 37 ANSP questionnaires have been answered; the resulting maturity scores are rather uniformly distributed from 10% to 95%, with a difference of about 15% between the best three and the rest; and
- 33 regulator questionnaires have been answered, yielding maturity scores ranging from 20% to 95%, again rather uniformly distributed.

The maturity scores were classified in three groups:

- Uncertain starters, having a maturity score smaller than 35%;
- Willing developers, with a maturity score between 35 and 70%; and
- Confident adopters, with a maturity score above 70%.

The Swiss answers, provided by Skyguide and FOCA, respectively, are summarized in Table B-13.

Note that the higher score resulting from the regulator’s answers does not mean that the regulator scores better in ATM safety than the Air Navigation Service Provider, but that the regulator’s answers are more optimistic.
Table B-13 Switzerland’s maturity scores in the AGAS Overview

<table>
<thead>
<tr>
<th>Quantity</th>
<th>Range of maturity scores</th>
<th>Average maturity score (classification)</th>
<th>Ranking</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skyguide</td>
<td>from 56 to 70%</td>
<td>63% (willing developer)</td>
<td>9th of 37</td>
</tr>
<tr>
<td>FOCA</td>
<td>from 70 to 80%, with a peak of 90%</td>
<td>76% (confident adopter)</td>
<td>5th of 33</td>
</tr>
</tbody>
</table>

The ranges between the maturity scores over the various study areas appear modest. Based on the sums of the scores from ANSP and regulator, the three relatively most mature areas are:

- Organisational structures for safety;
- The implementation of SMS; and
- Promotion of best practice.

The three least mature study areas are:

- Timely implementation of ESARRs;
- Current safety rules and practices; and
- Data collection and dissemination.

It should however be noted that the ranges of the scores appear small; the differences in development of the various areas as indicated by the above ranking may not be significant.
Appendix C Overview of Safety management regulatory requirements

C.1 ICAO
Switzerland is a member of ICAO, and as such it is required to follow Standards and Recommended practices as adopted by the ICAO Council as Annexes to the Convention. According to Article 38 of the ICAO Convention the member states have the obligation to notify ICAO of the differences in the event of non-implementation. Guidance material, as for instance provided in the PANS-ATM and PANS-OPS, does not carry the same status afforded to Standards and Recommended practices. This guidance material is approved by the Council and is recommended to the contracting states for world-wide implementation. However, no formal feedback is required for non-compliance.

In the context of safety management, there are various paragraphs in the relevant Annexes (i.e. Annex 6: Aircraft Operations, Annex 11: Air Traffic Services & Annex 14: Aerodromes), addressing this subject specifically. Noteworthy are the deadlines for meeting safety management requirements, as specified in the respective Annexes.

The relevant articles are the following.

In Annex 6, Part I:

3.2.2 Recommendation.— From 1 January 2002, an operator of an aeroplane of a certificated take-off mass in excess of 20,000 kg should establish and maintain a flight data analysis programme as part of its accident prevention and flight safety programme.

3.2.3 From 1 January 2005, an operator of an aeroplane of a maximum certificated take-off mass in excess of 27,000 kg shall establish and maintain a flight data analysis programme as part of its accident prevention and flight safety programme.

In Annex 11:

2.26 ATS safety management
2.26.1 States shall implement systematic and appropriate ATS safety management programmes to ensure that safety is maintained in the provision of ATS within airspaces and at aerodromes.

2.26.2 As of 27 November 2003, the acceptable level of safety and safety objectives applicable to the provision of ATS within airspaces and at aerodromes shall be established by the State or States concerned. When applicable, safety levels and safety objectives shall be established on the basis of regional air navigation agreements.
In Annex 14, amendment 4:

1.3.1 As of **27 November 2003**, States shall certify aerodromes used for international operations in accordance with the specifications contained in this Annex as well as other relevant ICAO specifications through an appropriate regulatory framework.

1.3.4 **Recommendation.**— *A certified aerodrome should have in operation a safety management system.*

1.3.6 As of **24 November 2005**, a certified aerodrome shall have in operation a safety management system.

### C.2 JAA

Switzerland is a member of the Joint Aviation Authorities (JAA). The JAA is an associated body of the European Civil Aviation Conference (ECAC), of which Switzerland is also a member.

The JAA have worked out arrangements to cooperate in the development and implementation of Joint Airworthiness Requirements (JARs) in all fields relating to the safety of aircraft and their operation. These arrangements have been agreed and signed by Switzerland. Technical requirements and administrative procedures relating to the safety of aircraft and their operation should be harmonized on the basis of the JAR codes of the JAA.

In close contact with the European Commission and the fifteen EU member states, Switzerland is in the process of transposing the JAA requirements into Swiss legislation and making them legally binding. By special ordinances the following JAR requirements have been incorporated as yet within Swiss aviation legislation:

- JAR-66: Certifying Staff Maintenance
- JAR-145: Approved Maintenance Organisations
- JAR-147: Approved Maintenance Training/Examinations
- JAR-OPS 1: Commercial Air Transportation (Aeroplanes)
- JAR-FCL: Flight Crew Licensing (Aeroplane & Helicopters)
- JAR-STD: Aeroplane Flight Simulator and Training Devices

In the context of safety management mainly the JAR OPS provides concrete directives in articles JAR-OPS 1.035 Quality System and JAR-Ops 1.037 Accident prevention and flight safety programme.

JAR-OPS 1.035 addresses the establishment of one Quality System to monitor compliance with, and the adequacy of, procedures required to ensure safe operational practices and airworthy aeroplanes.

JAR-Ops 1.037 addresses the establishment of an accident prevention and flight safety program (possibly integrated with the Quality system).
Key elements are:
- achievement and maintenance of operational risk awareness
- safety occurrence (incident & accident) reporting
- evaluation of safety occurrence information, including safety trend monitoring and safety information promulgation
- implementation of corrective actions resulting from the accident prevention and flight safety program
- monitoring of the effectiveness of corrective actions

C.3 Eurocontrol
Switzerland is a member of EUROCONTROL, and as such is bound by decisions taken under either the current or revised EUROCONTROL Convention, and consequently has to implement and enforce within its legal order the safety regulatory requirements contained in such decisions. These safety regulatory requirements are expressed in so-called ESARRs (Eurocontrol SAfety Regulatory Requirement).

Therefore, Switzerland must identify the actions needed to fulfil this international commitment and must ensure through appropriate safety regulation that ATM service-providers meet these requirements.

In the context of safety management ESARR2 (ATM occurrence reporting), ESARR3 (use of safety management systems by ATM service providers) and ESARR4 (Risk assessment and mitigation in ATM) are most relevant. Especially ESARR3 provides a general framework for effective safety management by ATM service providers. Key elements, as addressed in ESARR 3 are:

1) General safety management requirements
   a) Safety responsibility
   b) Safety priority
   c) Safety objective

2) Safety achievement requirements
   a) Organisational requirements; i.e. Competency, SMS Documentation, Safety Management Responsibility, External Services
   b) Systematic actions to achieve safety; i.e. setting quantitative Target Levels of Safety, Investigation of safety occurrences, Risk assessment and mitigation

3) Safety assurance requirements
   a) Systematic action to maintain safety; i.e. safety surveys and safety monitoring
   b) Documentation of systematic actions and changes; i.e. producing and maintaining safety records, documentation of risk assessment and mitigation results
4) Safety promotion requirements
   a) Lesson dissemination
   b) Safety improvement (safety culture establishment)
Appendix D List of most significant safety threats mentioned

UVEK
- increased competition and associated economic pressure
- integration of safety cultures within SWISS
- rapid growth of aviation industry
- relation BAZL-BFU
- Staatvertrag

FOCA
- complexity of system
- human error (complacency)
- rapid change within system
- (failure of) successful transition of FOCA to supervising agency
- problem with pilots (unions) at SWISS
- sufficient time to implement changes in licensing and training

BFU
- implementation of recommendations
- lack of surveillance (technical and operational)
- lack of structure in heli-branch
- increasing administrative burden (JAR-FCL not an improvement)

Skyguide
- human error (pilots and controllers, less concentration)
- runway incursion
- safety culture (Gameboy mentality)
- complex operation at ZRH (runway lay-out, environment, airport operation)
- use of STCA (ZRH vs GVA)
- occurrence reporting

SWISS
- cultural conflict with pilots
- high stress on pilots due to uncertainty
- technical state/reliability of aircraft
- operations at ZRH, ATC & airport
Appendix D List of most significant threats mentioned

Airports
- survival of SWISS
- runway incursions
- economic pressure
- traffic on apron (collision aircraft/vehicle)
- construction work

Others
- absence of non-punitive occurrence reporting
- economic pressure
- insufficient safety awareness at management
- organisation of FOCA (independency and staffing level)
## Appendix E  List of interviews conducted for the REACH study

<table>
<thead>
<tr>
<th>Company</th>
<th>Name</th>
<th>Position</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bundesamt für Zivilluftfahrt (BAZL)</td>
<td>A. Auer</td>
<td>Director</td>
</tr>
<tr>
<td>Bundesamt für Zivilluftfahrt (BAZL)</td>
<td>U. Adam</td>
<td>Dep. Director + COO</td>
</tr>
<tr>
<td>Bundesamt für Zivilluftfahrt (BAZL)</td>
<td>R. Aebersold</td>
<td>Process Manager, Infrastructure Planning</td>
</tr>
<tr>
<td>Bundesamt für Zivilluftfahrt (BAZL)</td>
<td>R. Ritz</td>
<td>Process Manager, Aviation Facilities</td>
</tr>
<tr>
<td>Bundesamt für Zivilluftfahrt (BAZL)</td>
<td>U. Herren</td>
<td>Process Manager, Flight Training and Licences</td>
</tr>
<tr>
<td>Bundesamt für Zivilluftfahrt (BAZL)</td>
<td>D. Ruhier</td>
<td>Process Manager, Air Transport Companies</td>
</tr>
<tr>
<td>Bundesamt für Zivilluftfahrt (BAZL)</td>
<td>G. Boller</td>
<td>Principal Inspector, Air Transport Companies</td>
</tr>
<tr>
<td>Bundesamt für Zivilluftfahrt (BAZL)</td>
<td>C. Schüle</td>
<td>Flight Inspector, Air Transport Companies</td>
</tr>
<tr>
<td>Bundesamt für Zivilluftfahrt (BAZL)</td>
<td>Dr. M. Trueb</td>
<td>Co-ordinator Accident Investigation and Prevention</td>
</tr>
<tr>
<td>Eidgenössisches Departement für Umwelt, Verkehr, Energie, Kommunikation (UVEK ) -Büro für Flugunfalluntersuchungen (AAIB)</td>
<td>J. Overney</td>
<td>Chief of the Aircraft Accident Investigation Bureau</td>
</tr>
<tr>
<td>Verteidigung, Bevölkerungsschutz, sport (VBS)</td>
<td>J.F. Gut</td>
<td>General Secretary VBS</td>
</tr>
<tr>
<td>Skyguide</td>
<td>A. Rossier</td>
<td>President &amp; Chief Executive Officer (CEO)</td>
</tr>
<tr>
<td>Skyguide</td>
<td>F. Moor</td>
<td>Head of quality &amp; safety</td>
</tr>
<tr>
<td>Skyguide</td>
<td>Dr. M. Probst</td>
<td>Head safety management</td>
</tr>
<tr>
<td>Skyguide</td>
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Appendix F  Improving safety feedback in Switzerland

F.1 Removing the exemption to Annex 13
In the previous chapters, the need to remove the Swiss exemption to ICAO Annex 13 with regard to the use in legal proceedings of evidence given in the course of accident investigation with the purpose of accident prevention has been identified. It is often thought that removing this exemption will mean that the legal investigation and the safety investigation will have to duplicate each and every part of the investigation as the findings from the safety investigation are not admissible in legal proceedings. This would obviously be most impractical and is therefore not the case. Removing the Swiss exemption to Annex 13 will not mean that every piece of wreckage must be investigated twice, or that Flight Data Recorder data would not be available to the legal investigation. Annex 13 is quite specific with regard to the information that must be protected, but that Switzerland until now has elected not to protect.

ICAO Annex 13 states in paragraph 5.12 *Non-disclosure of records* that the following records should not be made available for any purpose other than accident prevention:

a) All statements taken from persons by the investigation authorities in the course of their investigation.
b) All communications between persons having been involved in the operation of the aircraft
c) Medical or private information regarding persons involved in the accident or incident
d) Cockpit voice recordings and transcripts of such recordings
e) Opinions expressed in the analysis of information including flight recorder information.

The above basically means that the legal investigation will have to interview its own witnesses, the legal investigation cannot use the Cockpit Voice recording, and the legal investigation cannot use the parts of the safety investigation that do not constitute factual information.

The legal investigation cán use the data from the flight data recorder, and all factual information gathered in the course of the safety investigation other than that mentioned above.

In view of the need to prevent situations of self-incrimination it seems logical that witness statements giving to the safety investigators and cockpit voice recordings are not available for the legal proceedings.

Many states have not filed an exemption to Annex 13, and their safety investigations may still work together in a practical manner while not acting in breach with the provisions of Paragraph 5.12. Various states have found ways to write their national legislation such that the
provisions of Annex 13 are respected while the legal investigation is not made needlessly impractical. Examples could be the legislations of the Netherlands and the Transport Accident Investigation Bill of New Zealand.

F.2 Voluntary occurrence reporting programmes

Societies are becoming increasingly litigious across the globe. This general drive toward a claims culture and a call for more enforcement makes people and organisations more wary of their legal liabilities in the conduct of their daily work. Aviation is no exception. Recent examples of successful legal cases against aviation professionals include the airport directors air traffic controllers (ATCo's) and cockpit crew have not gone unnoticed in the aviation community. The preparedness of aviation personnel to report their mistakes for the benefit of safety improvement drops considerably when the risk of prosecution becomes real. In the Netherlands, incident reporting by ATCo’s dropped some 50% after colleagues were convicted in a legal case after a serious runway incursion incident. Such a decline in reporting is extremely worrisome as it negatively affects what is probably the most important safety mechanism in aviation: its ability to learn from mistakes.

The desire of the safety community to strengthen aviation's ability to learn form mistakes by increasing the volume and quality of occurrence reports on the one hand and the drive of the legal community to strengthen their ability successfully bring legal charges to people and organisations that have acted in breach with the rules and regulations on the other hand, lead to conflict in many states. Attempts to resolve the opposing desires of the legal community and, to some extent, society at large, and those of the aviation community, are often stopped dead in their tracks because both groups claim exclusive rights to the interests of safety. In the view of the REACH team, the following reasoning should govern developments in this area.

The rules of aviation exist for very good reasons and have as their primary purpose to ensure that air transport is conducted in a safe manner. As the rules are there for safety, it is obvious that ensuring that people and organisation act in accordance with those rules is also in the interest of safety. Hence, enforcement with the purpose of promoting adherence to rules and procedures is good for safety. Without enforcement, it is unlikely that people and organisations will act in accordance with the rules to the same extent as they do today. Prosecution is a necessary part of enforcement. Hence, some level of prosecution is in the interest of safety and the work of people and organisations charged with enforcement is thus in the interest of safety. The inability of the aviation community to wholeheartedly agree to this conclusion is at the heart of the failure of the aviation community and the legal community to reach a shared position on the legal provisions for confidential occurrence reporting.

Obviously, this line of reasoning also holds in the other direction. If it is true that the ultimate objective of the rules is to achieve safety, and if enforcement is there to help achieve that
objective, then enforcement should not be conducted in a way that does in fact negatively affect safety. If the legal community would agree to the position that occurrence reporting is a vital element of the safety chain, and thus would agree that enforcement such that occurrence reporting is negatively affected is not in the interest of safety, this would provide a good starting point to find the right balance between enforcement and protection against prosecution from the shared objective of ensuring and possibly improving safety. If the aviation community and the legal community in Switzerland could both agree to this line of reasoning, it should be possible to establish appropriate provisions to the legislation.

A common misconception is that legal provisions to support voluntary occurrence reporting programmes effectively mean that reporting an occurrence to such a reporting programme renders the reporter exempt from any legal proceedings regardless of whether laws or regulations were breached. This is of course not the case as it would contradict the reasoning above with regard to the need for enforcement. All confidential reporting programmes, and also the JAA policy statement repeated later in this Appendix state that acts of gross negligence or willful misconduct will not receive the protection of the reporting programme.

The need to establish voluntary confidential occurrence reporting programmes and the necessary legal provisions is very widely supported. ICAO, EU, JAA, IATA, ACI and many other organisations have expressed strong support. Excerpts from recent EU proceedings may serve to underscore the ample support and recognition of need:

Article 9 of the Directive of the European Parliament and of the Council on occurrence reporting in civil aviation is about Confidential Reporting and reads: "Member States shall adapt their laws, regulations and administrative provisions to permit the disidentification of voluntary reports of non-reportable occurrences by bodies created to collect, analyze and disseminate to parties able to use it for improving aviation safety, information on observed deficiencies in the aviation system perceived by the reporter as an actual or potential hazard."

The associated Explanatory Memorandum reads:

3. CONFIDENTIAL INCIDENT REPORTING
3.1. Current situation
Experience has shown that mandatory reporting is relatively successful at collecting information on technical defects and other incidents, which do not involve the responsibility of reporters. On the opposite, human errors, even if they
are induced for example by wrong cockpit design or complicated procedures, are seldom reported and there is little chance they will surface spontaneously. Knowing that human factors are involved to a certain extent in about eighty percent of the accidents, reporting system providing for the confidentiality of reporters are essential tools for accident prevention.

In September 1999, ICAO held an Accident Investigation and Prevention (AIG) Divisional Meeting in Montreal where aviation safety experts from 83 contracting states and 11 observer organisations reviewed the ICAO Standards and Recommended Practices, in particular those of Annex 13. They concluded *inter alia* that:

"A State should establish a voluntary incident reporting system to facilitate the collection of information that may not be captured by a mandatory incident reporting system.

A voluntary incident reporting system shall be non-punitive and afford protection to the sources of information.

Note 1.- A non-punitive environment is fundamental to voluntary reporting.

Note 2.- States are encouraged to facilitate and promote the voluntary reporting of events that could affect aviation safety by adjusting their applicable laws, regulations and policies, as necessary.

These provisions are currently part of Chapter 8 of the current ICAO Annex 13.

The fact that the European Commission actively ensured that such provisions became part of the European Directive is evident from the text of Amendments to the directive:

Parliament adopted two amendments to the common position of the Council at the second reading. The Commission accepts all the amendments proposed by the European Parliament.

**3.1 Amendment 1: Protection of the reporter.**

Amendment 1 reinstates the paragraph 3 of Article 8 of the Commission amended proposal which was deleted in the common position of the Council. This paragraph aims at protecting the reporter of an incident from sanctions, except in case of gross negligence. In its Communication to the European Parliament on the common position, the Commission regretted the deletion of this paragraph which gave a clear political signal about the principle that the occurrence reporter should
be regarded as conveying an important positive message for air safety and therefore encouraged to do so without risking any counterproductive sanctions. The Commission is able to accept this amendment.

3.2 Amendment 2: Confidential reporting

Amendment 2 reinstates Article 9 of the Commission proposal which was deleted in the Common position of the Council. This paragraph aims at establishing the legal framework to enable the setting up of voluntary confidential reporting systems. The Commission opposed the deletion of this article which would allow a better understanding of human factors involved in occurrences and accidents. The Commission is able to accept this amendment.

The regulatory authority JAA also has established a supportive policy towards voluntary and non-punitive reporting programmes. The policy is given below. As Switzerland has a strong tradition of following JAA, ICAO and EU regulation if at all possible, and since these three organisations all strongly endorse setting up such programmes and the necessary national legal provisions, it would seem wholly appropriate for Switzerland to take the necessary action in their endeavours to regain their position as a pro-active leading state in aviation safety.

The JAA policy reads:

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The attached Policy Statement recognises the important contribution to the aviation feedback process made by mandatory occurrences reporting systems and the accident investigation process. The Policy Statement shows the aviation feedback process as a coherent whole to support the idea of a system of complementary occurrences reporting systems.

The Policy Statement encourages the development of another generation of reporting systems, voluntary reporting systems, which are designed to obtain more information, especially on human factors related aspects and, thus contribute to improving aviation safety. Voluntary reporting systems could be defined as a protective link between the reporter of an event and whoever is responsible for correcting the problem. Such systems address events not covered by mandatory reporting systems which are of interest to aviation safety, such as landings on the wrong runway, rushed approaches and confused callsigns, which, if not reported under voluntary confidential reporting systems, would probably never be known.
This Policy Statement introduces the essential requirement that a voluntary reporting system must have independence from the regulating authority, to ensure that reporters to the system are assured of a high level of confidentiality and a non-punitive attitude towards reporting.

In addition to these fundamental principles, the Policy Statement describes other characteristics of voluntary reporting systems. These characteristics should, however, be further examined at national level taking account of national legal and regulatory systems.

There should not normally be overlaps between mandatory reporting systems and voluntary reporting systems. However, the possibility of overlaps exists, even though a list of mandatory reportable occurrences is available.

It is not intended to define criteria aiming at avoiding overlapping risks, as they may be defined in a number of ways and will often be dependent on national factors. However, useful guidance is provided in the requirement document drafted by a committee of experts set up by the European Commission, which proposes an alternative scheme for recording those events which should have been reported under the mandatory system.

This approach proposed by this Policy Statement has been supported by the ICAO.

Finally, the Policy Statement recognises that similar voluntary reporting systems could be developed by operators, manufacturers, etc.

JAA POLICY STATEMENT

Voluntary Reporting Systems: The need for them and their essential features

The aviation safety information feedback process consisting of mandatory occurrences reporting systems and of accident and serious incident investigations, could only improve if there were complementary voluntary reporting systems which were more likely to obtain information on human factors related aspects but not limited to these aspects.

When an accident occurs, several causal factors can generally be determined. The number of accidents in which a cause has been determined to be human factors related have remained at around 70% of the total. Accident reports may, therefore, address only the tip of the
iceberg. It is thus of importance to introduce other systems complementary to the existing ones which are able to identify key factors which may lead to an accident.

Persons reporting incidents must be able to trust the recipient organisation and be confident that any information they provide will not be used against them. Such reporting systems, known as voluntary reporting systems, thus need two essential principles to function: confidentiality and a non-punitive policy. Furthermore, these two principles can only be fully effective when they are applied in an independent system. Independence from the regulating authority is thus an essential requirement.

*Confidentiality* requires the reporter to submit sufficient personal contact details to permit a follow-up process in order to validate the report and to obtain any relevant additional data. After the follow-up process is complete, all personal details are removed from the documentation and are returned to the reporter. The report is *de-personalised*. Before being analysed, reports are technically *disidentified* to ensure that the reporter’s identity or the identity of other parties are protected. *Disidentification* and *de-personalisation* are thus important features of a voluntary reporting process.

Another essential feature of the voluntary reporting system is that it provides incentives such as the systematic feedback of information to the reporter. This is essential to encourage participation in the system as part of a safety culture of the aviation safety organisation. This systematic feedback takes place during the initial contact in order to validate the information given by the reporter and obtain additional information. Once the information supplied has been analysed then the dissemination and publication of any findings are an important feature of the voluntary reporting system.

The confidential element permits the reporting of deficiencies and discrepancies, which may result from, or cause, human errors without exposing the reporter within the system to critical judgement or blame. The latter constitutes the second essential principle, the non-punitive policy.

A non-punitive culture creates an atmosphere in which problems can be corrected in order to prevent future accidents. Creating an open safety culture concept should be considered as the final and permanent aim when establishing a non-punitive policy. *Safety culture may be defined as the combination of properties and attitudes which, in organisations and individuals, cause issues relating to the safety to receive proper attention in due time.*
Non-punitive aspects are already developed in different existing systems within Europe. It is important for accident prevention that the implications of imposing any sanctions are balanced against the advantages brought by a free flow of safety information, in particular in the field of human error.

Other institutions such as international organisations dealing with aviation safety insist on the necessity to develop the non-punitive environment concept. It is a fact that a reporting policy cannot be expected to function if the regulatory authority and/or the employer penalise those who report their mistakes.

Concealing errors for fear of punishment is to be avoided, but failing to punish errors may lead to a state of mind not conducive to safety. A non-punitive system is characterised by the absence of prosecution before a criminal jurisdiction to the extent permitted by national law. It finds its limits when gross negligence on the part of the reporter is established. In other cases, the reporter should not be subject to administrative or disciplinary sanction only on the basis of the report they have submitted.

The aviation safety organisation tasked with the collection and interpretation of reports should be independent and separated from the regulating authority in order to ensure confidentiality and a non-punitive attitude towards incident reporting systems. The level of independence may be achieved in a number of ways and will often be dependent on national factors. It may take the form, for example, of the UK CHIRP, which is operated and managed by an independent foundation, funded by UK Civil Aviation Authority. The Danish authorities have put a provision in their regulation on mandatory occurrence reporting (ref. 261) to the end that reporters receive a certain level of protection against punishment after reporting an occurrence. The paragraph reads:

*Any person who according to the regulations in this BL [regulation] has reported an occurrence, cannot be punished for the occurrence in question for violation of § 42 of the Danish Air Navigation Act, regulations laid down in pursuance of §§ 31, 52, 54, 82 or 83 or regulations in EU Regulations in areas that are covered by the Danish Air Navigation Act, cf. § 149 a of the Danish Air Navigation Act.*