EUROPEAN ORGANISATION
FOR THE SAFETY OF AIR NAVIGATION

EUROCONTROL

ESARR ADVISORY MATERIAL/GUIDANCE DOCUMENT
(EAM/GUI)

EAM 2 / GUI 5

HARMONISATION OF SAFETY OCCURRENCE SEVERITY AND RISK ASSESSMENT

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Abstract :

The objective of this document is to provide support guidelines to State organisations in order to harmonise the reporting, assessing and subsequent analysis of safety occurrences in compliance with the EUROCONTROL ESARR 2 Severity Classification scheme.

The overall deliverable contains a core detailed document followed by a summary annex containing guidelines on the developed mark sheets. It also includes components and information that should be appropriate to the development of training courses on ESARR 2.

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F.3 DOCUMENT APPROVAL

The following table identifies all management authorities who have approved this document.

AUTHORITY	NAME AND SIGNATURE	DATE
Quality Control (SRU)	***signed by Daniel Hartin*** (Daniel HARTIN)	31-May-05
Head Safety Regulation Unit (SRU)	***signed by Peter Stastny*** (Peter STASTNY)	31-May-05
Chairman Safety Regulation Commission (SRC)	***signed by Ron Elder*** (Ron ELDER)	31-May-05

Note: For security reasons and to reduce the size of files placed on our website, this document does not contain signatures. However, all management authorities have signed the master copy of this document which is held by the SRU. Requests for copies of this document should be e-mailed to: sru@eurocontrol.int.

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F.4 DOCUMENT CHANGE RECORD

The following table records the complete history of this document.

EDITION NUMBER	EDITION DATE	REASON FOR CHANGE	PAGES AFFECTED
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0.02	08-Apr-03	Revisions made after AST-FP3 meeting inputs and internal SRU review.	All
0.1	05-Jun-03	Document status amended to 'Draft Issue'.	All
0.2	28-Jan-04	Inputs from Severity Mark sheet workshop and further SRU consistency check. Creation of the Annex with the Mark Sheets summary as a separate document	All
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0.4	23-Apr-04	Consistency check between the core document and the Annex	All
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1.0	01-Mar-05	Document released following minor changes resulting from formal SRC consultation and approval (RFC No. 0431).	Executive Summary, Sections 3, 4

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F.5 CONTENTS

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F.6 EXECUTIVE SUMMARY

The objective of this document is to provide guidelines support to State organisations (mainly regulators) in order to harmonise the reporting, subsequent analysis and assessment of safety occurrences in compliance with the EUROCONTROL ESARR 2 Severity Classification Scheme.

The overall deliverable contains a detailed core document followed by a summary annex containing guidelines on the developed mark sheets. It also includes components and information that should be appropriate to the development of training courses on ESARR 2.

The aim of the document is to describe and explain the following factors associated with the assessment of safety occurrences:

- What is risk of collision, severity and associated risk;
- Why is it necessary and useful to assess the severity of analysed safety occurrences;
- How may the risk of collision, severity and associated risk of safety occurrences be practically assessed;
- Why the assessment of safety occurrences should be harmonised.

This document is complemented with:

- two excel files containing mark sheets for risk of collision, severity and associated risk assessment, one being a qualitative version while the second is a quantitative one;
- a repository of dis-identified occurrences scored as examples using the developed mark sheets (available for this edition only in request from SRU).

This deliverable is not intended to produce a methodology for deriving indicators for safety levels and benchmarking. However, it is intended to provide those States not having equivalent schemes with criteria for reducing subjectivity when assessing the severity and risk of recurrence of safety occurrences. It is to be stressed that the use and application of EAM 2 / GUI 5 is one way of meeting requirement 5.1.6 of ESARR 2, but not the only one.

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1. DOCUMENT STRUCTURE

The overall objective is to define a comprehensive and standardised approach for recording safety occurrences in such a way that will enable their analysis within the framework of the ESARR 2 Severity Classification Scheme. In this way, the resulting fund of data can be used to continually improve the ATM infrastructure and air navigation services in order to safeguard all aircraft and occupants.

The aim of the document is also to describe and explain the following factors associated with the assessment of safety occurrences:

- What is the risk of collision, severity and associated risk;
- Why is it necessary and useful to assess the severity of analysed safety occurrences;
- How may the risk of collision, severity and associated risk of safety occurrences be practically assessed;
- Why the assessment of safety occurrences should be harmonised.

To achieve a firm foundation in understanding severity classifications, it is firstly important to accurately define key terms. Within the aviation industry safety environment, it is very important to be precise about the interpretation and meaning of terminology.

Section 2 defines the key terms and concepts for the benefit of subsequent objective interpretation and occurrence categorisation.

Section 3 sets the context and approach for developing a universal methodology in relation to the ESARRs framework and in particular to ESARR 2 relating to the Severity Classification Scheme.

Section 4 evaluates the possible contribution that experience with the currently established methodologies can make. However, the general conclusions are that; none of them fully meet the ESARR 2 requirements, most of them fail in the systemic issue area and they lack the ability to predict the frequency of occurrence and potential risk. These concepts are further expanded upon in Section 5 – Systemic Perspectives.

Section 6 describes the new proposed approach in a more embracing methodology that will allow experts to consistently assess overall safety occurrence severity and risk.

Appendices provide details on some of the existing best practices that have been used to start this development, as well as a repository of worked examples to illustrate the application of the methodology to representative scenarios.

Finally a separate Annex is produced as a summary of the mark sheets and describes in detail the guidelines on how to make use of the two sets of mark sheets (quantitative and qualitative) and how and when to score their individual criteria.

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2. KEY TERMS AND CONCEPTS

The glossary of terms has been intentionally placed at the beginning of the document as the correct interpretation of terms hereafter is seen as essential to the understanding of the issues dealt with in this study. Definitions (from ICAO and EUROCONTROL/SRC) of key relevance to this guidance material are as follows:

Term	Definition
1. ATM (Air Traffic Management)	The aggregation of ground based (comprising variously ATS, ASM, ATFM) and airborne functions required to ensure the safe and efficient movement of aircraft during all appropriate phases of operations.
1.1. ANS (Air Navigation System)	The aggregation of organisations, people, infrastructure, equipment, procedures, rules and information used to provide to Airspace users, Air Navigation Services to ensure the safety, regularity and efficiency of air navigation.
2. Occurrences	Accidents, serious incidents and incidents as well as other defects or malfunctioning of an aircraft, its equipment and any element of the Air Navigation System which is used or intended to be used for the purpose of or in connection with the operation of an aircraft or with the provision of an air traffic management service or navigational aid to an aircraft.
2.1. Accident	An occurrence associated with the operation of an aircraft which takes place between the time any person boards the aircraft with the intention of flight until such time as all such persons have disembarked, in which: a) a person is fatally or seriously injured as a result of: - being in the aircraft, or - direct contact with any part of the aircraft, including parts which have become detached from the aircraft, or - direct exposure to jet blast, except when the injuries are from natural causes, self-inflicted or inflicted by other persons, or when the injuries are to stowaways hiding outside the areas normally available to the passengers and crew; or b) the aircraft sustains damage or structural failure which: - adversely affect the structural strength, performance or flight characteristics of the aircraft, and - would normally require major repair or replacement of the affected component except for engine failure or damage, when the damage is limited to the engine, its cowlings or accessories; or for damage limited to propellers, wing tips, antennas, tyres, brakes, fairings, small dents or puncture holes in the aircraft skin; or c) the aircraft is missing or is completely inaccessible. Note 1.-For statistical uniformity only, an injury resulting in death within thirty days of the date of the accident is classified as a fatal injury by ICAO.

	Note 2.- An aircraft is considered to be missing when the official search has been terminated and the wreckage has not been located.
2.2. Serious Incident	An incident involving circumstances indicating that an accident nearly occurred. Note: The difference between an accident and a serious incident lies only in the result.
2.3. Incident	An occurrence, other than an accident, associated with the operation of aircraft, which affects or could affect the safety of operation.
3. Hazard	Any condition, event or circumstances, which could induce an accident.
3.1. Condition	*A stipulation; something upon the fulfilment of which something else depends; circumstances, especially those affecting the functioning or existence of something (Oxford Concise dictionary)*
3.2. Event	*A thing that happens or takes place especially one of importance (Oxford Concise dictionary)*
3.3. Circumstances	*Surroundings of an act or event; the external conditions that affect or might affect an action (Oxford Concise dictionary)*
4. Severity	**ESARR 4 definition extract describes "severity" as the level of effect/consequences of hazards on the safety of flight operations (i.e. combining level of loss of separation and degree of ability to recover from hazardous situations)**
5. Risk of collision	**ICAO Doc 4444: Airprox - Risk of Collision: "The risk classification of an aircraft proximity in which risk of collision has existed".**
6. Risk Mitigation	Mitigation or Risk mitigation involves steps taken to control or prevent a hazard from causing harm and reduce risk to a tolerable or acceptable level.
7. Risk	**The combination of overall probability, or frequency of occurrence of a harmful effect induced by a hazard and the severity of that effect.**

(Table 1 – Definitions of key terms)

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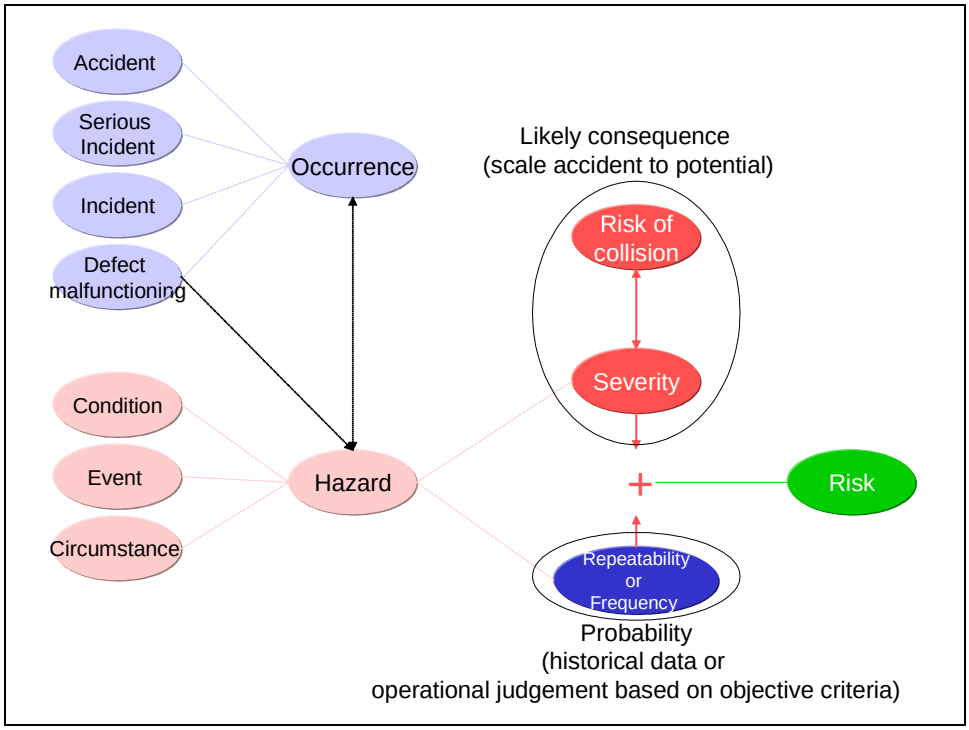
The interrelationships of the concepts can be thought of schematically as represented in Figure 1:



(Figure 1 - Schematic representation of the definitions)

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3. ESARR 2 SEVERITY SCHEME

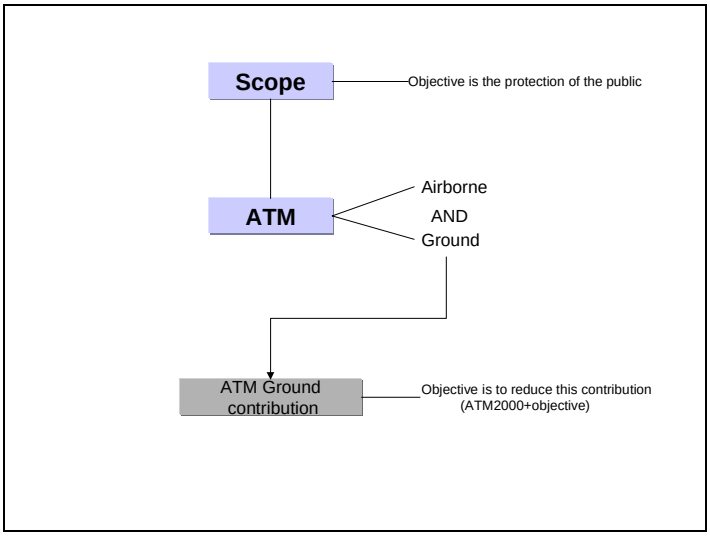
The Safety Regulation Commission has developed a harmonised EUROCONTROL Safety Regulatory Requirement for ATM related occurrence reporting and assessment that has been adopted by Provisional Council and approved by EUROCONTROL Commission (Decision No. 80).

Amongst other things, ESARR 2 requires that each State shall ensure "**that the severity of occurrences is determined, the risk posed by occurrences classified, and the results recorded.**" (See ESARR 2 – section 5.1.6). Therefore a guidance document to ESARR 2, describing the harmonised EURCONTROL Severity Classification scheme has been developed and approved simultaneously with ESARR 2 (EAM 2 / GUI 1).

The present deliverable is designed to provide additional guidance in interpreting and applying the ESARR2 Severity Classification Scheme.

3.1 Scope and Objectives

The scope covers all ATM aviation (ground and airborne segments) safety aspects of the ATM 2000+ strategic road map. The ultimate objective is to achieve better protection for the travelling public and improved operational safety, that will initially arise from a comprehensive method of categorising and assessing a dynamically developing fund of occurrence data derived across the complete spectrum of experience of all Member States.



(Figure 2 - Scope and objectives)

The second scope is to provide a harmonised tool for ensuring the adequate population of the ESARR 4 matrix to be used in the design of changes or new ATM systems.

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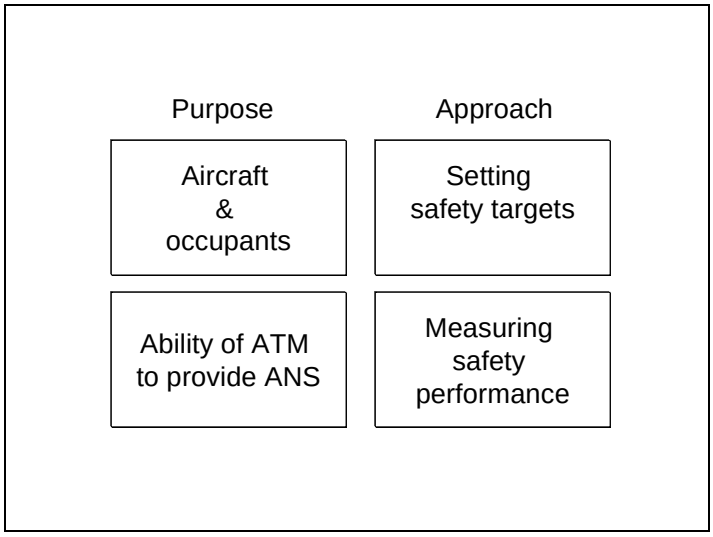
3.2 Purpose and Approach

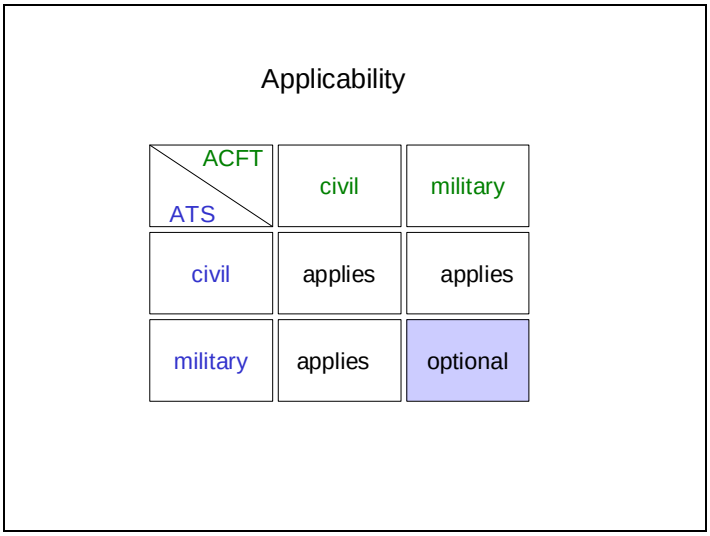
The approach adopted is in accordance with the principles of safety monitoring required, not only in ESARR 2, but also by ESARR 3. The overall purpose is to continually improve the ATM infrastructure and air navigation services in order to safeguard all aircraft and occupants. This is to be achieved by establishing measurable and achievable safety targets and devising effective methods of safety performance. The latter is, in practice, not an easy task. A number of schemes have been developed and these have been evaluated, as explained later in this document, in order to devise a new and easy to use assessment methodology that gives an effective and balanced method of comparison.



(Figure 3 - Purpose and approach)

3.3 Applicability

The principles derived apply to all airspace, in any combination of circumstances. The logic is that occurrences are not predicated in any way territorially and that much can be learned from any set of circumstances, especially as there is rarely one single incidence cause but more often several factors combine to produce a given situation.



(Figure 4 – Applicability)

Consequently the applicability must not be limited in any way by reference to airspace in which the service is being provided.

3.4 Risk

Once the risk of collision and the severity have been assessed, the likelihood of recurrence should be investigated. By doing so, it will alleviate the need to spend effort and resources in implementing remedial measures which may lead to additional new problems, should the probability of recurrence be extremely rare. Equally, the reverse argument applies in that, where there is a trend of repeated occurrence of the same causal situation, it makes sense in terms of safety and cost effectiveness to consider procedural or system changes.

Most safety occurrences involve a variety of events and conditions, and identifying only one single factor as the “cause” can be a shortcoming in preventing future repetition of a similar event. Even determining the relative importance of causes (provided that “importance” can be defined) to an occurrence may not be useful in preventing future losses. Safety experts argue that mitigations should not be determined by the importance of the causes, but instead priority should be given to the measures that will be most effective.

Possible sources or data to be used to assess the likelihood of recurrence would naturally be:

- Historical data and (own or other) experience (Similarly classified Safety Data);
- The incident characteristics, i.e. its complexity;
- The window of opportunity existing at the time of occurrence;
- Additionally the safety recommendations by their nature may provide an obvious indication of the likelihood of recurrence, particularly when they are meant to address systemic issues.

3.5 Rationale for the Assessment of Risk of Collision, Severity and Risk

The need for a rationale for assessing risk of collision, severity and subsequently the risk posed by each safety occurrence is immediate. The necessity to make a judgement about the likelihood of the recurrence of the same (or similar) incidents, or the occurrence being a precursor for an accident, is a question that should be repeated during the investigation.

It is important to clarify that the recurrence probability should be considered before any changes are applied to the **ATM system (people, procedures and equipment)** as there are implications such as cost and safety issues, i.e. changes that might need to be re-assessed. In other words, any system modification or change should only be made following a well balanced and careful evaluation by an expert and knowledgeable body.

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3.6 Need for the Harmonisation of the Assessment of Risk of Collision, Severity and Risk

The value of safety monitoring and exchanging safety data is widely recognised. The more occurrence data that is available, the better the ATM improvement decisions can be made and more comprehensive operational procedural change evaluation can take place. However, the pertinence of the exercise is highly dependent upon the quality and coherence of the data that is to be used for comparison and/or aggregation.

This obviously calls for all organisations that intend to share or use safety data to adopt a common, agreed, reliable and robust method to ensure the quality of the assessment mechanism. Furthermore, such methods should be harmonised to ensure a maximum degree of commonality of the rationales used in terms of type of assessment as well as the level of quality to be achieved.

Note: It must be stressed that the quality of the investigations does have an impact on the assessment of risk of collision, severity and risk particularly having regards to the completeness of findings and causes.

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4. EVALUATION OF CURRENT METHODOLOGIES

Currently, there are a number of existing methodologies, the majority of which are air proximity based. Nevertheless the approach and philosophy of interpretation differs widely and much can be learnt from the rationale of these methods, although by their number and diversity they underline the need for a harmonised approach.

4.1 NATS Methodology[1]

The United Kingdom National Air Traffic Services (NATS) "Evaluation of the Safety Significance Event Scheme (SSE)" is a system that is already long established.

The main objective of the scheme is to provide a performance safety management indicator to Air Navigation System Providers (ANSPs), as a better system than the ICAO AIRPROX procedure. Furthermore, the AIRPROX classification focuses on effect and the categorisation is subjective.

The NATS Scheme applies exclusively to all types of ATC occurrences in which the ATM organisation has played a role.

The NATS Scheme aims at "measuring";

- Controller awareness;
- Layers of defences breached;
- Separation achieved;
- Action taken; and
- Contribution from ATC systems or procedures.

All data in this section refers primarily to what is known as the "old" NATS Scheme - elements extracted from a NATS presentation at the Brussels Workshop 21/23 October 2002 (see Annex 1) which uses a question-based system combined with a scoring system. This is aimed at increasing objectivity as well as reliability of the system. However, an element of subjectivity will always remain, even though assessors are trained in the technique, and NATS has consequently established moderation panels at local and company level for the purpose of:

- balancing results on an occurrence to occurrence basis (local level); and
- balancing results across the company units so as to enable a meaningful aggregation of the data.

Following assessment with the use of the new NATS "Safety Significant Assessment Mark Sheet" safety events fall into three possible categories;

- Very significant;
- Significant;
- Not significant.

As far as possible the principle of classifying occurrences using a question based system rather than judgement should be retained as it reduces ambiguity and enhances objectivity.

[1] *The NATS scheme which is described here is the first version of the scheme. A revised version is under consideration by NATS.*

Overall the NATS methodology has great value for what it is meant for, i.e. safety management activities, but addresses only partially the ESARR 2 objectives. Those parts that are applicable to ESARR 2 have been considered and retained in the final proposal for an ESARR 2 severity assessment guidance method, particularly the part that looks at the ATCO(s)' performance. However there are other issues that render the NATS methodology incomplete with regards to the ESARR 2 Severity Classification:

- Scope: the NATS Scheme does not address ATM specific occurrences, nor does it comprehensively address the systemic issues behind an operator's error,
- TCAS: should not be "interfering" with the assessment of the performance of the ATM ground segment, which is under the responsibility of the service providers. TCAS is an airborne safety net and therefore may be considered when assessing the performance of the ATM as a whole, i.e. including both segments; airborne and ground. However the distinction must be clear;
- Output: the NATS Scheme objective is to assess the ATM contribution in the SEVERITY of safety significant events (events that have a bearing on safety) in order to provide a set of tools for SAFETY MANAGEMENT purposes. The NATS Scheme does NOT assess the RISK associated with an occurrence i.e. its likelihood to recur and the probability to recur as required under the ESARR 2;
- The number of categories for classification is different (3 for the NATS Scheme as opposed to 5 for the ESARR 2 classification);
- The NATS "new" Scheme has dropped the initial SSE Question 6 regarding the contribution of ATC systems or procedures;
- It also must be stressed that the NATS Scheme requires moderation panels at local and company levels. The lack of the moderation panel may be detrimental to the reliability of the system. However, this best practice has been found robust and reliable and has been retained within the EUROCONTROL guidelines.

It is a belief that for any scheme to succeed, there is a need to train the investigators in the techniques of assessing risk of collision, severity and risk as well as to require the establishment of moderation panels/knowledgeable bodies at local and national level and possible reviews (through workshops) at EUROCONTROL level.

4.2 Service du Contrôle du Traffic Aerienne - SCTA

The French SCTA draft "Grille d'évaluation d'événement ATM" (ATM occurrence evaluation grid) is inspired from the NATS Scheme with significant adaptations. In particular it looks at the systemic issues in a Reason Model based sequence.

The mark sheet is a safety significance evaluation tool dedicated only for incidents in which there was an ATM contribution. It is used to measure the significance in terms of ATM and therefore excludes the wider issue of flight safety (ATM specific occurrences, pilot errors, etc.).

It has been designed for incidents involving at least two aircraft..

The safety significance evaluation comes after the incident has been investigated. It is neither a substitute for investigation nor guidelines for investigators (to identify causes of an incident for example). This principle applies for the NATS SSE too and has been retained within EUROCONTROL Guidelines..

The mark sheet (see Annex 3) has been developed as a transposition of the systemic analysis of an incident. The Reason Model has been selected as a reference. However, in order to remain ATM compliant, the "Reason's layers of defence" have been renamed as follows:

Level 1 – LEGISLATION/REGULATION

This includes inadequate / insufficient / lack of International / National legislation or regulations (ICAO, AIP, National Manual of Air Traffic Services, etc.). It is here a matter of conception of the regulations and not its interpretation, implementation or utilisation.

Level 2 – ACTIVITY FRAMEWORK

- **Airspace Organisation:** route structures, complexity of sectorisation or interface, space limits, classes of airspace, etc.
- **Local Instructions:** covers local instructions, memorandums, LOAs, Manual of Operations, etc.
- **Training:** existence**,** conception, implementation of ATCO initial and continuous training.

  It doesn't include OJTI (which is taken into consideration below).
- **ATC activity management:** Mainly concerns the supervisor's role; overall activity handling, human resource management, position manning, sectors splitting / band-boxing, OJTI implementation and organisation, etc.

Level 3 – CONTEXT

- **ATC systems:** refers to any failure or poor condition of an ATC system.
- **Workload:** excessive or complex workload.
- **Handling of the position:** operational handling of the position (handling of splitting / band-boxing, relief, task sharing, co-ordination, trainee/mentor interactions etc.).

Level 4 – REAL TIME ATC HANDLING

This concerns the conflict detection and resolution.

The controller referred to here is the one in charge of a position (in case of one-controller - positions) or the pair of controllers considered as a whole (radar + assistant) in the case of ACC positions.

4.1 Situational Awareness (Detection)

- Detected in time by the controller
- Detected late
- Detected by a third party *(other position)*
- Detected by the STCA
- Never detected by ATC or detected and forgotten

4.2 Event Resolution

- Adequate
- Inadequate
- A Third party action *(other position)*
- Pilots here are excluded. It is considered that pilot intervention is similar to "no action".

The SCTA assessment scheme is based on the following principles;

- The safety significance of an incident depends on the number of levels involved: the more levels involved, the more significant the event is;
- In order to avoid excessive focus on the first-line actor (generally the ATCO) it has been considered that each “level” should have the same weight in terms of score;
- The scoring has been validated and a number of practical exercises based on real ATC incidents, with the maximum scoring per level subsequently established at 12 points.

RESULTS

Following several practical exercises, and in order to allow the mark sheet to produce results in sympathy with the feeling of what significant and very significant events are, the following categories have been determined:

- minor event;
- significant event; and
- very significant event.

The SCTA scheme does not assess the probability of recurrence and consequently does not give an indication about the overall ATM risk posed by the investigated occurrence and is not therefore meant to cover the full ESARR 2 scope requirements.

In addition the consideration of the causes under the severity part and not under the risk of recurrence evaluation has been found not consistent with the definitions of the key terms used (risk of collision, severity, risk etc).

4.3 UK CAA Occurrence Grading Process

For a number of years reports submitted under the Mandatory Occurrence Reporting (MOR) scheme have been subject to a grading scheme by the UK CAA. The gradings have been developed to improve high-level analysis of all occurrence reports and to provide better management information. They are made by the Safety Investigation and Data Department (SIDD) when they receive the initial reports and are reconsidered if, or when, further details become available. The following coding system has been developed and is applied to all MORs.

SEVERITY	SEVERE A	**A1**	**A2**	**A3**
	HIGH B	**B1**	**B2**	**B3**
	MEDIUM C	**C1**	**C2**	**C3**
	LOW D	**D1**	**D2**	**D3**
		HIGH 1	MEDIUM 2	LOW 3
		PROBABILITY		

(Table 2 - UK CAA Occurrence Grading Process)

The UK CAA Grading System is the only known risk assessment system found in existence. This is due to the fact that the final assessment result is obtained from a matrix, which looks at the severity on one side and the probability on the other.

Tables assist the assessment of occurrences to determine both the severity and probability of the recurrence of the same or similar events. Both tables provide qualitative indications (See Annex 2).

This is similar to what ESARR 2 requires and probably the weakness of such a system is that examples or generic situation descriptions never catch all the possible situations.

As far as the probability of recurrence is concerned the UK CAA scheme only looks at historical data and therefore is basing the evaluation of probability on a linear projection. It would be correct to assume that if circumstances that lead to an incident recurred a number of times, it is very likely that they will re-appear.

In other words, historical data needs to be used and that should be retained in the guidance to the ESARR 2 guidance material. However this may be considered as a limitation. By nature the incidents could be similar but are never identical, nor are their sequence of cause or their complexity.

Some aspects of the UK CAA concepts have been retained for the ESARR 2 classification support guidelines.

4.4 ICAO "AIRPROX Classification"

The SRC Document Mapping between the EUROCONTROL Severity Classification Scheme and the ICAO AIRPROX Severity Scheme (EAM 2 / GUI 3) gives a very comprehensive assessment of the fundamental features of AIRPROX which in many ways is reflected by comments already made in this section on the various derivative systems.

4.5 Conclusions

In summary figure 5 below shows that the current available schemes, as described briefly in the sections above, do not fully cover the requirements of the ESARR 2 severity Classification Scheme.

This is not surprising since the objective of these schemes is mainly geared to ATM providers, either from a safety management or airborne regulatory requirement stand point (i.e. AIRPROX oriented).

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Evaluation of existing schemes

scheme / criteria		NATS	SCTA	UK SRG	ICAO AIRPROX
Scope	ATM (global)	**no**	**no**	**no**	**no**
	ATM (Ground)	yes	yes	yes	yes
	ATM (specific)	**no**	**no**	**no**	**no**
Risk of collision		yes	yes	yes	yes
Severity		yes	yes	yes	**no**
Probability		**no**	**no**	yes	**no**
Risk		**no**	**no**	yes	**no**

(Figure 5 – Summary evaluation of the identified existing schemes)

As pointed out in the introductory paragraph to this section above, there are valuable principles in each existing approach which have been retained as relevant parts of the proposed scheme.

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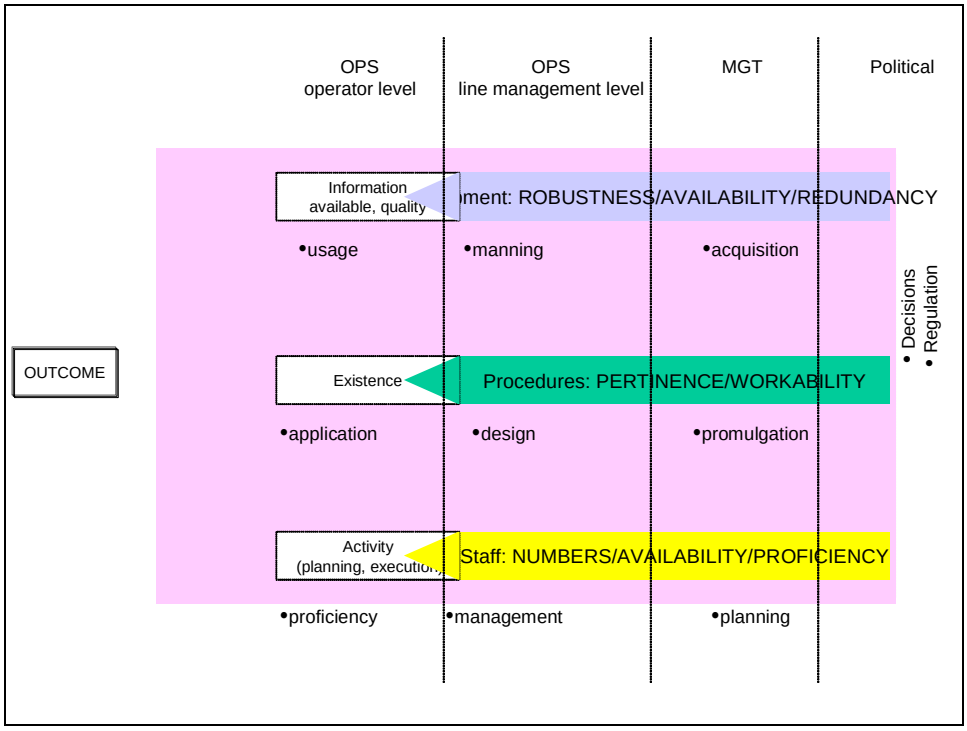
5. SYSTEMIC PERSPECTIVES

Severity and risk assessment should be achieved whilst moving away from the "**norm culture"** where the approach is to look only at the strict application of the rules and regulations. This approach is often very idealistic and inevitably includes some element of hypothesis to "reconstruct" a safety occurrence as if all rules and regulations could be applied fully and strictly in real time in an activity that involves so much human input.

However, far more importantly, analysing and assessing a safety occurrence on the sole basis of rules and regulations adherence is a hindrance to progress, if only because the rules and regulations themselves need to be questioned as to their pertinence and applicability. In other words, it is more beneficial to look at "What could ATM have done to provide a better service or support for the sake of safety?" rather than restricting the scope to "What should ATM have done to comply with the existing rules?".



(Figure 6 - Systemic issues)

The assessment scheme proposed herewith should take into account the conceptual ideas that are described in this section in order to embrace the spirit of ESARR 2.

5.1 Safety Recommendations

The purpose of safety recommendations is to identify systemic deficiencies and suggest remedial actions. Therefore due to their very nature, they are good indicators of the risk of a safety occurrence. It is of paramount importance that safety occurrences are fully and carefully reconstructed; no factual data is overlooked and subsequently professionally analysed.

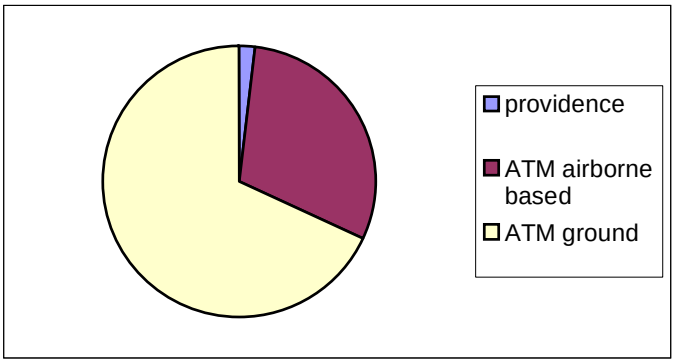
This document assumes that the safety occurrence reconstruction and analysis processes and methodologies can be practically harmonised.

5.2 Accidents and Incidents

Analysing an accident could be seen as “measuring” how unlucky those involved were, as it takes a lot of coinciding events for an accident to happen. Conversely, assessing an incident (or safety occurrence) is measuring how much luck participated in preventing an accident happening.

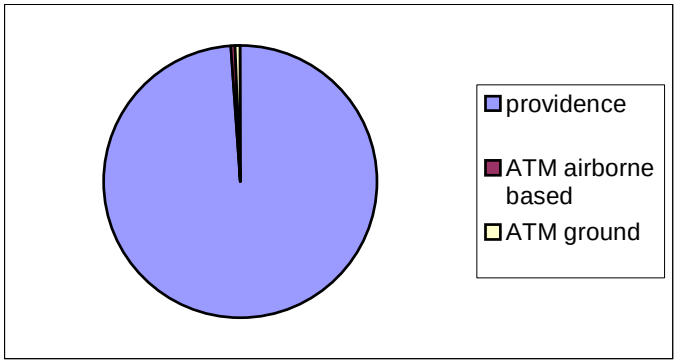
Under normal circumstances the typical respective contributions can be illustrated in the pie chart below:

- ATM ground carries out most of the activity (large part of the data acquisition, detection, plan and part of the execution);
- The airborne based ATM element does its share (provision of data, execution of the plan); and
- There might always be some element of providence that caters for inaccuracies, delays and some degree of human fallibility.



(Figure 7 – 1st example of contributions distribution to an occurrence)

An extreme example (**although not unrealistic**) can be depicted as shown below.



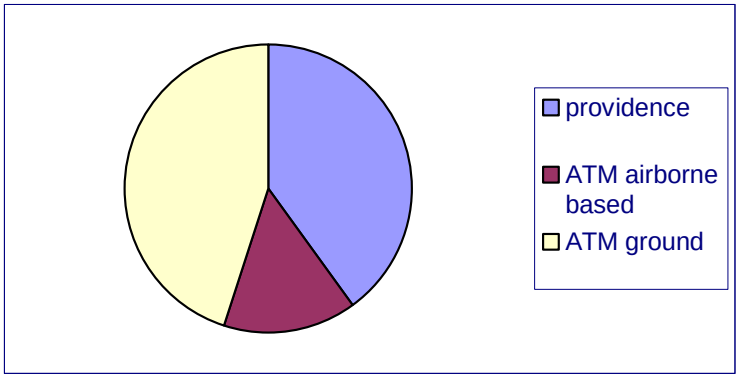
(Figure 8 – 2nd example of contributions distribution to an occurrence)

In fact this illustrates the situation where a conflict remained totally undetected and no subsequent action by any of the ATM components (includes the airborne component of ATM in this case) was initiated.

5.3 The Providence Factor

A large number of incidents would probably “look” like the diagram below where ATM as a whole has contributed to avoid an accident but providence to some extent has also played a role which in turn then reflects on the amount of ATM effectiveness.

It is therefore of paramount interest to risk of collision, severity and risk assessment to determine the “contribution” of providence in the outcome of a safety occurrence.



(Figure 9 – 3rd example of contributions distribution to an occurrence)

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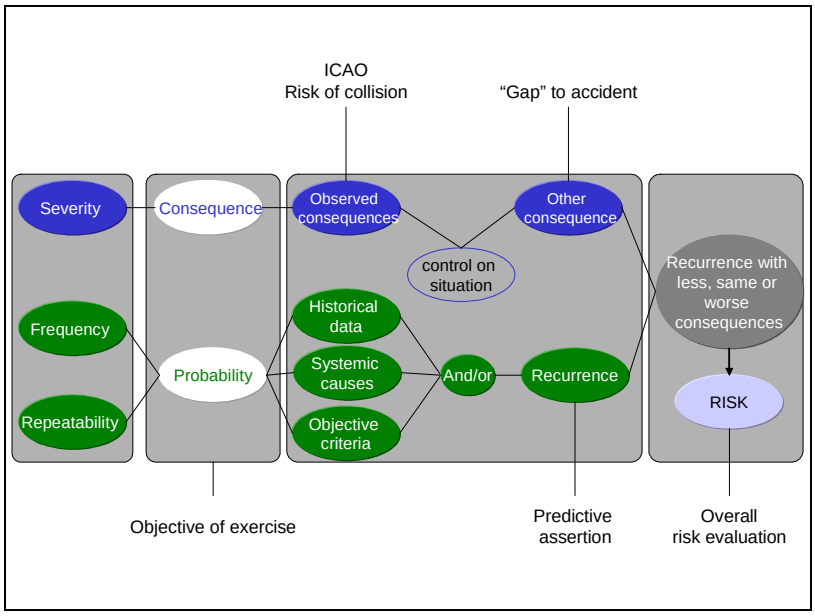
6. PROPOSED APPROACH

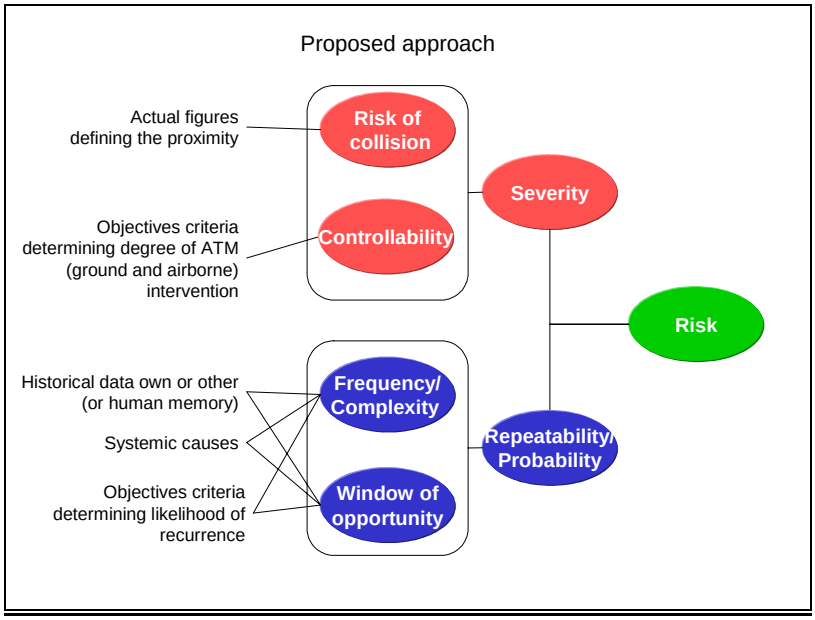
The end objective of the safety occurrence classification exercise is to produce and record a severity and risk[2] for each safety occurrence. The evaluation should therefore assess:

- the likely consequence of such occurrence(s) including the question of should they reccur and the likelihood of rcurrence.



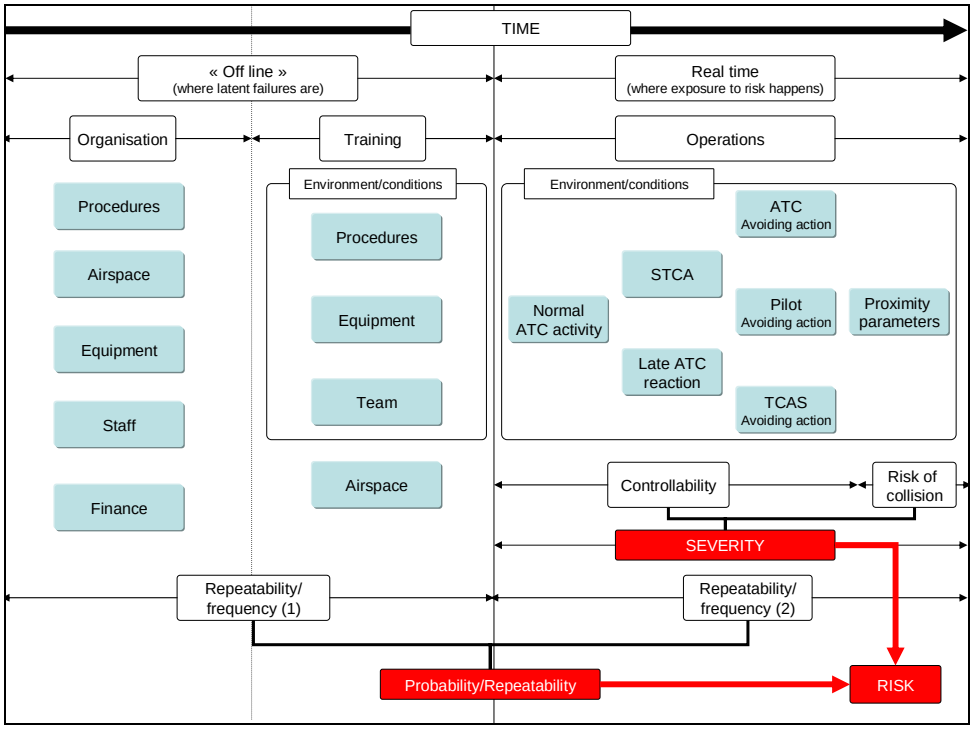
(Figure 10 - Proposed approach)

It is suggested that the system retains the principles of a question-based scoring system as it provides an objective basis for judgement that is easy to use. Figure 11 below shows the general criteria that could be used to perform these assessments and evaluations.



(Figure 11 - Criteria used for Risk Assessment)

[2] ESARR 2 – requirement 5.1.6. "*The **severity** of such occurrence is determined, the **risk** posed by each such occurrence classified, and results recorded*".



(Figure 12 - Relationship between activities of the risk assessment)

As shown in figure 12 above the severity, i.e. the combination of the risk of collision (how close to colliding were the aircraft) and controllability (how much did ATM airborne and ATM ground respectively contributed to actually avoid the collision) is by nature a real time related criteria. It reflects the exposure to the possibility of colliding.

The "**repeatability**" of the occurrence is a parameter (or at least may be evaluated as such using this logic) that depends upon both the real-time occurrence characteristics, and the complexity of the occurrence itself within this overall environment (essentially involves the number of causal factors and their timing, i.e. importance of their order and time spacing).

Considering the latent causes (or systemic causes) for assessing the severity of an incident may lead to assessing the organisation rather than the safety occurrence itself. Latent factors are part of the "scene" which is set by the organisation (in which real time activities are carried out). However, considering that an occurrence was more severe because the organisation brought latent failures into real-time operations does NOT reflect the direct daily exposure to risk of collision. Assessing the errors takes the latent factors into account. Latent failures provide the ground for errors to take place that are not part of it. Additionally, their permanent character is such that it is very likely that they will provide the ground for other operators to make the same errors in the future.

Therefore, it was decided that latent failures (system issues) will be taken into account for assessing the repeatability of the occurrence and not its severity. Severity is assessed by the "real time" criteria while the overall risk of recurrence is derived from the "off-line' criteria.

Another element of repeatability is the historical data[3] that can show that such or similar occurrences have already taken place. However there might be insufficient historical data available within the national databases. It may well be that there is no such data at all, however this does not refer to the quality of such databases but rather to the fact that precursors to an accident may not be found in your own data. Historical safety data should be looked for (whenever feasible) in all available data, i.e. through safety data exchange.

The complexity inherent in accidents is such that it reflects in their random geographical distribution[4].

Similarly incidents with near-identical causes occur at different places in the world but are rarely considered as precursors at the ANSPs' own locations. In fact this might be an erroneous vision of the problem and instead safety data from other parts of the world should be used as much as possible as historical data.

It should be also noted that training acts as an interface between the "off-line" activities and real time operations, and therefore carries the potential for building latent failures into the system. The "Substitution Test" could be the process by which this can be determined, i.e. determine whether the training issue related to the safety occurrence is an individual problem of those staff concerned OR a problem of the training itself, be it the training syllabus or the conduct of the training including examinations.[5]

The following key aspects ought to be considered when scoring the historical data criterion in order to maintain harmonisation and consistency: when trying to assess if similar incidents occurred at the "same location" an organisation should look not only into thier own database but into European or world-wide repositories. If the issue is a recognised key risk area (such as runway incursion, unauthorised penetration of airspace, level bust, etc.) then the historical criterion should look outside the location of occurrence. The same principles will also apply if a similar type of occurrence has triggered the organisation SMS monitoring threshold.

Finally, the recommendation to score this criterion is to work it from 'Very high' to 'Few' or 'None' using the above guidelines.

Section 6.3.1. below and the on-line guidelines within mark sheer are giving the approach on how to consistently score the "historical data" criterion.

6.1 Aircraft

The number of aircraft determines or confirms the type of safety occurrence, i.e. ATM specific, aircraft specific which may have some ATM ground involvement or simply ATM only.

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[3] *This is not shown on figure 9.*

[4] *Even though there might be some trends due to systemic issues.*

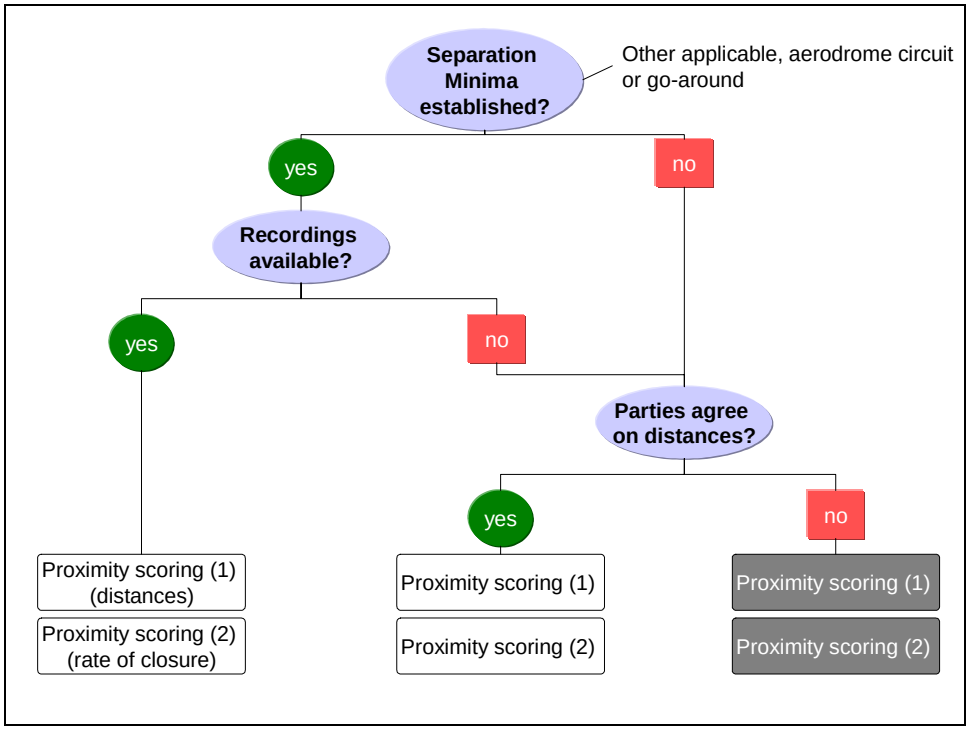
[5] *It must be stressed that the quality (the reliability notably) of examinations play an important role as they are the process by which (well before incidents may occur) the differentiation between individual performance and training efficiency is made.*

6.2 Severity Assessment

6.2.1 Risk of Collision

Risk of collision parameters: minimum distances at closest (vertical and horizontal) approach point, which are to be compared with the separation minima applicable.

Note that when no separation minima is defined it is suggested that the moderation panel use field experience to decide a scoring of the "separation distance criteria".



(Figure 13 - Decision tree for use of "Proximity tables")

Related score calculation;

1. In cases where there are separation minima and recordings available: use the illustration shown below to determine the score;
2. In cases where separation minima and recordings are NOT available: follow items 3 and 4 (as applicable) below using the prescribed minima as a basis and with moderation panel decision required;
3. In cases where there are no separation minima and parties involved agree on the observed distances then the moderation panel should decide on a score value;
4. In cases where there are no separation minima and parties involved DO NOT agree on the observed distances: the table below cannot be directly used, and a decision of the moderation panel is again required.

Proximity scoring (1)

Minimum separation	Score
Minimum separation achieved	0
+75% Minimum separation	1
> +50%, =<75% Minimum separation	3
>25%, =<50% Minimum separation	7
=<25% Minimum separation	10

(Figure 14: Proximity scoring 1st criterion "minimum separation")

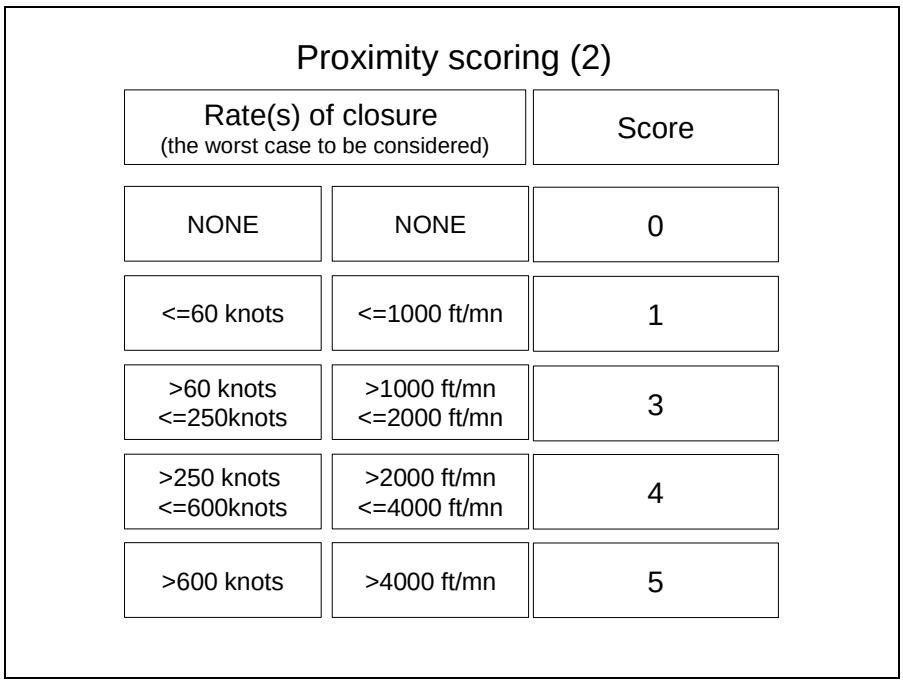
The "best" value of the horizontal and vertical infringement separations will be taken into consideration when scoring

The separation criteria refers to the separation, intended or not by ATCOs involved, in relation to the physical horizontal and vertical distances achieved between aircraft

Example: Radar Separation Minima is 5NM and Vertical Separation Minima is 1000ft and the proximity figures are: 2NM and 600ft. The value retained for scoring would be 600ft i.e. 60% of the separation. Therefore the score using the table in Figure 14 above would be 3.

The second criterion in the proximity scoring to take into account is the rate of closure involved in the encounter. The "logic" behind this argument is that even if (e.g.) 75% of the separation minima may have been achieved, the erosion rate may have been very high and therefore the time available for reaction was very limited. This is to be compared with a relatively marginal separation e.g. (between 50 and 75% of the separation minima) but possibly with a very slow closing speed. The first case would probably be scored as more critical than the second.

NOTE: The above values are to be used in the case for more than one aircraft involved. For the situation when only one aircraft is involved the same principles apply but the values are slightly different to reflect realistically proximity approaches to ground or restricted area.

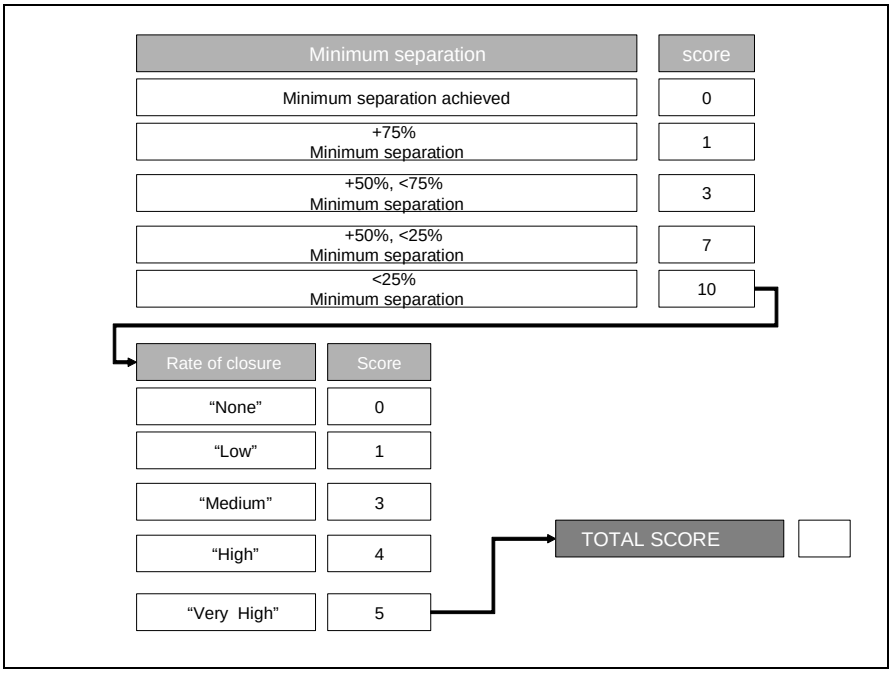


(Figure 15 - Proximity scoring 2nd criterion – rate of closure)

The "worst" value between horizontal and vertical speed will be taken into consideration when scoring this criterion.

In the situations where the separation is lost after the crossing point and the aircraft are on diverging paths the rate of closure should be scored “none”.

The final result is the sum of the two tables depicted in Figures 14-15.



(Figure 16 – Overall Scoring of the “risk of collision” in a quantitative manner)

The same quantitative scheme for “risk of collision” above can be mapped into a “qualitative” one maintaining the criteria (see the Annex of this deliverable).

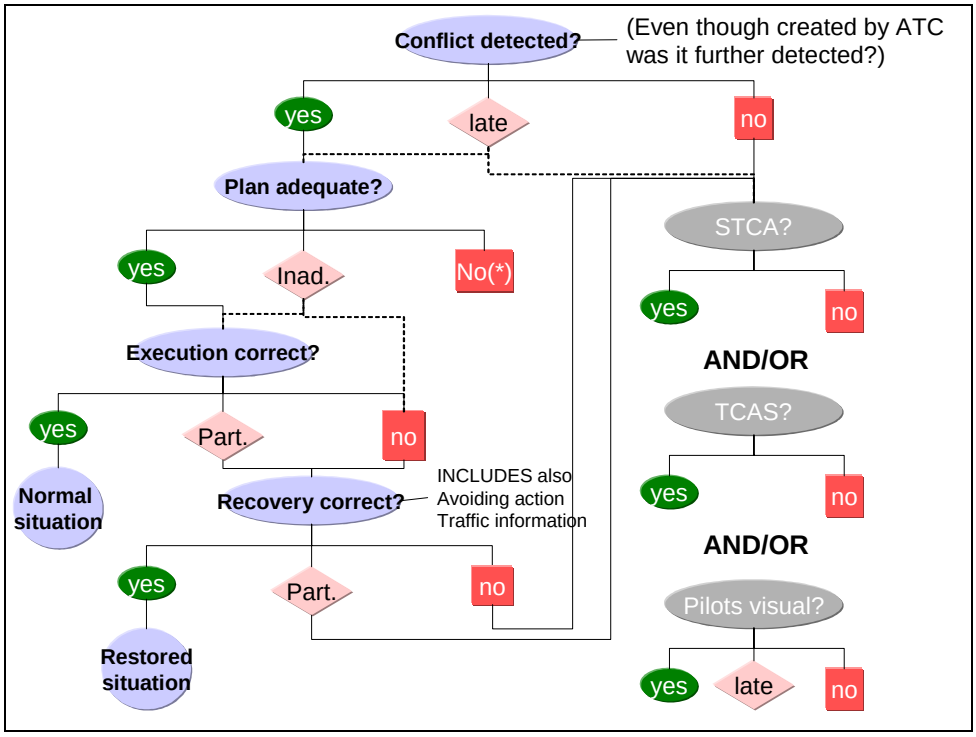
The qualitative scheme is based on quantitative scheme scores. The principles of scoring are the same, only the mechanics of the mark sheet usage is just different – tick the appropriate box instead of granting marks. During validation trials, the qualitative scheme was found as the favourite one when using the computerised version. Obviously the quantitative scheme is recommended when a manual system is used and no IT systems are available to replicate the qualitative mark sheet.

6.2.2 Control and Providence Issues

ATM, both total aviation and ATM ground elements, has to be considered from the perspective of control over the situation. The purpose of this step is to balance (positively or negatively) the result of the proximity (risk of collision) evaluation in the light of the amount of control that the ATM exhibited.

This facilitates an evaluation of the amount of luck or providence intervention that "saved the day". The "logic" is that if there has been some control over the situation, even though the separation was tight, it was nevertheless achieved by the system. For this step it is proposed to follow the typical defence barriers as they apply chronologically.

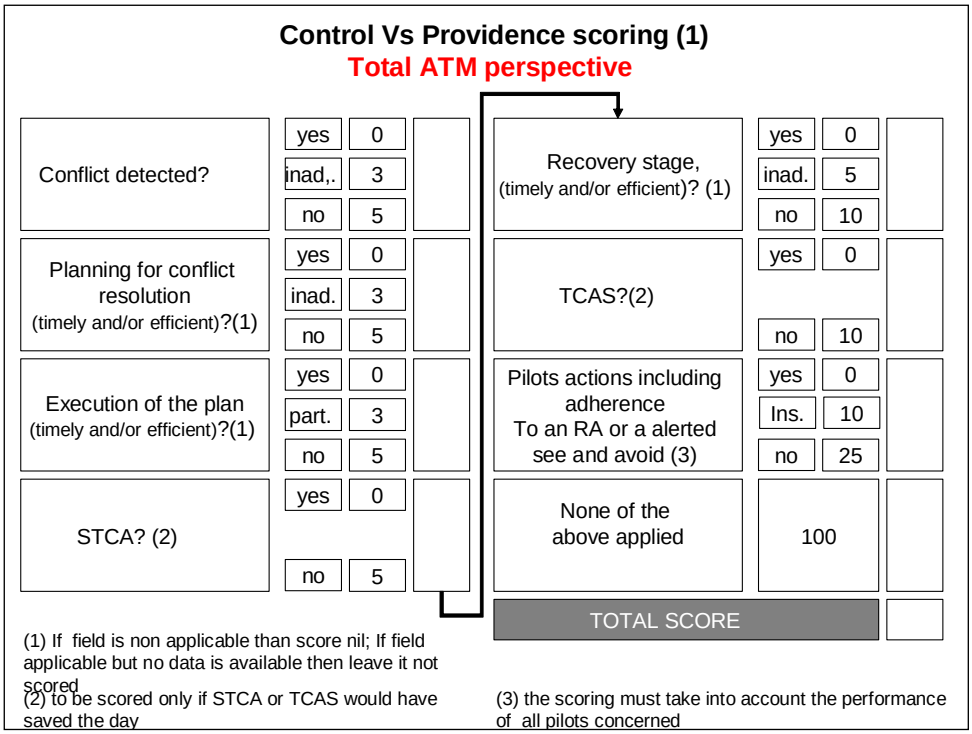
The defence barrier model used is the one introduced by EUROCONTROL Strategic Performance Framework and further refined within SOFIA methodology. For a brief description of the barrier model see the Annex of this deliverable.



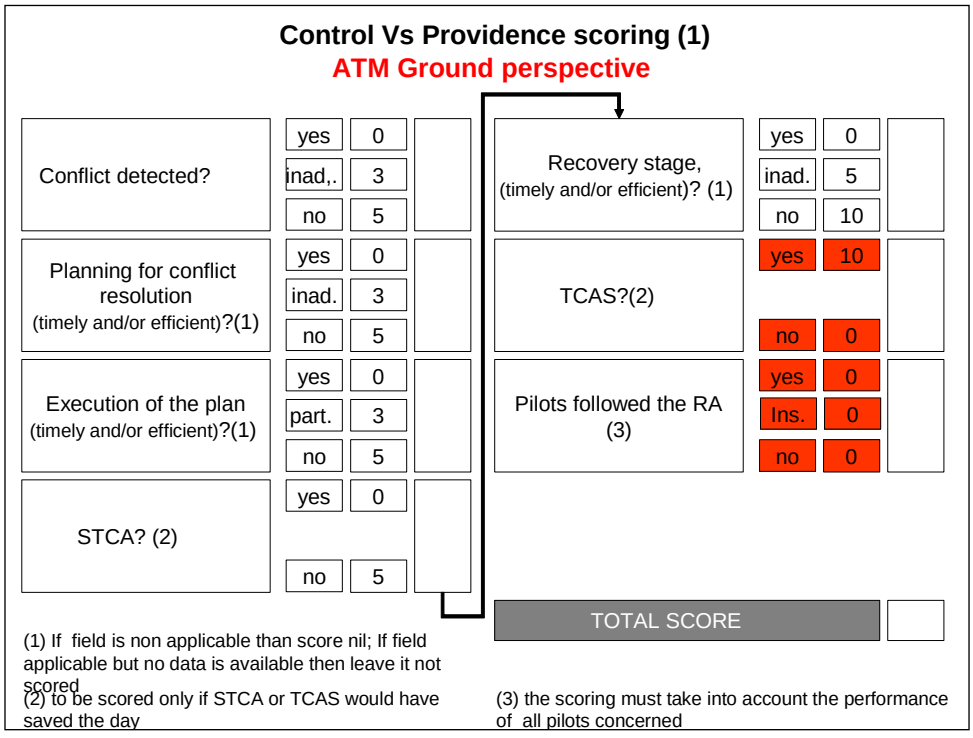
(Figure 17 - Controllability over the situation)

The scoring ought to cover ALL players i.e. all ATCOs and ALL pilots involved during the incident.

The Scoring logic works as it is described in Figures 18 and 19 for both the overall aviation performance and the ATM (ground) sub-element.



(Figure 18 - Total ATM performance)



(Figure 19 - ATM Ground Performance)

The same quantitative scheme for "controllability" above can be mapped into a "qualitative" one maintaining the criteria (see Annex).

In the cases where more than one controller and/or more than one pilot/crew were involved in the incident with different performances, a preference to use the quantitative mark sheet has been found during the validation process. This is probably because more flexibility in granting marks is allowed when using the quantitative version of the mark sheet.

Severity is built upon the combination of Risk of collision/proximity criteria moderated by controllability.

When scoring the severity, two values will be retained:

- One for overall ATM severity (to be used for publishing safety data to the general public);
- One for ATM ground to be used for system design and as a safety indicator of the ATM ground organisation performance.

There will obviously be cases when the severity for overall ATM will be higher than for the ATM ground, and vice-versa. The figure to be used by the ATM safety regulators when publishing safety data for general public shall be the one for overall ATM.

The difference between the two values is the following:

- ATM ground includes ATC (ATS in certain cases where only information services is provided and the methodology is still applied) supported by Safety Nets all included in the model that ATCO are supposed to detect a conflict, build up a solution and deliver it to the crews for execution.
- ATM global includes the airborne segment i.e. crews and TCAS that can either be an additional defence barrier (pilot positive see and avoid, TCAS) or during the resolution can comply fully, partially or not with ATC clearances or with TCAS resolution advisories.

Detailed guidelines on how to make use of (score) both types of mark sheet (quantitative and qualitative) are to be found in the annex of this deliverable (EAM 2 / GUI 5 – Annex).

6.3 Repeatability

Historical data is a natural candidate for computing the Repeatability[6]. Two other main candidate criteria are "window for opportunity" (conditions that created the environment for the occurrence to happen) and the complexity of the occurrence (basically the number of causes that had a direct[7] contribution in the occurrence together with their time order and spacing). All identified criteria to establish the repeatability will be described in the following section.

Repeatability of an occurrence is to be scored at the end of the investigation. **The criteria used to score the repeatability shall NOT be used to apportion any blame or to replace any of the phases of the investigation process.**

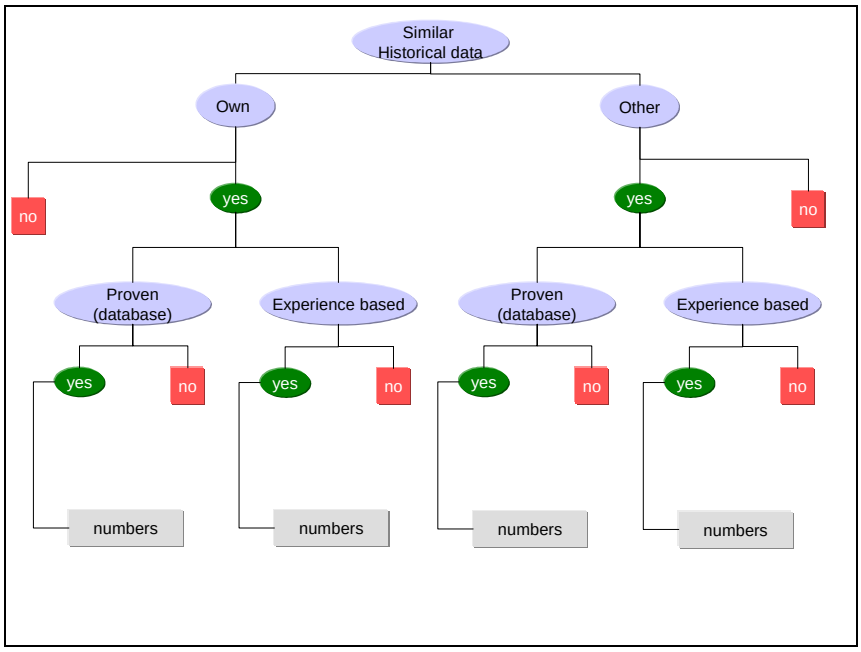
[6] *In the literature the term repeatability is often replaced by likelihood*

[7] *Here only direct contributive causes are to be taken into account as they are the ones who create the conditions for the occurrence to develop in the way it did.*

6.3.1 Historical Data

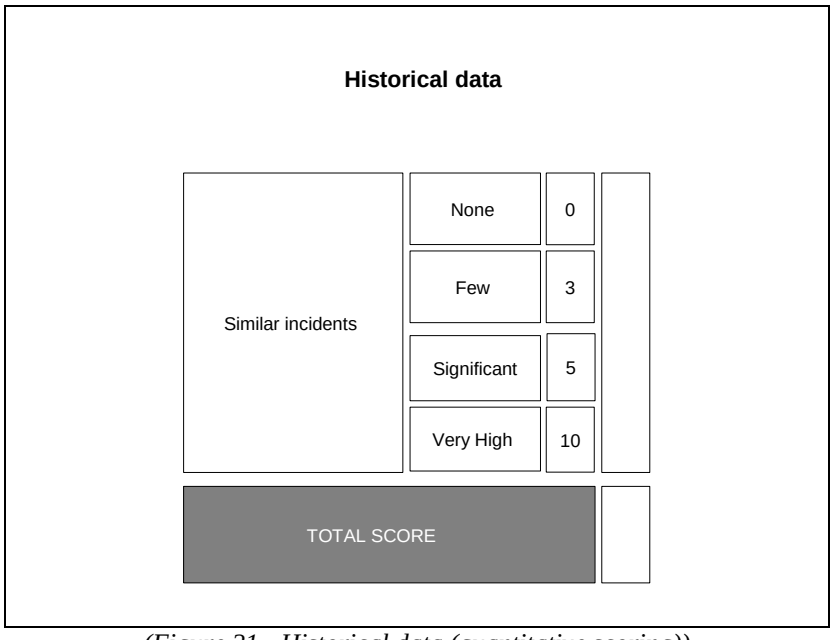
Using historical data to make a linear projection (“it has already happened several times and therefore it might well happen again”) requires historical data to be extracted from a safety occurrence database. However, as an alternative to historical data stored in a database, operational experience (memory) can also be used i.e. staff/investigators recalling similar events that did not lead to an investigated safety occurrence (or a report) but which could have degraded to this extent.

Similarity should be interpreted as classification of type of incident regardless the type of causes that are to be scored in a criterion below.



(Figure 20 - Historical data)

The scoring method is worked as follows:



(Figure 21 - Historical data (quantitative scoring))

Another very important parameter for this criterion is the Safety Management System (SMS) threshold that the organisation has established to trigger a more in depth look for certain types of occurrence and/or as an alerting mechanism.

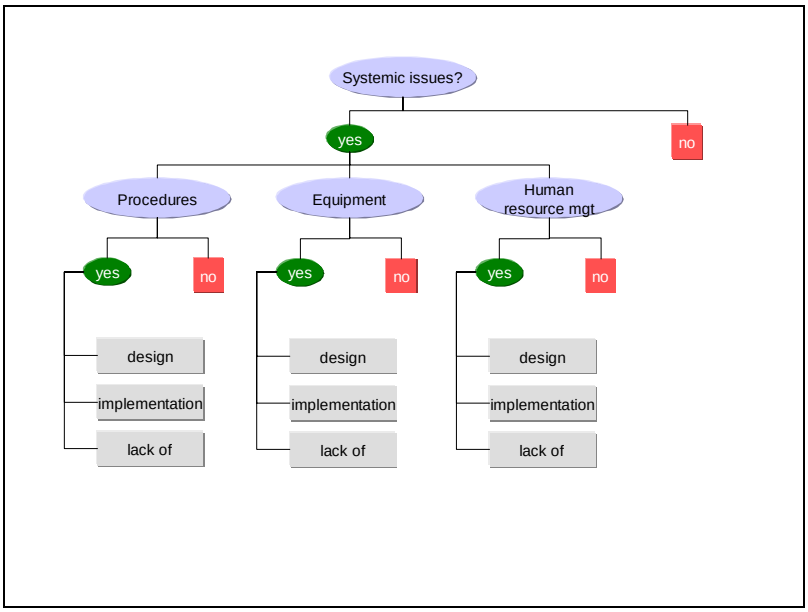
“Few” similar incidents means that a similar type of incident has occurred more than once at the same location, but the numbers of occurrences have not yet reached a certain awareness threshold from which the SMS would require particular attention.

When the type of occurrence that we are scoring is a recognised key issue (own or others) then “Historical data” criterion should be scored “very high”.

6.3.2 Systemic Issues

Systemic causes have to be considered carefully because they are of intrinsic design and therefore can be insidious and potentially very dangerous. Furthermore they may incorporate potential latent failures i.e. have a recurrence potential. As such, systemic issues should be viewed both from a total aviation and ATM ground perspective.

One way to find out whether systemic causal factors are involved is to look at the safety recommendations and whether they are addressing such issues.



(Figure 22 - Systemic issues.)

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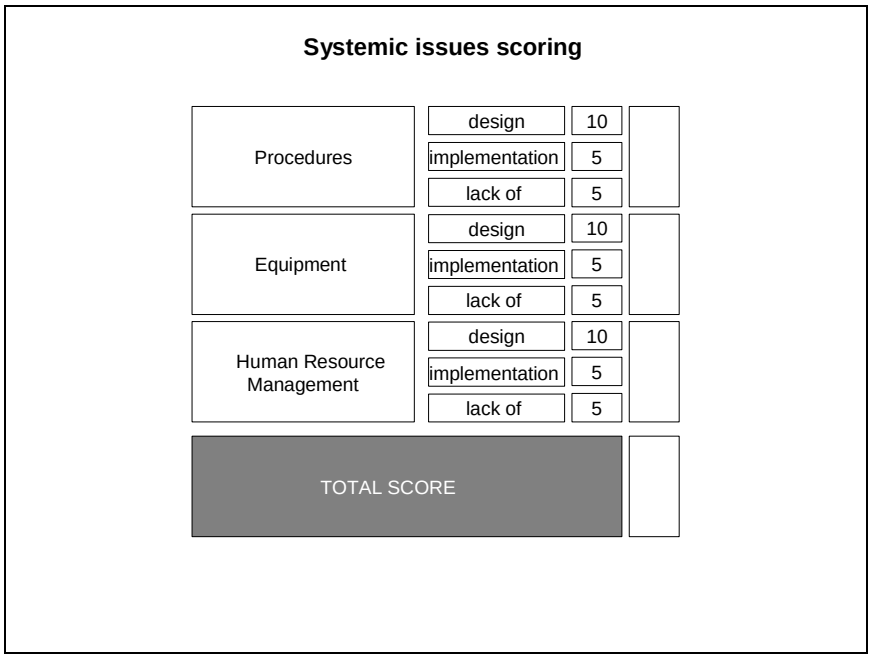
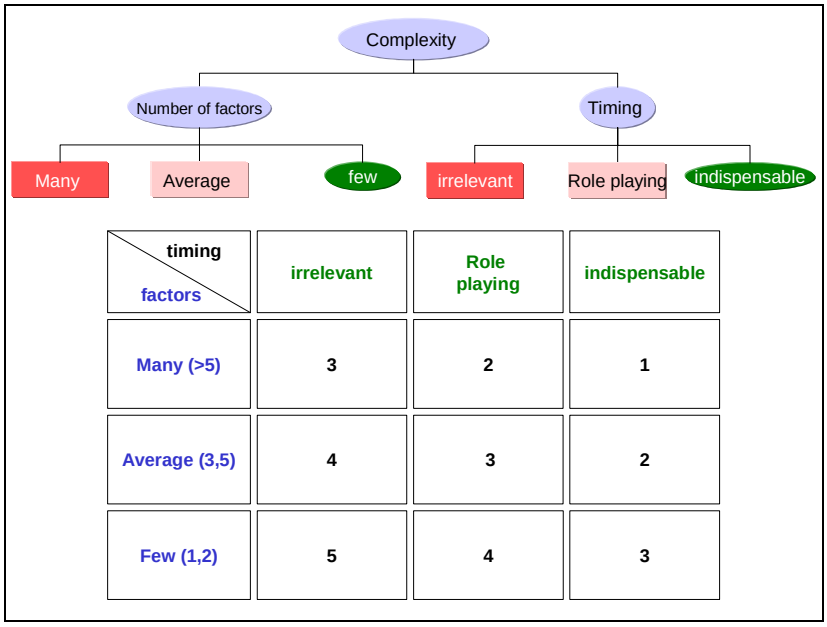
The scoring logic is worked as illustrated in Fig 23.



(Figure 23 - Systemic issues scoring logic – quantitative scoring)

6.3.3 Complexity

"Complexity" is another criterion to be considered when scoring repeatability. This parameter may be assessed through factors such as the number of causes having played a (DIRECT) role in the occurrence and/or the significance of their timing i.e. would the occurrence have happened whatever the timing or did it depend closely on the actual time order and spacing.



timing / factors	irrelevant	Role playing	indispensable
Many (>5)	3	2	1
Average (3,5)	4	3	2
Few (1,2)	5	4	3

(Figure 24 - Complexity (quantitative scoring))

Note: In determining the occurrence complexity it will be useful to use graphical representation techniques such as SOFIA (Sequentially Outlining and Integrated Analysis) that helps to identify easily the link between the events and their contribution to the final occurrence.

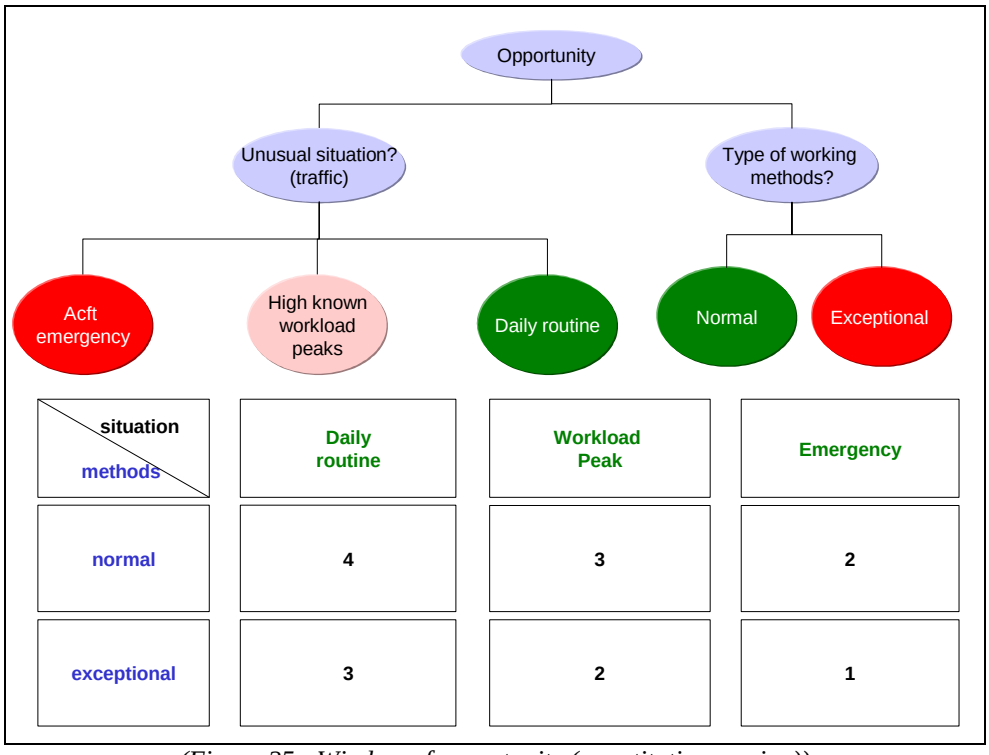
SOFIA is a graphical-analytical tool supporting the process of ATM Safety Occurrence Investigation, which was developed to be compliant with ESARR 2 -The EUROCONTROL Safety Regulatory Requirement – Reporting and Assessment of Safety Occurrences in ATM. SOFIA is recommended for use in the following phases of the investigation process:

- ✈ *Factual information gathering;*
- ✈ *Occurrence reconstruction;*
- ✈ *Occurrence Analysis;*
- ✈ *Issuing Recommendations.*

SOFIA combines a representation of the generic sequence of events (potential conflict, actual conflict and safety occurrence), leading to the safety occurrence, together with some examples of the causal factors groups (contributors) from a structure defined in different layers.

6.3.4 "Window of Opportunity"

Repeatability of an occurrence is closely related to the opportunities for it to recur. e.g. usual/unusual compared with routine/non routine operations.



(Figure 25 - Window of opportunity (quantitative scoring))

The Likelihood (of reccurrence)/Repeatability is computed by the "aggregation" of historical data and the other objective criteria such as systemic issues, window of opportunity and complexity.

6.4 Risk Assessment

The overall RISK of a safety occurrence is assessed by making use of the relevant matrix which encompasses severity versus repeatability/probability.

6.5 Proposed Assessment/Scoring Procedure

Preliminary note: Mark sheet(s) are to be seen as a guide to risk assessment rather than as a system that will determine through calculations a definite risk. There is a need for additional procedures such as moderation panels to ensure adjustments and smoothing of results.

The Mark Sheets are to be scored at the end of the investigation when all the details are available to the investigation team or the moderation panel. The scoring of the mark sheets exercise shall not replace the investigation process and shall use the factual information coming out from the occurrence report. If the information is not available it is preferably not to score certain criteria rather than making assumptions.

It is acknowledge that for the purpose of allocating an initial severity the first part of the mark sheet (the severity part) may be used at the beginning of the investigation following the receiving of the notification form and/or the controller report.

Any eventual additional assumptions should be recorded and documented. During the validation process of the mark sheets it has been found that any additional assumptions not documented have lead to different scoring of the same occurrence by different panels.

The number of aircraft involved in the occurrence determines the type of mark-sheet to be used in direct relationship with the type of occurrence i.e. incident, ATM specific occurrence.

The scores for the criteria in assessing Severity and Risk are representative for each individual criterion. There is no intention to quantify the importance of each criterion in comparison with others. No hierarchy between criteria and no trade-offs shall be considered between them. Additionally by using the mark sheets there is no tendency to identify an accident/incident causality model.

6.5.1 Proposed Mark Sheet(s)

Mark sheets have been developed using both a qualitative and quantitative approach. During the validation process it was found that the qualitative approach is preferred in certain cases, provided that adequate guidance accompanies the excel files.

The Annex to this deliverable provides detailed explanations on how to use the mark sheets and provides guidelines for scoring each individual criterion. In addition the overall deliverable is complemented by two excel files containing the electronic version of the two sets of mark-sheets.

The mark sheets compute two values for the severity and risk of the occurrence: one for the overall ATM system and one for the ATM ground part. **The regulators should use the value for the overall ATM system when presenting safety data to the general public**. The ATM ground result may be used by the ANSP for safety management purposes (as a performance indicator) and for the design of new ground systems and/or by the Regulator for safety oversight purposes.

It is strongly recommended that both figures are computed and retained together with the report of the occurrence. The severity to be used when reporting through the Annual Summary Template shall be the resultant value for the overall ATM system.

6.5.2. Reliability Indicator

The concept of a Reliability Indicator has been introduced for both qualitative and quantitative versions of the mark sheets. The rationale is multi-folded:

- the reporting and assessment scheme do not have the same maturity in all ECAC States;
- the data will not be available for all safely occurrences to quantify all the criteria;
- not all the criteria will be applicable for all safety occurrences;
- there is a need to have a certain level of trust when trend analysis is performed with safety data from different sources.

The Reliability Indicator (RI) will measure the level of confidence in the assessment (scoring) done, based on the data available to answer the questions in the mark sheets.

If enough data is available to the investigator to answer all the questions in the mark sheet, then the risk is correctly calculated and Reliability Indicator will measure that confidence (RI=100%).

If data is missing and some questions in the mark sheet cannot be answered, there is less confidence in the risk being correctly calculated. The value of the RI will then be less then 100%, indicating the degree of the confidence in the final value of the risk.

The indicator can be used later in performing meaningful statistics based on consistent data.

For the excel version of the mark sheets the Reliability Indicator is calculated based on the number of the questions answered/filled in.

As some questions are not relevant for a particular occurrence, they can be marked as “answered” even if no option has been selected, allowing for the correct calculation of the RI.

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APPENDIX 1 – NATS SSE SCHEMES ISSUES

NATS has been of the opinion that its system requires development due to the following areas of current concern:

- increase in the number of SSEs (Safety Significant Events), particularly at airports due to reporting rates and possibly inappropriate classification of events (i.e. that do no qualify for assessment)
- over scoring particularly of those events that are just breaching standards but did not trigger any safety net; and also due to use of the Question 6 (contribution of ATC system) which brings fairly minor events into the highest category;
- increase in voluntary reports;
- lack of consistency in the way questions are answered;
- the current system only scores NATS attributable events. NATS feels that it is important to understand the risks of non-NATS attributable events particularly for external publication purposes;
- causal factors are addressed in the "old" scheme, however NATS believes that a consistent causal factor analysis for each SSE is required;
- the boundary between the two categories of VERY SIGNIFICANT and SIGNIFICANT is difficult to explain
- the terminology "Safety Significant Event" is sensible.

As a result NATS has started a programme to enhance its "Safety Significant Assessment Mark sheet".

The NATS "Safety Significant Assessment Mark sheet" was first presented to the SISG-EUROCONTROL Safety Improvement Sub-Group following concerns expressed by a number of SISG Members about the lack of harmonisation in assessing safety occurrences among the ATM community and particularly differences between Service Providers and Regulators.

Further to the presentation to the SISG, a workshop was organised in Highfield at the invitation of NATS with the purpose of providing a deeper understanding about the scheme so that the SISG could form a qualified opinion about the scheme.

Generally the participants in the Highfield workshop "liked" the NATS scheme as it was seen to be:

- addressing adequate issues;
- simple and practical as it is question based;
- providing good guidance in the form of a scoring system;

There were some reservations and debate around the fact that the NATS Scheme addresses primarily the ATCOs' performance rather than the systemic issues that may be lying behind. One question (Question 6) addressed this issue in the form of a YES/NO answer to the question as to whether PROCEDURES or SYSTEMS were involved. This would bring the severity of the occurrence to the highest category.

Nevertheless in the absence of other solutions, following the Highfield Workshop, a number of service providers embarked on using the NATS Scheme. NATS has since then produced a new "Safety Significant Assessment Marksheet"

Both the old and the new (draft) NATS Scheme were discussed at a second workshop which was organised at the initiative of the EUROCONTROL Safety Enhancement Business Unit, in Brussels on the 21st to 23rd October 2002. The purpose of this workshop was to present to the participants the directions into which NATS is taking the “new” NATS “Safety Significant Assessment Mark sheet”.

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APPENDIX 2 – UK CAA OCCURRENCE GRADING PROCESS

The following criteria are used by SIDD when grading occurrences.

SEVERITY

	DEFINITION OF FAILURE CONDITION	ATM CLASSIFICATION CRITERIA
A - SEVERE	Catastrophic event	Airprox - open FIR, very close to each other, no opportunity to avoid, one unsighted
	Potentially Catastrophic	Airprox (ATC control) – very close, pilots/controller unaware of proximity or unable to do anything
	Inability to continue safe flight and landing	Mid-air Collision
	Multiple Fatalities/Serious Injuries	
B - HIGH	Serious increase in Flight Crew workload.	Serious Airprox - large reduction in safety margin
	Serious degradation of aircraft strength /integrity.	Serious ATC overload - out of control situation
	Serious degradation of aircraft performance /handling.	Serious ATC system failure
	Small number of Fatalities* or Serious Injuries	Serious loss of separation - not reported as Airprox
C - MEDIUM	Significant increase in Flight Crew workload	All other significant Airprox
	Significant degradation of aircraft strength /integrity	ATC overloads (significant increase in ATC workload) + SRP
	Significant degradation of aircraft performance /handling.	Loss of separation (other than technical)
	Minor Injuries	
D - LOW	Slight increase in Flight Crew workload	Technical loss of separation
	Results in an effect which can be readily counteracted and for which adequate procedures are already in place	All other (reportable) ATC incidents - failures which do not significantly affect safety
		Airprox low risk
		Slight increase in ATC workload
E - NON-REPORTABLE		Submitted to the SIDD as a safety report but classified as not within the remit of the Mandatory Occurrence Reporting Scheme

* Large aircraft only (i.e. small number proportional to persons on board)

PROBABILITY

1 HIGH
- A significant number of similar incidents already on record.
- Has occurred several times to aircraft of the type or a significant number of times at the same location or involving the particular ground based system.

2 MEDIUM
- Several similar incidents on record, has occurred more than once to aircraft of the type or similar, or more than once at the same location, or more than once to similar ground based systems.

3 LOW
- Only very few similar incidents on record when considering a large fleet, or no records on a small fleet.
- No similar incidents on record when considering a particular location or ground based system.

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APPENDIX 3 – SCTA MARKSHEET

QUESTIONS		SCORE
LEVEL 1/ LEGISLATION/REGULATIONS*(ICAO, AIP etc)*		
1.1- Were the **Legislations/regulations** one of the causes?	Yes/No	**12**
LEVEL 2/ ACTIVITY OVERALL VIEW		
2.1 – Was the **Airspace organisation** one of the causes?	Yes/No	**12**
2.2 - Were **Local instructions** one of the causes?	Yes/No	
2.3 – Was **Insufficient/lack of Training** one of the causes?	Yes/No	
2.4 – Was the **ATC Activity management** one of the causes?	Yes/No	
LEVEL 3 / CONTEXT		
3.1 – Was a **technical failure/condition of an ATC system** one of the causes?	Yes/No	**12**
3.2 – Was a **high or complex workload** one of the causes?	Yes/No	
3.3 – Was **an incorrect handling of the position** one of the causes?	Yes/No	
LEVEL 4 / REAL TIME ATC HANDLING*:*		
4.1 Situational Awareness		*Only one possible answer*
The event was :		
Detected in time by the controller		**0**
Detected late by the controller		**2**
Detected by a third party *(colleague, other position)*		**3**
Detected by the STCA		**3**
Never detected by ATC or detected and forgotten		**6**
4.2 Event Resolution		*Only one possible answer*
The action taken by the ATM was :		
Adequate		**0**
Inadequate		**2**
A Third party action *(colleague, other position)*		**3**
No action		**6**
MINIMUM SEPARATION*:*		
4.3 If a standard separation was specified, the minimum separation was:		*Only one possible answer*
In respect of the standards		**0**
Between 100 and 70% of the standard		**1**
Between 50% and 70% of the standard		**2**
Below 50% of the standard		**3**
If no standard was specified, the minimum separation was		
Sufficient?		**0**
Minor?		**1**
Serious?		**2**
Very serious?		**3**

APPENDIX 4 – REPOSITORY OF SAFETY OCCURRENCES SCORING

AVAILABLE ONLY ON REQUEST FROM SRU AND ON ONE SKY TEAM EXTRANET OF AST-FP GROUP[8]

ASK AT SRU@EUROCONTROL.INT

*** *End of Document* ***

[8] The access to the One Sky Team AST-FP Extranet is a limited and controlled access for the members of this group appointed by States.