

SMS & Audit

Safety and Audit Management



Index

Page

3	Foreword
4	Overview
8	Incident Management
12	(Anonymous) Safety notifications
14	Safety Performance Indicators (SPIs)
18	Risk Management
30	Overview graphic: „Risk analysis & operative risk management“
32	Investigation Management
36	Committee Management
38	Audit Management
42	Our services

Publisher: Arconda Systems AG
Hesestücken 17
22453 Hamburg

Date: 09 / 2014

Editors: Frank Espenhain
Pascal Rohmann

Layout&Graphics: Torben Petrina

Copyright: Distribution, copying and reproduction is only permitted with written approval from Arconda Systems AG. This also applies to recording in electronic databases and copying onto storage mediums. All data is protected by copyright.

Foreword

“Implementing safety objectives through an integrated, company-wide global approach while taking economic conditions into consideration”

Safety Management Systems are used in all organisations that have high risk potentials, in particular the chemical industry, petrochemistry, pharmaceuticals production, maritime navigation, railroad systems and civil aviation.

The use of Safety Management Systems is required in the individual industries through a wide variety of national and international legal provisions and regulations.

eControl provides a variety of modules for the efficient running of a Safety Management System, whereby the following objectives are pursued in addition to a revised regulatory compliance:

- *Reduced likelihood of accidents*
- *Implementation of a systematic process for the monitoring and minimisation of safety risks*
- *Improved safety awareness through employee integration*
- *Delegation of responsibility*
- *Cost minimisation*
- *Improved control and productivity*
- *Reduction of liability risks*

eControl's integral software and operational concept enables process optimisation with regard to safety, quality and economic objectives.

eControl is a digital process archive with a variety of management functions for the improvement of the efficiency of a Safety Management System. Intuitively operable dialogues ensure that safety staff can focus their attention on the technical tasks of an SMS.

eControl automates communication, consolidates documentation from all system components and provides reporting, which reduces a variety of issues and reporting frameworks at the touch of a button.



Frank Espenhain
CEO

Overview

Elements of the Safety Management System (SMS)

eControl integrates specific elements of a Safety Management System into the company-wide process management. The Safety Management System uses the data stream from operational departments, which is supplemented by Safety Management staff.

This structure guarantees extensive authentic process information and ensures that Safety Management can promptly accept information from all safety- relevant processes at minimal cost. Conversely the Safety Management activity for the operational areas is ever more present, and therefore requires the safety awareness of all staff.

SMS – Safety-focused Process Management

Some eControl components are used exclusively in operational practice by Safety Management staff. These components are combined as an SMS module:

- **Risk Management**
 - **Risk Assessment**
Company-wide risk inventory
with the RiskDB - bottom-up or top-down
 - **Operational Risk Assessment**
Documentation and assessment of operational risks
with Initial Event Risk Classification (IERC)
 - **Risk Mitigation Process**
Documentation of measures, quantification
and accumulation of risks, (cluster-) analyses
- **Research Management**
- **Committee-Management**
- **Safety Indicators and Cockpits**
- **Anonymous safety notifications**

The SMS-specific components are the subject of this technical product catalogue. For the non safety-specific components we refer to the additional product catalogues for the eControl system. Additional white papers provide a clear insight into the processes and options of the eControl software product, which are available for selected topics.

Incident Management

Incident Management is the central data source for process information together with process-specific eForms provided by the customer. eForms replace paper forms in the day-to-day business of the departments - from shift reports to dealing with property damage. Process information is available in real-time for further processing by downstream departments, activates automated e-mail notifications and can be analysed statistically. Safety Management looks for and identifies safety- relevant processes and adds facts that are relevant from a safety perspective in a work area that is defined, but seamlessly integrated into the dialogue.

Processing System

The processing system documents and administrates company processes and subsystems in an overall context. The documentation combines process descriptions as well as procedure and operating instructions and publishes these in the currently valid process version. The processing system is the basis of Compliance Management, whereby safety- specific ICAO, EASA, IATA etc. compliance standards are highlighted.

The processing system is the backbone of Risk Management. The company-wide risk database RiskDB and the Initial Event Risk Classification(IERC) are classified by the process and system structure.

TQMS Training and Qualification Management

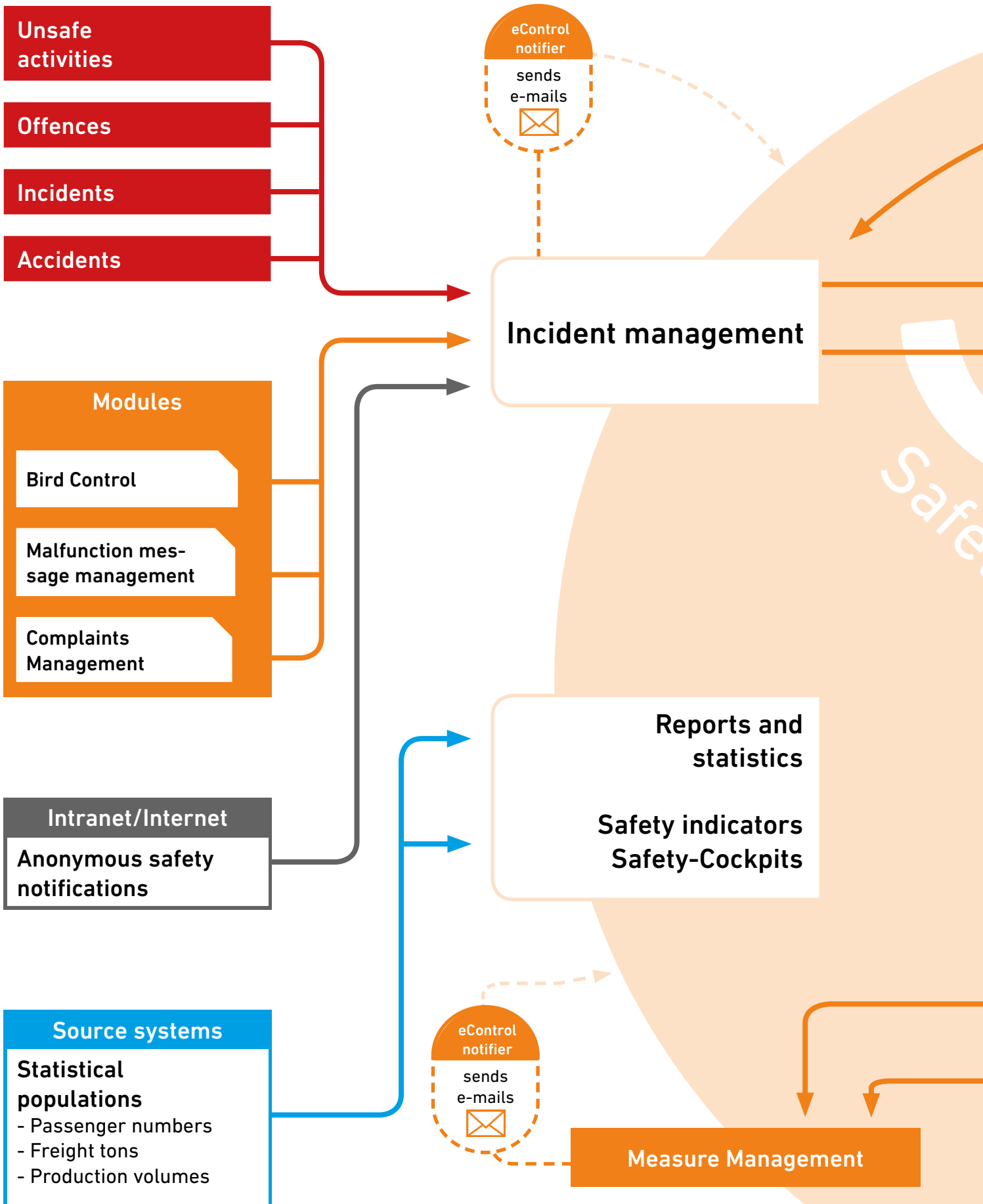
Staff must be qualified in the implementation of process and procedure instructions in the currently valid version. Event Management documents the processes carried out by company staff. Combining the safety- relevant processes and staff training levels is the basis for the effective optimisation of staff training. Proof of a functioning training and qualification management is managed via TQMS with regard to authorities and additional stakeholders.

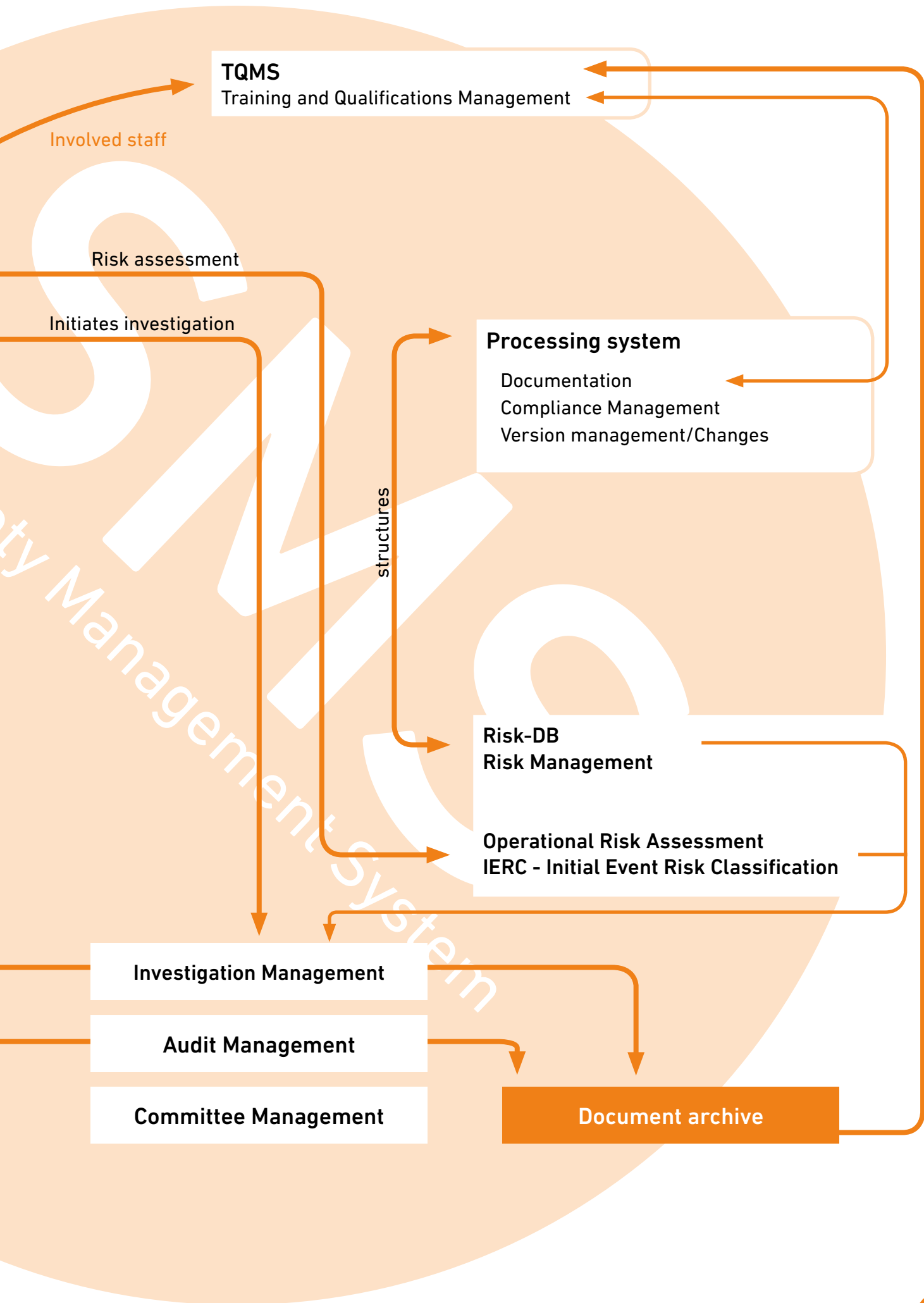
Audit Management

Audit Management supports the planning, preparation, execution, evaluation and post-processing of audits. Checking standard conformity can involve processes, audits, supplier audits or self-inspections. Audit Management is designed in such a way that it can be used in parallel by different departments with an isolated database. Predefined catalogues are already available for the most important standards, which can be used directly or modified as required.

Object Explorer

Object Explorer is an efficient instrument for the integration of incidents, risks, audit elements, investigations, committee meetings and processes. The aim is the permanent and reproducible integration of established connections between the respective elements. Object Explorer is part of the system standard and supports Safety Management in the research and preparation of information.





Incident Management

Universal reporting methods for safety- relevant incidents

Incident Management is a fundamental component of a Safety Management System. Safety Management must essentially obtain information on all relevant processes, in order to be able to initiate appropriate corrective and preventative measures.

In addition to incidents and accidents, unsafe situations such as near misses are of particular significance, as their recurrence may at some point lead to an accident.

Information Platform

Incident Management aims to provide an information platform that is available company-wide, as well as the option of recording anonymous safety hints. Event Management is the technical basis that enables Safety Management to take note of all safety-relevant processes in a practical way.

Incident Management

The comprehensive storage of offences, accidents, near misses and other incidents, including the documentation of specific parameters, results in a valuable and unique company-specific database.

eControl provides various statistical analysis tools for the database, in order to identify trends, correlations and distributions and adequately verify assumed connections with historical data.

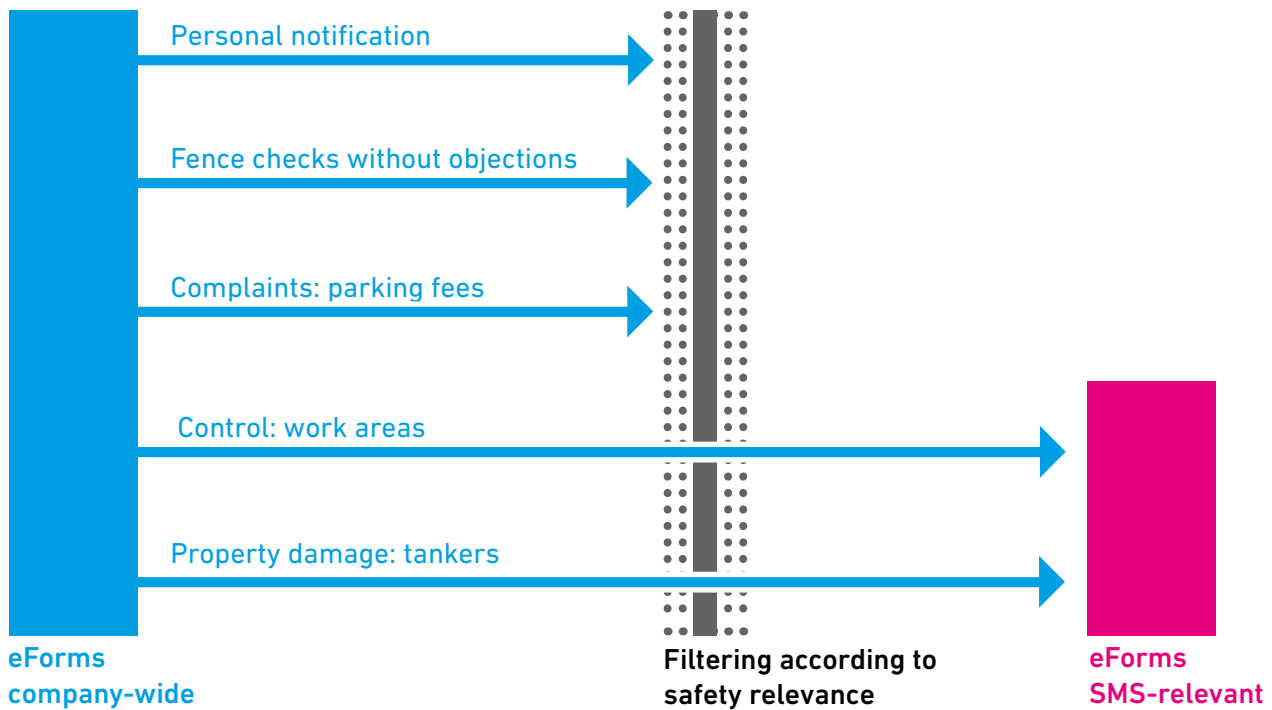
The Philosophy

A database for departments and Safety Management

The use of eControl eForms in the operationally active organisational units of a company provides a continuous data stream of process information through electronic forms.

eForms are authentic information from the respective departments, which can be filtered by Safety Management as desired at the touch of a button, in order to identify the processes which are relevant from a safety perspective.

The eForms available throughout the company are therefore universal reporting methods for safety-relevant incidents. If necessary, individual safety-relevant incidents are added by Safety Management staff to an electronic file including a case-related risk assessment (Initial Event Risk Classification - IERC). Safety Management therefore uses the expertise and information of the respective department, which enables a comprehensive and authentic assessment of the actual safety level.



Identification of safety-relevant processes

Reliable identification of potential hazards requires a methodically suitable approach by safety staff and of course in-depth knowledge of the processes and the layout. eControl provides a bundle of tools for the identification of safety-relevant processes.

Every software tool requires a digitally analysable database. According to the philosophy of the system, the identification of safety-relevant processes is simplified if additional operational departments use the system's electronic forms, thus increasing the proportion of digitally analysable data.

Identification through e-mail alerts of the eControl Notifier

The eControl Notifier is a push service, which notifies Safety Management fully automatically of incidents and routine control results.

Safety Management defines criteria in the eControl Notifier, which trigger an automatic e-mail notification (e.g. eForm = "Car property damage" and area = "airside"). eControl allows the definition of as many notification rules as required.

eControl Notifier is part of the eControl system standard and can of course not only be used for the identification of safety-relevant issues. A rule generator is available for the amendment of notification rules, whereby the content of forms provided by customers can be interpreted in full. The recipient group is established individually for each notification rule.

Identification through anonymous safety notifications

Anonymous safety notifications are an additional important source of information for the identification of safety-relevant processes. In this case the author initiates an anonymous (if necessary) notification from Safety Management. eControl sends these safety notifications to Safety Management and manages an automatic verification of the processing.

Identification through the analysis of the data stream from incidents and routine checks

eControl provides efficient research instruments for the specific analysis of the data stream from eForms and routine checks. A database is generated from the regular performance of routine control (for example the control of aircraft operation areas, fence controls etc.), which provides Safety Management (and other departments) with valuable control information. Furthermore eControl has many automatisms, in order to minimise the expenditure for the recording of routine controls.

eControl guides the user in the classification of faults, in order to guarantee an optimal statistical validity of the control results.

Identification through the analysis of the module's data stream

eControl provides software functions for different departments, thus making the use of independent software applications (isolated applications) redundant and at the same time ensuring that the data stream from these departments continues to be statistically analysable.

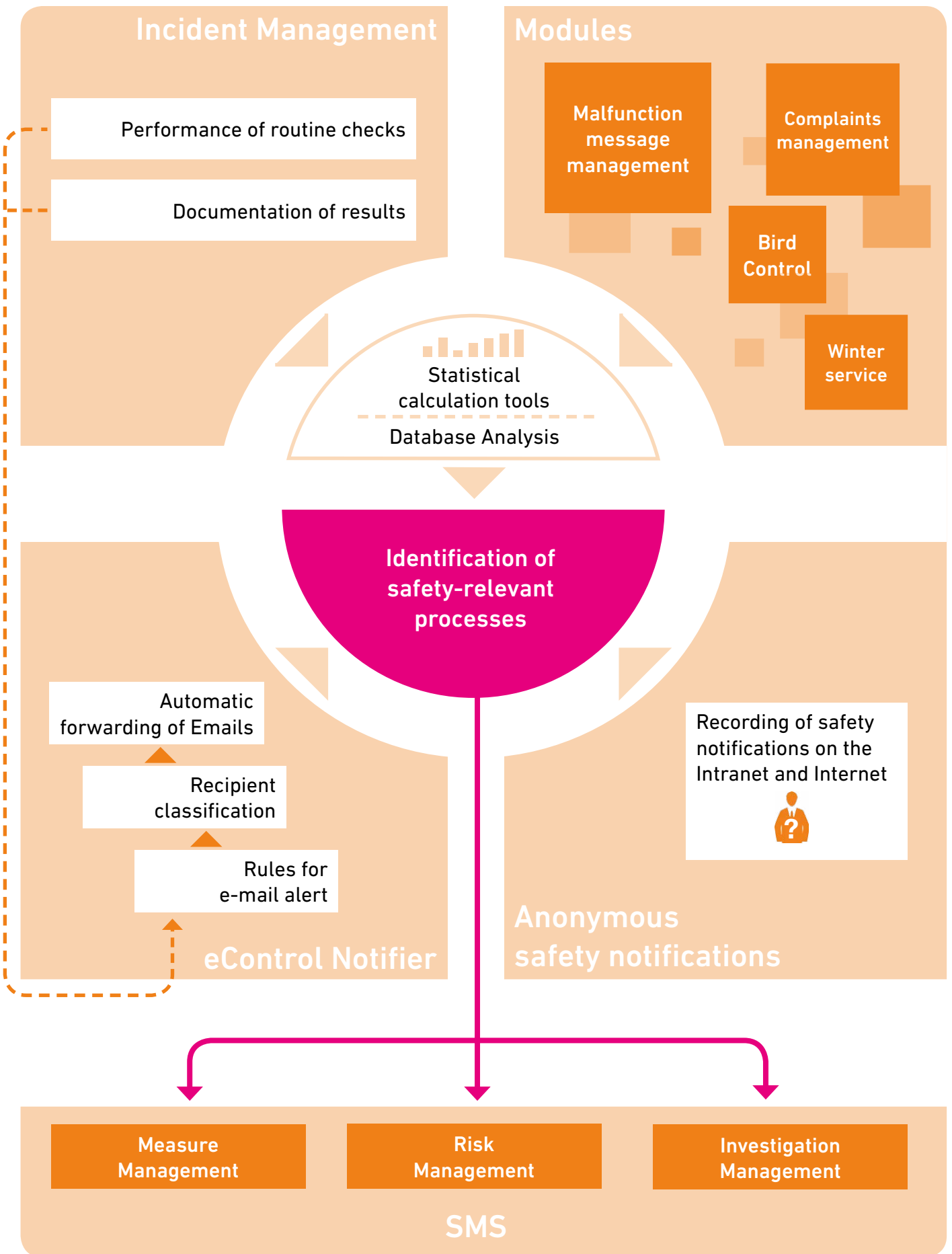
The modules:

- **Bird Control**
- **Malfunction Message Management**
- **Complaints Management**
- **RunUp-DB**

are part of eControl and can provide information on safety-relevant processes. The avifaunal module "Bird Control" documents bird strikes, carcass finds and abundances, and in addition realises avifaunal risks in excess of the bird strike rate.

"Malfunction Message Management" is used to record the breakdown or damage of equipment using special electronic forms and to monitor the rectification thereof by the respective department or external company. These malfunction messages can alleviate safety-relevant issues.

"Complaints Management" is used for the documentation, interpretation and monitoring of corrective and preventative measures. The complaints can also include safety-relevant issues.



(Anonymous) Safety notifications

Notification of safety-relevant incidents

eControl enables the recording of safety notifications – anonymously if desired. The safety notifications usually involve near misses, risky situations, offences or even suggestions for improvement.

Through the provision of a separate website for the Intranet or Internet, individual staff and outside companies can become involved in improving the safety level. In this way external individuals can play a part in the maintenance of the safety level. The design of the public website can be adapted to various design standards without any problems.

Safety Awareness and Incentive System

An efficient notification system for safety notifications requires appropriate safety awareness on the part of the staff. Staff who have internalised the joint safety objectives tend to be more motivated to record safety notifications, which brings the company closer to achieving this objective. eControl enables the measurement of the safety level using statistical figures that can be managed by means of an incentive system, which provides for a collective reward if joint safety objectives are achieved.

Repressions and Anonymity

eControl provides a separate website for the recording of safety notifications, where the user decides independently whether or not he wishes to identify himself. This website must of course be used without personalised dial-up access and can thus simply be integrated into the Intranet or Internet portal.

eForm / Standardised Processing

A safety notification is an electronic form, which is created by the system and is supplied to Safety Management for assessment. If desired, Safety Management can also be notified automatically via e-mail by the eControl Notifier about the entry of safety notifications.

A safety notification can be processed by Safety Management in the same way as any other safety - relevant incident. Specific user rights ensure that only Safety Management actually has access to the safety notifications, – irrespective of whether or not they have been forwarded anonymously.

Specific reporting for (anonymous) safety notifications is available for verification of processing.

Anonymous or personalised recording of a safety notification



eControl Notifier
e-mail-Alert

Routing to
Safety Management

Assessment by Safety Management



NO

Assessment
documentation

YES

Processing of the safety notification by
Safety Management: eFile safety notification

IERC

Initial Event Risk
Classification



Documents



Measures



Link to
Object-Explorer

Statistics / Reporting

Safety Performance Indicators (SPIs)

Definition and achievement of safety objectives

The Safety Performance Indicators - SPIs – help to define and control the compliance of safety objectives using quantitative figures.

eControl provides universal instruments for the definition of indicators, whereby reactive, proactive and predictive or forecast indicators can be created. The free definition of SPIs using SQL generators is also the basis for a specific measurement of the effectiveness of action management.

eControl indicators manage the requirement to systematically back up decision processes with customised indicators that are available in real-time. Making decisions based on objective, quantitative figures is not a procedure limited to Safety Management.

eControl indicators are also suitable for the measurement of qualitative (complaints/10,000 traffic units) or commercial figures (delay penalties per airline/ 10,000 aircraft movements).

Simple and flexible definition

Below are some examples of SPIs, which based on the electronic Event Management forms can be retrieved at any time in real time:

- Aircraft damage AOG / 10,000 aircraft movements p.a.
- Damaged aircraft ground service equipment airside / 10,000 aircraft movements p.a.
- Injured passengers airside / 10,000 aircraft movements p.a.
- Injured third party company staff airside / 10,000 aircraft movements p.a.
- Workplace accidents airside / 10,000 aircraft movements p.a.
- Safety-relevant incidents / 10,000 aircraft movements p.a./p.m.
- EventRisk IERC cumulative / 10,000 aircraft movements p.a./p.m.
- Oil alarms (kerosene spill) / 10,000 aircraft movements p.a.
- Runway incursions / 10,000 aircraft movements p.a.
- Bird and wildlife accidents (bird strike rate) / 10,000 aircraft movements p.a.
- Dangerous goods accidents / 10,000 aircraft movements p.a.

Provided that an indicator supplies clear figures, the indicator definition can be copied and differentiated according to the assumed explanation. This can be done for example through narrowing down individual shifts, night work or departments. eControl provides software instruments for the archiving and documentation of indicator definitions.

Indicators are set in proportion to the probability of occurrence of specific incidents (e.g. aircraft damage) and key performance indicators (e.g. number of aircraft movements). These key performance indicators and statistical populations can be flexibly defined for different notification intervals. Recording dialogues are available for data capture, whereby digitally available data can automatically be imported via a flexibly adjustable import interface.

The screenshot displays the 'Indicators' configuration window in the eControl software. The window title is 'Indicators' and the breadcrumb path is 'Settings > Master data > Operation management > Indicators'. On the left, there is a tree view of incident categories, with 'Aircraft damage' expanded to show 'Aircraft damages AOG per 10,000 movements' selected. The main area is divided into two tabs: 'Indicator' and 'Key figure values'. The 'Indicator' tab is active, showing the following fields: ID: 1, Name: Aircraft damages AOG per 10,000 movements, Note: (empty), Category: Safety Performance Indicators, Subcategory: Damages and Injuries, Incident: E Aircraft damage. Below these is a 'Conditions' section with a single condition: Airworthiness = AOG. The 'Key figure values' tab is also visible, showing Measurement interval: Annual, Key figure: Aircraft movements per year, and Factor: 10,000. The interface includes standard UI elements like a 'Deactivated' checkbox, a search bar, and a 'SQL syntax' checkbox.

ALoS and Targets

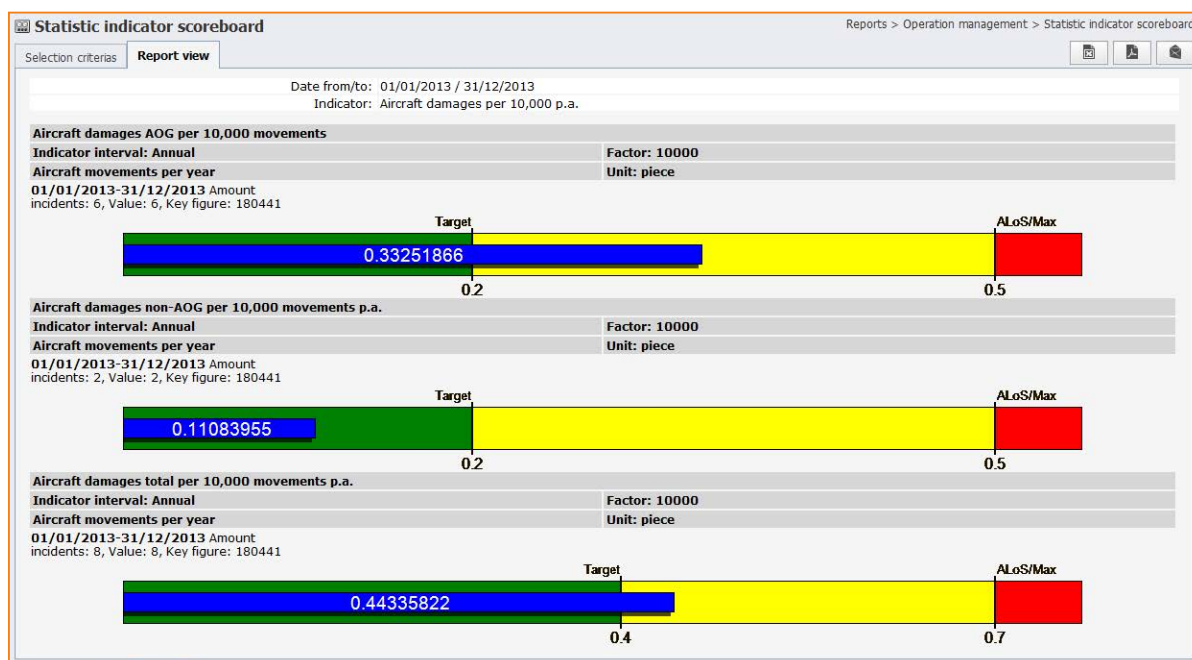
According to ICAO DOC 9859 - Safety Management Manual, a maximum value which can be fallen below, known as the Acceptable Level of Safety (e.g. 4.3) can be quantified for every indicator (e.g. bird strike rate) and every reference period (e.g. 2015).

If this indicator is exceeded (red) measures must be introduced to improve the level of safety.

eControl also enables the definition of targets for each indicator and period, which show the desired safety objective.

The area between ALoS and target requires additional effort in order to meet the safety objectives (yellow).

If the target is fallen below, according to the indicator definition there is no need for improvement (green).



Indicator sets – Bundling from a technical perspective

eControl has a hierarchically organised tree structure, in order to document indicators and to classify them according to technical and organisational criteria. Provided that there is appropriate authorisation, as many indicators as desired can be provided by the customers beyond the Safety Management requirements.

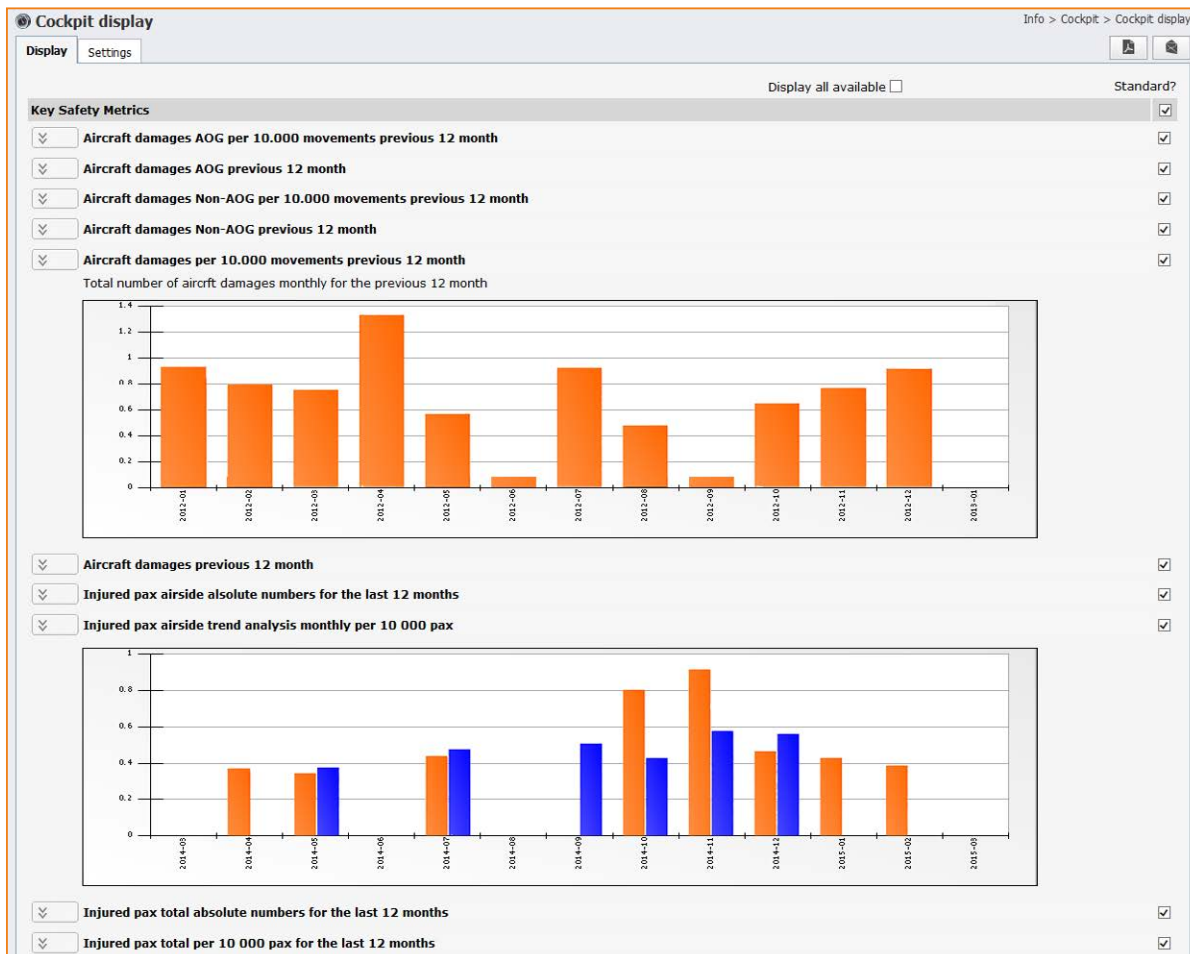
The eControl indicator sets enable indicators to be bundled according to technical criteria. The SPIs stated can be bundled as an indicator set e.g. according to the designation "SPI" and retrieved in a summary report.

SPI-Cockpit

eControl provides information cockpits, in order to publicise figures and other statistical information in processed form for any system users. eControl makes it possible for different report generators to save all query criteria (if necessary complex) and to save them together with technically explanatory documentation.

Several of these predefined report definitions are combined according to technical criteria into an information cockpit. The reports and statistics published can be viewed in their current form by the assigned users without further authorisation, production expenditure or statistical knowledge.

eControl updates the statistics fully automatically and therefore always publishes current data.



Risk Management

Identification of potential hazards and assessment of risks

Risk Management is based on the identification, analysis and assessment of an organisation's risks. The management process provides for the design and implementation of risk reduction measures, which can lead to the elimination or reduction of individual risks and thus the cumulative overall risk of the organisation.

eControl provides a risk database with specific analysis and documentation functions for this part of risk Management.

The risks identified by Risk Management essentially cover the potential of accidents and incidents or events. Risk Management must analyse individually occurring incidents according to risk factors (IERC – Initial Event Risk Classification) and compare them with the risk database. By doing so it can be ensured that the Risk Management's risk inventory is correct and complete. The assumed likelihood of occurrence is entered into the quantitative assessment of risks, and must be adapted to actual incident occurrences e.g. Initial Event Risk Classification (IERC) if necessary. The risk inventory of the risk database includes a finite number of relevant system components, whereby the analysis of IERC incidents can show that an expansion or differentiation is necessary.

eControl provides different functions to support an efficient Risk Management. Based on the implemented Operational Risk Assessment by the ARMS Working Group, Initial Event Risk Classification is the link for the dynamic coupling of the risk database, risk inventory and incident specific risk assessments of the operational departments.

RiskDB

The explicit identification of hazards is required – in addition to compliance with established infrastructure and operational standards – in order to ensure an appropriate and desired safety level. This hazard identification is normally carried out for the first time in the course of setting up the risk database and recorded by the system.

Hazard identification must be updated as a reflection of the processes over time.

A three-stage process is implemented with the risk database Risk DB in the course of hazard identification and risk assessment:

- 1 Determining system components that exhibit a hazard potential**
Which hazards exist in the context of which (sub-) systems?
- 2 Derivation of 1 to any number of scenarios in the context of one or several hazards**
What can happen?
- 3 Risk assessment of scenarios**
Likelihood of occurrence and severity of consequences

Identification of system components

The identification of system components, which exhibit a hazard potential, is a demanding operation. Success factors for appropriately determining system components with regard to risk management are sector-specific know-how and informed knowledge of infrastructure, processes and basic conditions of the respective organisation.

A differentiation can be made between the top-down and bottom-up approach for the identification of system components or a mixture of both directions of synthesis.

The top-down approach is based on the compilation of known hazards by experienced staff, which are then structured in workshops and broken down into scenarios. The advantages of this approach are comparatively low expenditure and good coverage of known operational risks.

The bottom-up approach is based on a comprehensive inspection of all systems, for example according to regulatory frameworks (e.g. ICAO Annex 14) and the filtering of hazards, which are important from a risk management perspective. The bottom-up-approach is more labour-intensive, however it illustrates the relevant system components and hazards comprehensively.

Ideally the results of the bottom-up approach are supplemented with those of the top-down approach and pragmatically merged.

The system component catalogue is issued by eControl process management.

Processes and subsystems can be structured in the desired detail, whereby hierarchical structures can be generated. These hierarchies are used by all eControl modules, thus enabling the eControl process management to act as a link between Risk Management and Audit and Research Management.

(See P. 30-31 – Overview diagram: “Risk Analysis & Operational Risk Management”)

(Individual) risks

The individual risks describe scenarios that are defined as accurately as possible, in which generally several hazards can lead to an accident or an incident. These risks are administered with the eControl risk database RiskDB. The RiskDB follows the process and system structure, which was produced or expanded on when the system components were identified.

The documentation of hazards and consequences as well as the indexing and coding of the respective risk enable a systematic documentation and specific definition of risks.

(Individual) risks, documents, measures and connections can generally be assigned to other objects – such as investigations. The connection of (individual) risks and operational risks (IERC) is particularly important – if this connection is successful, the structure of the RiskDB is validated. If no suitable classification is reached, the risk database must be completed accordingly.

An individual digital file is produced in eControl for each individual risk, which also provides the risk manager automatically with the documents and measures of associated investigations and other objects for the improvement of the risk assessment. During the risk reduction process, and over time, additional knowledge is obtained, assessments checked, measures implemented and investigations carried out. This reference period is particularly important for the understanding and assessment of risks in the risk database. The risk database stores all historical data compliant with auditing procedures and in this way documents the “overall risk” over time. eControl therefore permits the most objective measurement possible of the risk mitigation process.

The screenshot displays the RiskDB application interface. At the top, there is a search bar and navigation tabs. Below the search bar, various filters are applied, including Indication, Risk code (HAZ_ID S003_H01-A), Process/System, Risk ID, Title, Note, S/W/A, G/K, S1/2/3, S4/5/6, Status, and Priority. The main area shows a list of risks, with the selected risk '030.040. Road crossing' expanded to show details for 'HAZ_ID S003_H01-A'. The hazard is 'Evasive maneuver (ground) area external logistics service provider' and the consequence is 'Evasive Maneuver'. The risk is classified as 'tolerable' with a score of 100. Below the risk details, there is a list of associated documents and their status.

Document ID	Document Description	Severity	Probability	Risk	Date	Status	
00000027	Renew Rollway A2-A11, B, C08-C17	High	Target	01/03/2013	Actual	26/03/2013	Finished
4	Near accident Abakus-Lifter crossed taxiway A340 on APRON	S significantly	D minimal	R tolerable	13873	22/04/2013	InciNearAccid
5	Emergency braking AC on APRON	S significantly	D ineffective	R unacceptable	13750	01/07/2012	RwyInc

Risk assessment

An assessment is performed for each (individual) risk, whereby the potential extent of damage and the levels of frequency are compared. Using a risk matrix, an ordinal ranking is created from increasing extent of damage and increasing likelihood of occurrence.

The classification involves categorisation into the categories green, yellow and red, which show generally acceptable, tolerable and non-tolerable risk classifications.

eControl also provides a risk index, which facilitates the accumulation of risks and the prioritisation of risk reduction measures. The extent of damage, likelihood of occurrence, the traffic light stages and the risk indications are freely configurable – for example according to ICAO DOC 9859 or according to an alternative classification system as shown in the following example:

	Frequent [5]	Occasional [4]	Remote [3]	Improbable [2]	Extremely Improbable [1]
Catastrophic [A]	1000	500	100	50	5
Hazardous [B]	500	100	50	20	1
Major [C]	100	50	20	10	1
Minor [D]	50	20	20	5	1
Negligible [E]	20	10	5	1	1

Priorisation, statistics and monitoring

The prioritisation of risk reduction measures is made considerably easier through the model provided. The introduction of risk reduction measures focuses on the system objects and subsystems involved and generally not directly on individual risks, so that an accumulation according to objects and subsystems is more appropriate for the control of measures.

eControl has the display format "RiskDB Risk index structure analysis", with which the risks of system components and their hierarchies can be integrated.

In the following example the individual risks, which are connected with the "040 CTR" subsystem, are looked at in summary form.

Statistic RiskDB risk index structure analysis Reports > Safety management > Statistic RiskDB risk index structure analysis

Selection criteria: **Report view**

Date/Time: 01/04/2015 13:08
 Process: 040 CTR
 View option: Number, weight and code incl. process-/risk overview

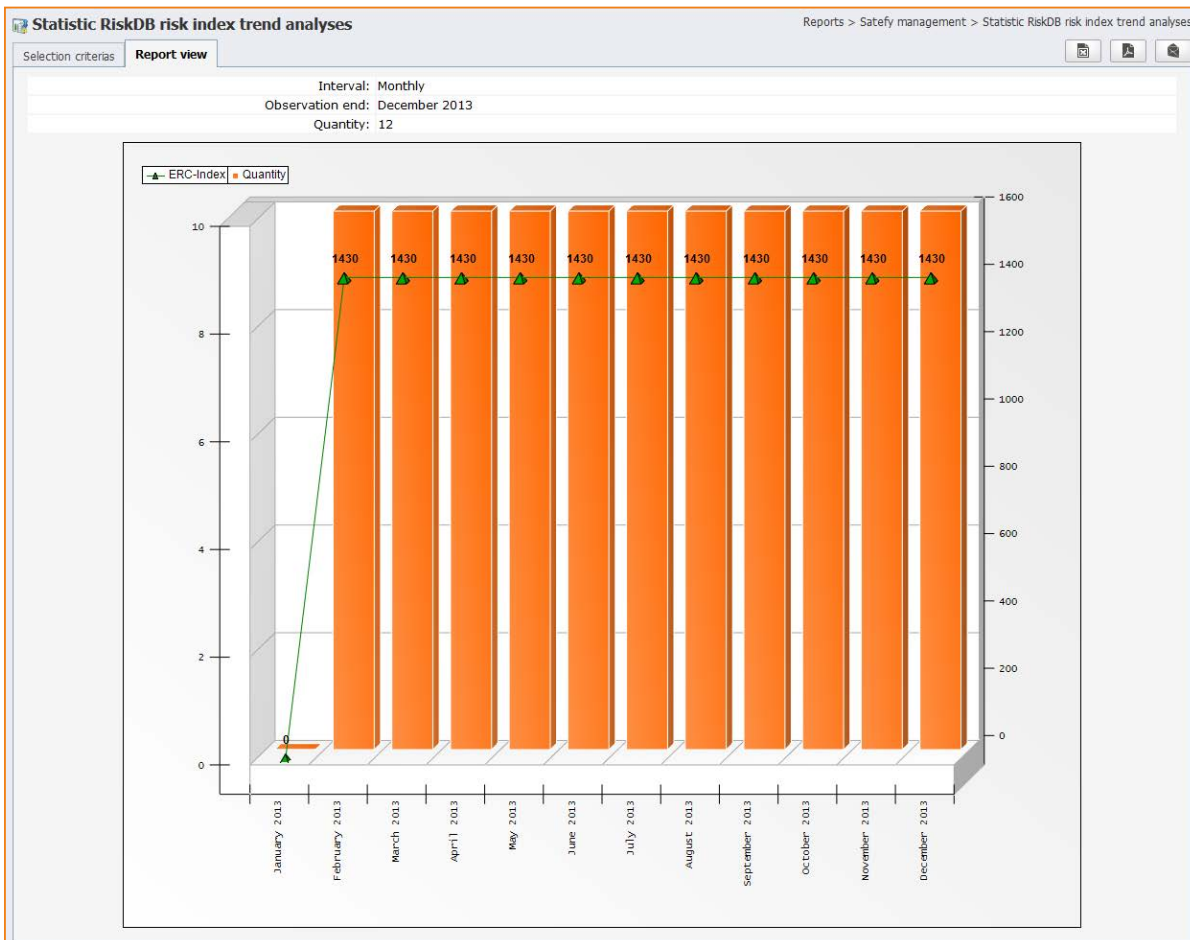
	Frequent [5]	Occasional [4]	Remote [3]	Improbable [2]	Extremely Improbable [1]	Sum
Catastrophic [A]	0 x 1000	0 x 500	2 x 100 = 200 S001_H03.a (3) S001_H04.a (4)	1 x 50 = 50 S001_H02.a (2)	1 x 1 = 1 S001_H01.a (1)	251
Hazardous [B]	0 x 500	0 x 100	0 x 50	0 x 20	2 x 1 = 2 S001_H01.b (7) S001_H02.b (8)	2
Major [C]	0 x 100	1 x 50 = 50 S001_H03.b (16)	0 x 20	0 x 10	0 x 1	50
Minor [D]	0 x 50	0 x 20	1 x 20 = 20 S001_H04.b (20)	0 x 5	0 x 1	20
Negligible [E]	0 x 20	0 x 10	0 x 5	0 x 1	0 x 1	0
Sum	0	50	220	50	3	323

Risks processtree

- 040 CTR Active:
 - 010 Concurrent mixed traffic Active:
 - S001_H01.a - Collision / crash because of concurrent mixed traffic (1)
 - S001_H01.b - Evasive action because of concurrent mixed traffic (7)
 - 020 Helicopter traffic Active:
 - S001_H02.a - Collision / crash because of helicopter traffic (2)
 - S001_H02.b - Evasive action because of helicopter traffic (8)
 - 030 Apron Management Active:
 - S001_H03.a - Collision/Crash because of airport tasks (3)
 - S001_H03.b - Evasive action because of airport tasks (16)
 - 040 Obstacle Approach Zone Active:
 - S001_H04.a - Collision / crash because of obstacles in approach zone (4)
 - S001_H04.b - Evasive action because of obstacles in approach zone (20)

The structure analysis can be retrieved for any points in the past. In this way conditions can be compared before and after performing the risk reduction measures. eControl therefore enables an objective examination of the efficacy of the risk reduction measures.

Trend analyses are available for the monitoring of the accumulated risks, and they accumulate the risk indices and risks and present them over time:



Operational Risk Assessment

Electronic forms are available company-wide with eControl, and replace the traditional paper forms, e-mails, table calculations and other locally managed departmental databases with a standard and convenient web- based form management.

The electronic forms from the operational units are interesting from the perspective of the operational risk assessment, as information regarding safety-relevant incidents is collected from them:

- **Personal injury accidents**
- **Declared air emergencies**
- **Aircraft accidents**
- **Overweight Landings**
- **Accidents and incidents with dangerous goods**
- **Aircraft damage**
- **Overfilling**
- **Bird strikes**
- **Damage or injury due to jet blast and prop wash**
- **Damage by FOD**
- **Incidents with “unruly passengers” /Narcotics**
- **Incidents, which have put aircraft crew and passengers in danger**
- **Aircraft interference**
- **Runway incursions**
- **Traffic accidents in a private area of the airport**

In addition to these undoubtedly safety-relevant accidents, near misses and incidents, unsafe situations and events are also saved, which are not explicitly reported to Safety or Risk Management, where there is a danger that these incidents might recur until a combination of different unsafe situations and incidents causes an accident or an malfunction.

Access to electronic forms, and therefore to the processes of all involved departments, enables research into time frames, areas, local incidents etc. The use of eControl ensures that Risk Management receives genuine information regarding the actual operational risk.

Initial Event Risk Classification

The eControl Model of Initial Event Risk Classification IERC is in line with the considerations of the Airlines Risk Management Solutions (ARMS) Working Group, which, with the Operational Risk Assessment, has developed an applicable and integrative model for the measurement of the operational risk for airlines and other aviation organisations. The approach can of course be applied to other industries.

The model implemented in eControl is available for every incident documented and electronic form in eControl. After an incident has been identified as safety-relevant by Risk and Safety Management, the respective form may be assigned one or more Initial Event Risk Classifications (IERCs) for the documentation and assessment of the operational risk.

Each of these assessments must be considered in the context of individual situation-specific conditions and can be assessed with a hazard potential in the actual situation, which means it is quantified as a risk, though this may be reduced by efficient safety precautions and other circumstances.

The efficient orientation of risk reduction measures to individual incidents is very labour-intensive and often not constructive. For this reason eControl makes statistical instruments available, which enable a comprehensive analysis of IERCs and operational risks with regard to

- Hazards
- Causes
- Consequences
- Processes
- Defence mechanisms.

In the existing example, the risk is classified by comparing the potential extent of damage and the effectiveness of defence measures.

The screenshot shows the 'Incidents' software interface. The main window displays details for incident ID 00013873, titled 'Near accident Abakus-Lifter crossed taxiway A340 on APRON'. The description states: 'The captain described the situation as follows: He supposedly first saw the lifter when he crossed taxiway N but expected it to stop in time. When it didn't, he had to evade it, nearly coming of the taxiway with the AC.'

The interface includes several dropdown menus for classification:

- Hazards:** 010. Apron management error
- Causal factors:** 020. Poor visibility conditions
- Consequences:** 010. Evasive Maneuver
- Processes:** (empty)
- Defenses:** (empty)

A risk assessment matrix is displayed at the bottom right, comparing the likelihood of occurrence (rows) against the effectiveness of defence measures (columns). The matrix values are:

	ineffective	minimal	restricted	effectively
catastrophic	500	500	100	50
significantly	100	100	20	10
irrelevant	20	20	4	2
negligible	1	1	1	1

As an option, likelihoods of occurrence can be compared in this matrix instead of defence measures. The consideration of likelihoods of occurrence as operational risks instead of the efficacy of defence measures involves the danger of statistical distortion. Events, to which a high likelihood of occurrence is assigned, may appear many times as IERCs – with a cumulative view the likelihood of occurrence is weighted with multiple factors and makes the statistical analysis difficult.

Operational Risk Management

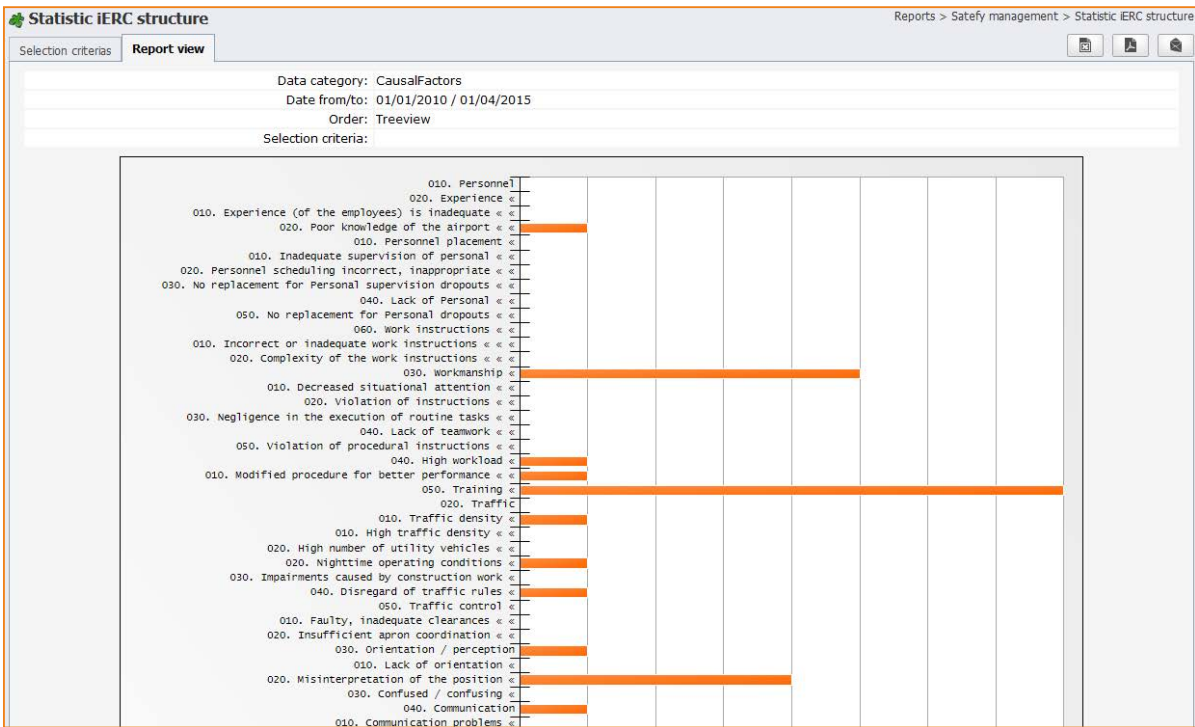
eControl provides universal instruments for the statistical evaluation of safety- relevant incidents. A notification generator is available for the formulation of any database queries. Queries can be carried out so specifically with eControl, that it can be used to prove or disprove explanatory approaches.

In the following example, the Safety Manager checks for confirmation of his assumption that significant aircraft damage (airworthiness = AOG) in the parking position "C" can be traced back to an inappropriate position layout. The assumption should be provable with statistical analysis of the causal factors that have been documented beforehand in the framework of IERCs, provided that layout- specific causal factors can actually be cumulatively verified.

The screenshot displays the 'Statistic iERC structure' web interface. At the top, the breadcrumb navigation reads 'Reports > Business applications > Safety management > Statistic iERC structure'. The interface is divided into several sections:

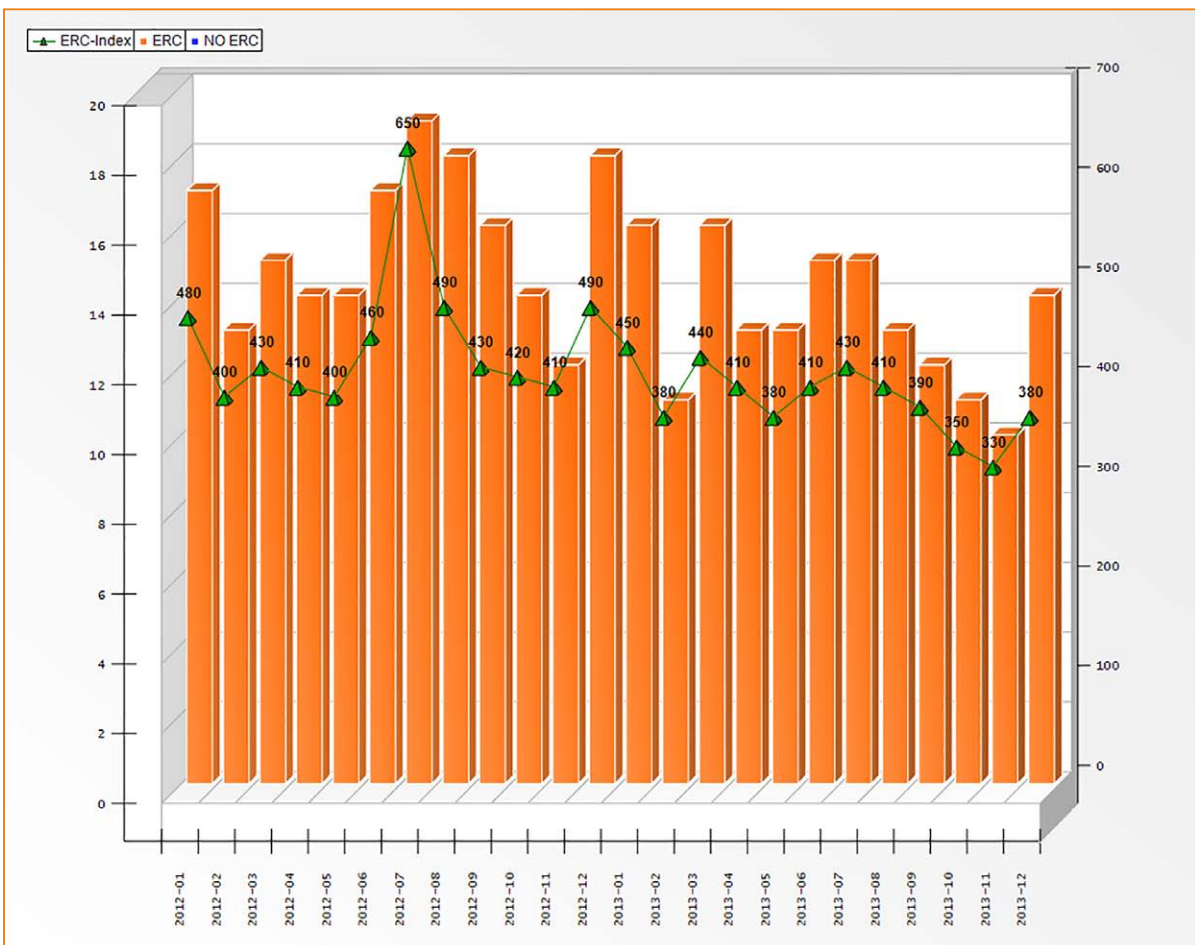
- Selection criteria:** Includes 'Report view' and a settings icon. Fields include 'Data category' (CausalFactors), 'Date from/to' (01/01/2014 / 22/04/2014), 'Order' (Treeview), and 'View option' (Chart (2D)).
- Conditions:** A tabbed interface with 'Conditions' selected. The 'Incident' dropdown is set to 'E Aircraft damage'. Below, two conditions are defined:
 - Condition 1: Airworthiness = AOG
 - Condition 2: Location LIKE CButtons for 'Add', 'Remove', 'AND', 'OR', '()', and arrow controls are present. A 'SQL Syntax' checkmark is visible.
- Save condition:** A section with a 'Global' checkbox and a 'Save' button. The 'Name' field contains 'My Analysis of aircraft damage on C1 to C17'. Other fields include 'Info', 'Category', 'Subcategory', 'Created on/by', and 'Changed on/by'.

eControl provides for the storage of these search criteria in reproducible form, whether privately or publicly and is therefore available to other suitably authorised users. The search criteria can be used for other statistics, safety performance indicators etc., and thereby contribute to the fast and comprehensive investigation of a fact. Freely definable SQL queries may be carried out for exotic problems, provided there are the appropriate user rights.



The above-stated frequency scale is also provided for the analysis of hazards, consequences, processes/systems and defence mechanisms.

The "iERC Trend Analysis" statistic is available for the depiction of the cumulative operational risk, which can be used with a condition generator for any problems.



RiskDB and Operational Risk Assessment

There are many interesting possibilities for Risk Management resulting from the synthesis of the risk database RiskDB and the Initial Event Risk Classifications of the Operational Risk Assessments.

The risk database should make a detailed inventory of the risks and must structure and quantify them. If individual IERCs cannot or cannot suitably be assigned to the identified system components of the risk database RiskDB, it must be checked whether the system components have been displayed in full and that the risks of all relevant scenarios are properly described.

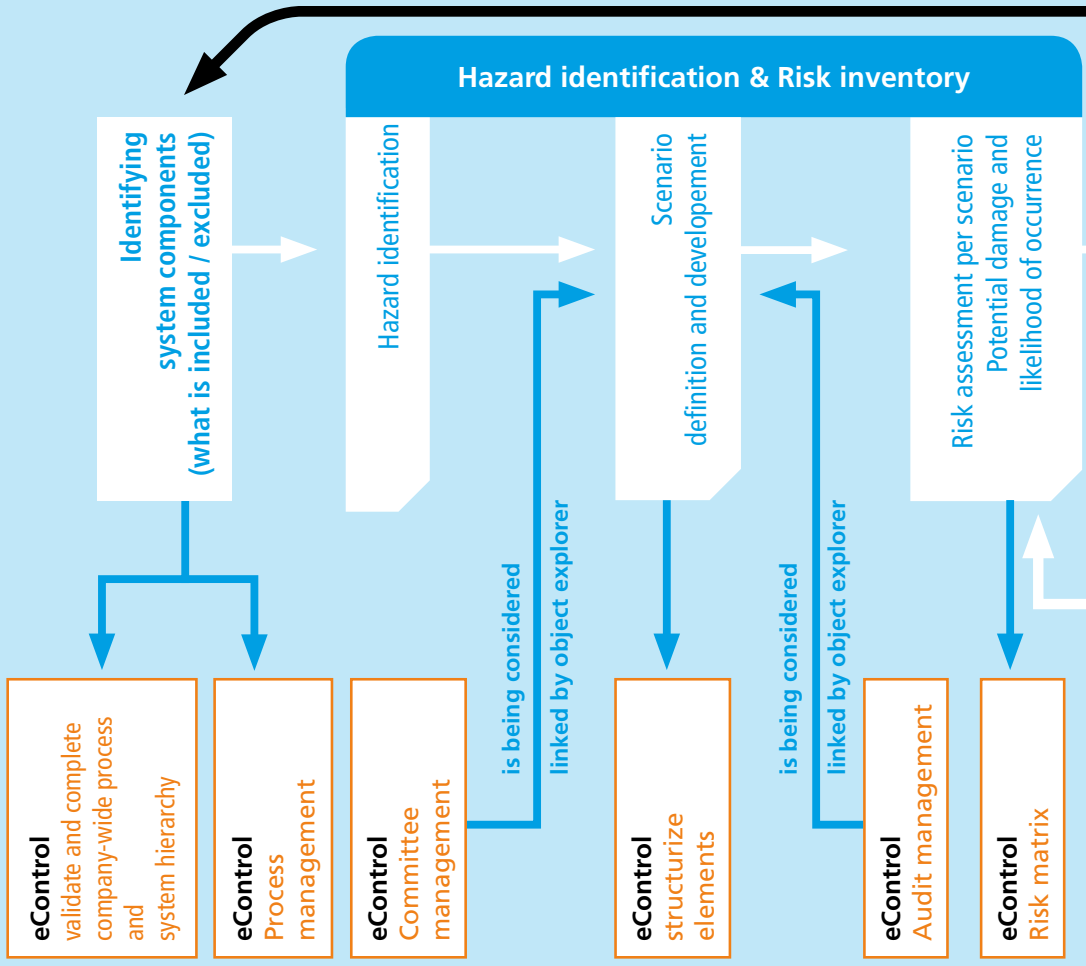
However, if an Initial Event Risk Classification can be appropriately assigned to an individual risk of the RiskDB, this is evidence of an authentic risk database. The individual risk must then be checked with regard to the potential extent of damage of the respective operational risk. A repeated occurrence of IERCs may also suggest a re-evaluation of the likelihood of occurrence.

The classification of risks in the RiskDB risk database and the Initial Event Risk Classifications is not an automated process, rather it is the responsible task of an employee, who is up-to-date with the overall structure of the risk database.

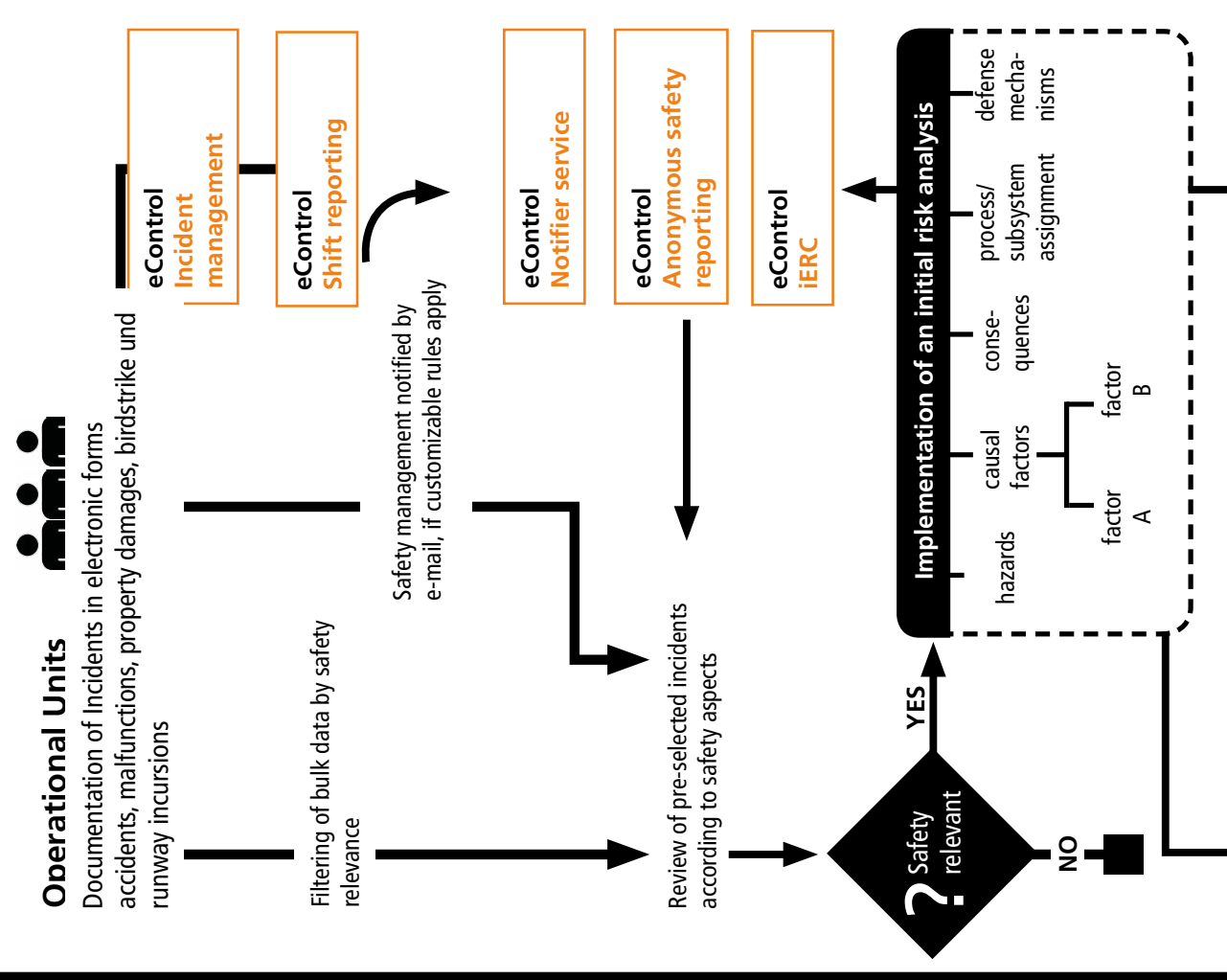
The screenshot shows the RiskDB interface with a breadcrumb trail: Business applications > Safety management > RiskDB. The main window displays a list of IERCs with columns for iERC ID, iERC title, Incident ID, Incident, Date, and Incident title. Below the list, the details for IERC 0000013 are shown, including its title 'Emergency braking AC on APRON' and a description. The interface also includes sections for Hazards, Causal factors, Consequences, Processes, and Defenses. A risk matrix table is visible at the bottom right of the details section.

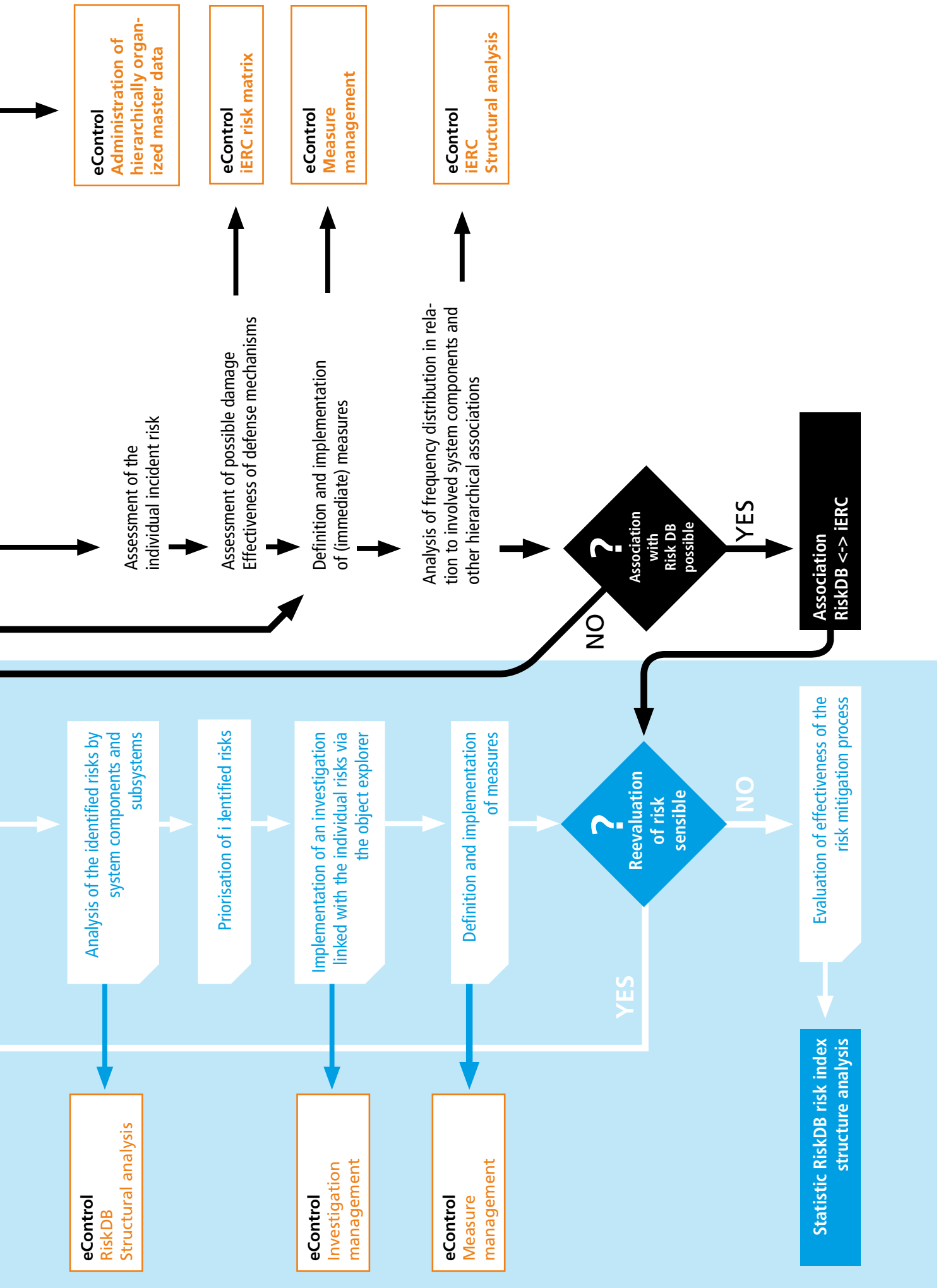
	ineffective	minimal	restricted	effectively
catastrophic	500	500	100	50
significantly	100	100	20	10
irrelevant	20	20	4	2
negligible	1	1	1	1

Risk analysis



Operational risk management





Investigation Management

Detection and evaluation of risks by means of investigations

The investigation of incidents creates a sound understanding of the connections and facilitates an assessment with regard to quality, safety or other investigation-forming aspects. In an investigation, causal connections, dangers and risks are analysed with regard to forming effective preventative and corrective measures.

Investigation Management makes great demands on the persons involved, who must have both profound understanding of operational processes and a methodically sound approach.

With eControl Investigation Management investigations can be performed rapidly, easily and productively.

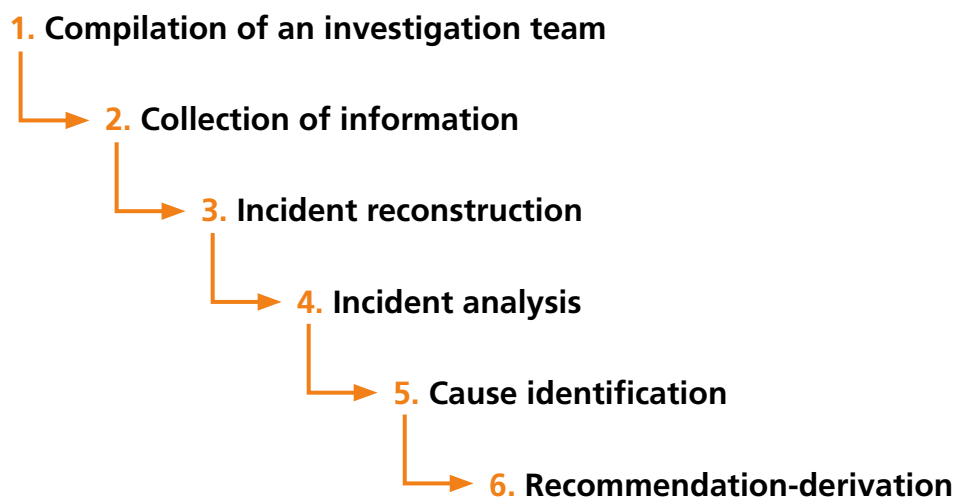
Arrangement of investigations

Investigations often involve staff resources to a significant extent, can stretch over a long period and change their investigation status continually until they reach their final conclusion. eControl provides time management for all investigations, detects overdue investigations that have exceeded the target dates and ensures the best possible allocation of resources of the departments involved.

Structure of investigations

- as standardised as possible, as individual as necessary

The use of standardised investigation steps helps the methodically sound performance of investigations. The proposal list is client-specifically programmable, and the investigation steps listed below can frequently be used:



Steps for the respective investigation can be amended, omitted/removed from the proposal list at any time.

The provision of investigation steps means that the investigation progress is measurable and that the overall status of all current investigations is identifiable and considerably simplifies the arrangement of resources and times.

The screenshot shows the 'Investigations' application window. The title bar reads 'Business applications > Safety management > Investigations'. The main menu includes 'Investigation', 'Rights', '6 Investigation steps', 'Documents', 'Activities', and 'Object explorer'. Below the menu, there is a breadcrumb trail: 'New investigation • Almost accident A340 with Abaskus lifter • Opening at 30/03/2015'. A '+ Add' button and a 'Show deactivated records' checkbox are visible. The main content area displays a table of investigation steps:

Sort.	Name of investigation step	State of invest. step	Active
	Caption of investigation step	Target date	Actual date
0100	Composition team	completed	<input checked="" type="checkbox"/>
			01/04/2015
0200	Information collection	completed	<input checked="" type="checkbox"/>
			01/04/2015
	Responsible: Espenhain, Frank	Execution: Rohmann, Pascal	
	Resp. dep.:	Deputy execution:	
	Requirement: Questioning of the pilot and co-pilot as well as the lifter's driver. Additional information on the driver and potentially other similar events at the same position has to be gathered to assess if this was a one time occurrence or whether there is a connection to other incidents.		
	Result: Questioning did not produce any contradictions. The driver said that couldn't see the aircraft because he was glared by the sunlight. There were neither prior occurrences concerning the pilot nor any similar incidents prior.		
	Internal:		
	Created on/by:		
	Changed on/by:		
0300	Incident reconstruction	Unfinished	<input checked="" type="checkbox"/>
	Date set for 7. April		
	Responsible: Espenhain, Frank	Execution: Rohmann, Pascal	
	Resp. dep.:	Deputy execution:	
	Requirement: Incident needs to be reenacted and possible inconsistencies concerning the statements have to be highlighted.		
	Result:		

Organisation and Teamwork

An eControl investigation is in the form of an electronic file, whereby all information in eControl can be viewed and maintained – the data is available to all authorised persons in real time.

The authorised persons are the respective investigation team, which can be compiled for each individual investigation. Staff involved in the investigation can only specifically be entitled to inspect or in addition to process the investigation information.

The group of people can be established intuitively with just a few clicks of the mouse for an investigation, without any administrator intervention, but instead by each member of staff authorised to take charge of the respective investigation.

Documentation and Reporting

The investigation and the individual investigation steps including associated documents are comprehensively documented in eControl. Staff responsibilities, times and progress information can also be administrated for each investigation step.

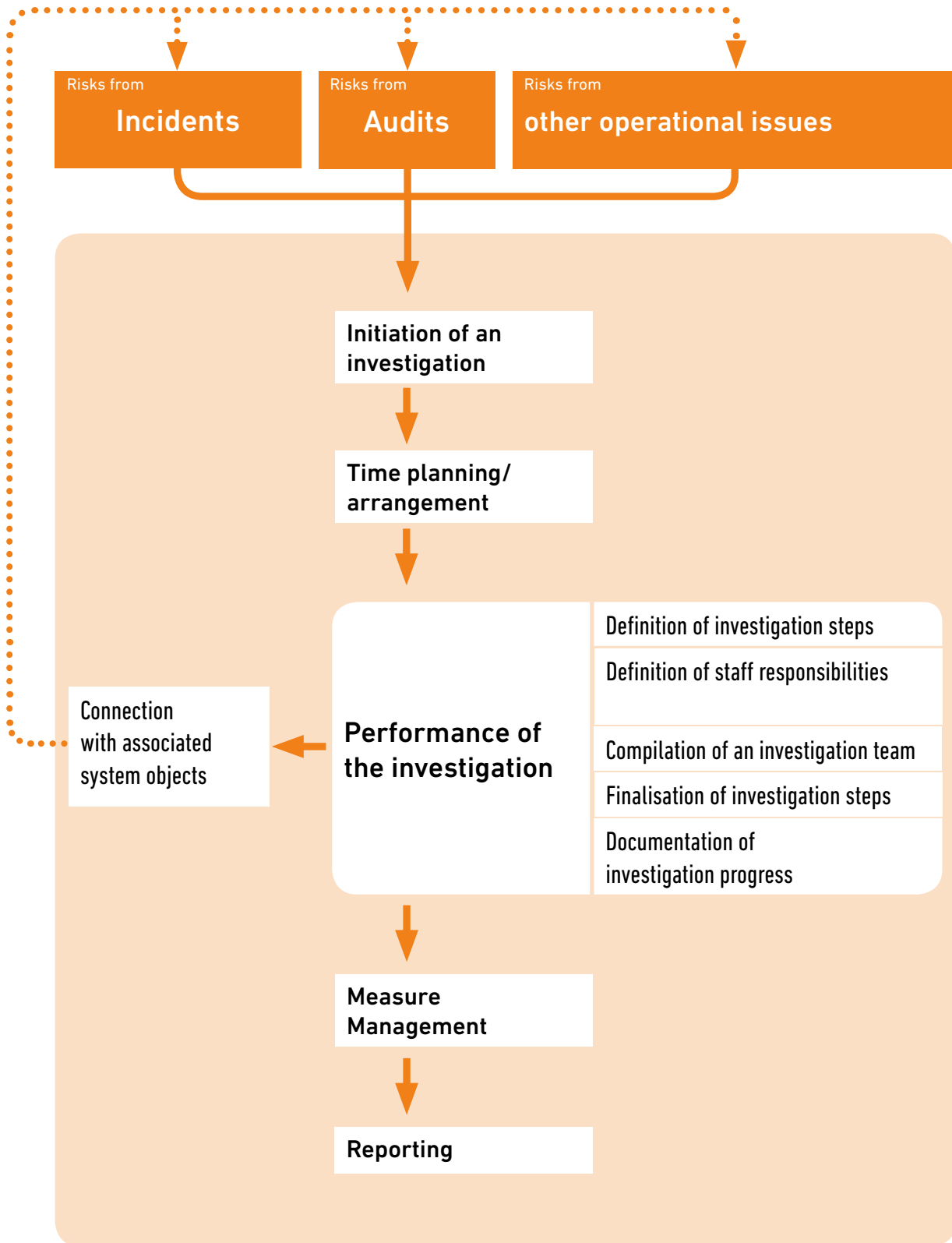
Investigation reports with variable levels of detail, summaries and statistical analyses can be called up at any time at the click of a button for each investigation and circulated by e-mail.

According to the eControl system standard, all changes to investigations are documented completely and lawfully.

Measure Management and Object Connections

The derivation of corrective and preventative measures is often regarded as part of the results of an investigation. The integration of measure management in investigation management provides for a seamless integration of the planning, implementation and monitoring of measures.

eControl presents the measures of all objects associated with the particular investigation and in this way helps to avoid intersecting or opposed measures.



Committee Management

Management of expert panels and organisation of meetings

Committees are expert panels, which support the activities of the departments in a number of ways. Committees serve as a forum for technical discussions and as a means of communication between the departments and the other organisational units involved such as third-party companies, authorities etc...

The number of committees to be established depends on the complexity of the organisation and the subjects to be discussed. The individual committees should be clearly defined and outlined, whereby the members, the subject areas to be discussed as well as their organisational process must be stipulated for the respective committee.

The eControl Committee Management provides instruments in order to support the committee members as much as possible with their organisational activities and in communication.

Planning and Organisation of Committee Meetings

Committee meetings of a committee normally take place at regular intervals and in addition as required. eControl supports the user in the planning, carrying out and follow-up or recording of committee meetings.

Administration of Participants

eControl enables the storage of participant lists, which are suggested as standard at committee meetings. This can include system users, contacts or any third parties. The list of meeting participants can be changed for each meeting as required.

Communication

Communication with the committee participants is simplified with mailshots. Irrespective of the status of a committee meeting, invitations with a meeting agenda, drafts of meeting minutes, approved minutes and any other work progress can be sent at the click of a button.

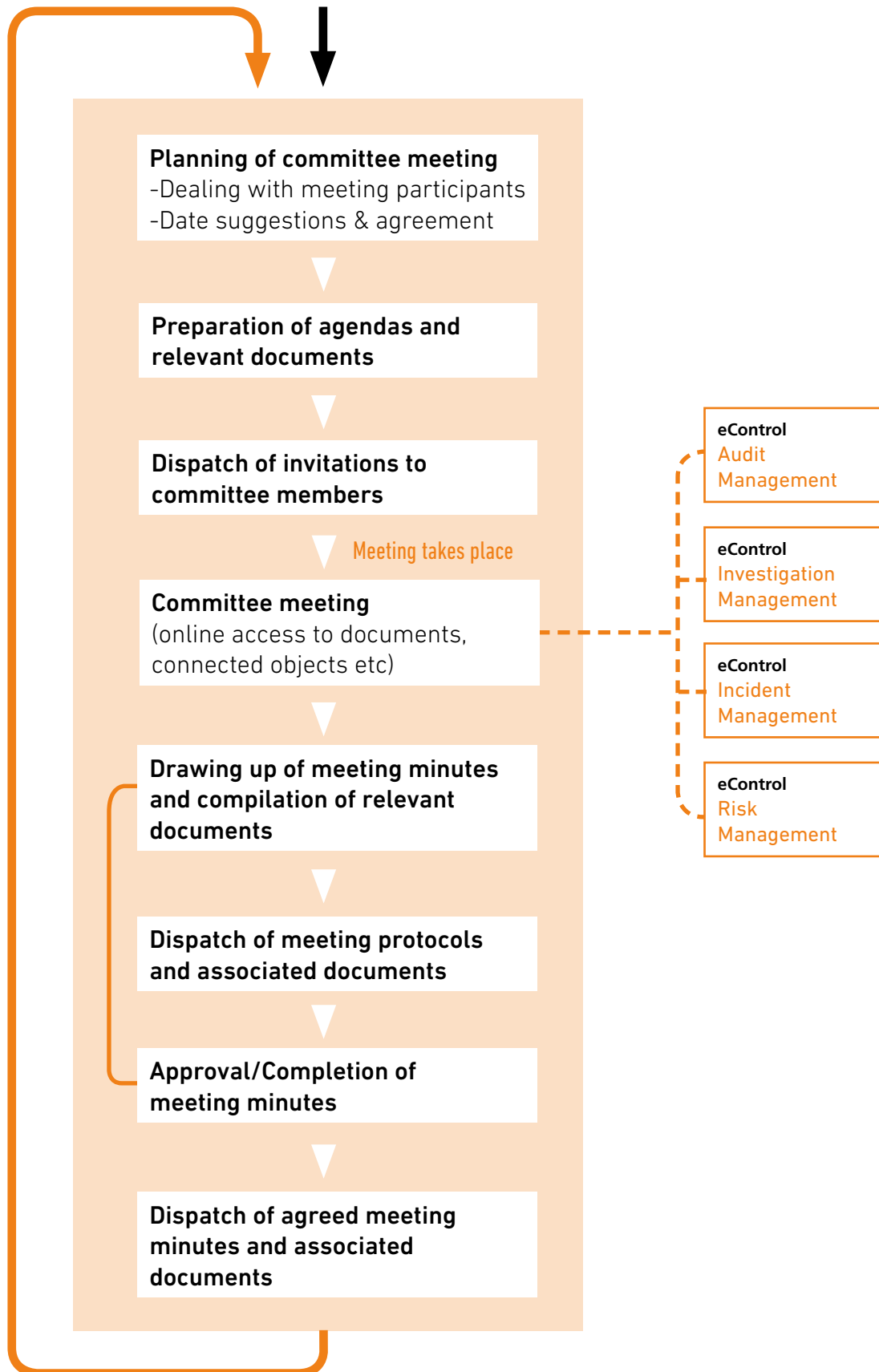
Meeting Archive

Authorised persons can easily see information on committee meetings including additional data such as documents, measures and object connections easily in eControl. eControl guarantees the committee participants standard reading access to the respective committee meetings. The authorisation to inspect and maintain committee meetings can be adapted at any time.



Definition of committee

▶ Assignment of (permanent) committee members



Audit Management

Planning, structuring and evaluation of audits

With increasing demands in the area of conformity to standards and closer interlocking of the process chains on globalised markets, the number and depth of audits is steadily increasing. eControl Audit Management is gaining momentum and simplifies all activities from planning and implementation to the monitoring of corrective measures.

A solution for internal, external and supplier audits

eControl sets up external audits through authorities, certifying bodies or clients. Internal audits or self-inspections for the control and maintenance of conformity to standards can also be administered, irrespective of whether this is done by one's own staff or by competent third parties. eControl Audit Management can also be used for the organisation of supplier audits.

Division of Labour and Data Protection

eControl Audit Management is designed in such a way that different teams and departments can use this module independently of one another. It is stipulated individually for each audit, which staff or groups obtain reading or writing access to the audit information. In this way the system only contains supplier audits from the perspective of the purchasing department, while safety management staff have exclusive access to the safety audits if necessary.

eControl guarantees that audits are only available to the group of people who have been explicitly authorised beforehand. In order to encourage the division of labour and to involve the staff concerned as closely as possible in the audit processing and implementation of corrective measures, this group of people can be stipulated for every audit as required.

Audit Planning

The respective departments plan and monitor the audit events relevant to them using eControl. In addition to time arrangement, the audit status is tracked from planning, through preparation, implementation and follow-up to completion. Audit planning also includes organisational and staff conditions such as the documentation of the audit team.

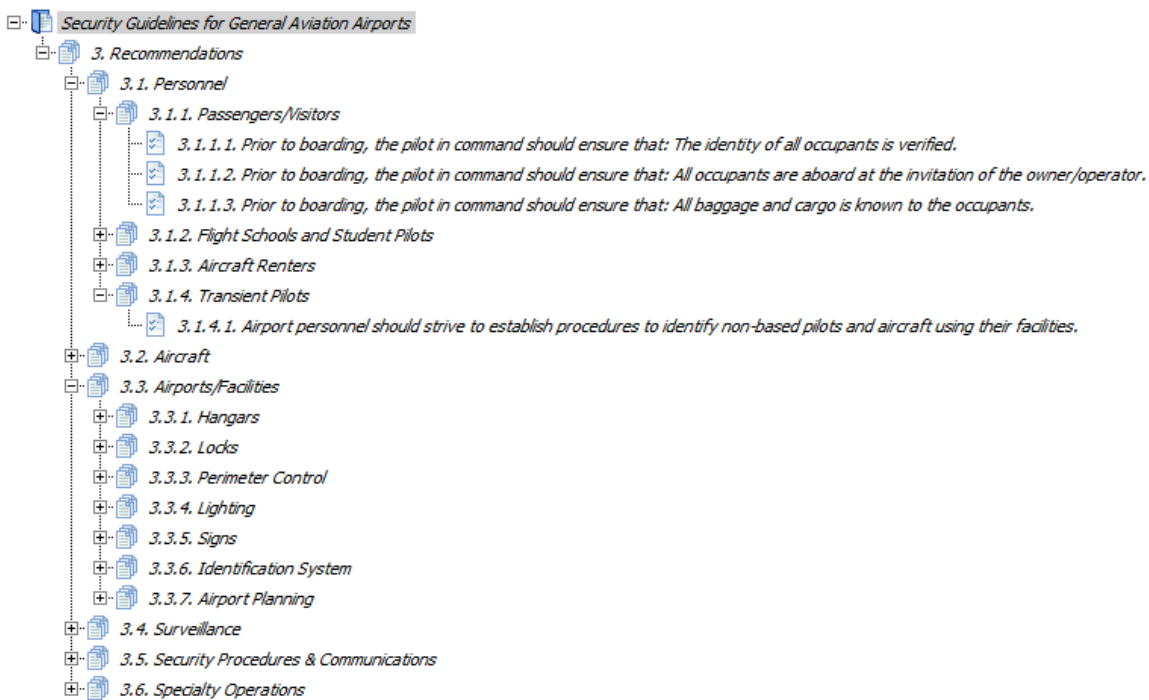
Measure Management

Cause analysis, the introduction of corrective and preventative measures and their monitoring is an integral component of eControl audit management. Measures can be defined for every element of the audit structure, both for the inspection points and the overall classification points.




Measures are processed smoothly according to eControl system standard. Measure Management has report generators at its disposal, in order to be able to evaluate the audit-specific measures overall, according to processing progress or other criteria.

Audit Catalogues

The provision of audit catalogues simplifies the work process with regard to recurring content. eControl investigates hierarchically structured audit catalogues, whereby different components such as structural levels, data capture fields and inspection points are available. The catalogues can be adopted completely or partially for conducting audits and combined with one another.



Detailed information on the underlying standard and the resulting verification and implementation regulations can be provided for every inspection point as required. This information helps the team of auditors with both processing on screen and conducting audits. eControl provides the possibility of entering audit results into previously printed out check or inspection lists, in which the respective acceptance criteria are listed in order to simplify the work process.

Annex 14 Vol I - Aerodrome Design and Operations		  	
ID:	9900000163	Active <input checked="" type="checkbox"/>	
Suspension:	3.4. Runway strips		
Type:	Checkpoint	Req./Rec.?:	Recommendation
Structure:	3.4.8.	Factor:	
Title:	That portion of a strip of an instrument runway within a distance of at least: — 75 m where the code number is 3 or 4, and — 40 m where the code number is 1 or 2, from the centre line of the runway and its extended centre line should provide a graded area for aeroplanes which the runway is intended to serve in the event of an aeroplane running off the runway.		
Explanation:			
Int. info:			
Ref. rules:	ICAO	Ref.-ID:	
Ref. explanation:	Guidance on grading of a greater area of a strip including a precision approach runway where the code number is 3 or 4 is given in Attachment A, Section 8.		

Inspection Points

Each inspection point compares eControl acceptance criteria and test results. In addition to a general compliance assessment for audits conducted independently, the extent of deviation, the frequency and the actual effect of the deviations can be documented. Traffic lights illustrations clearly show the evaluations made.

Additional data fields are available for the storage of detailed assessments on the respective inspection point. As many documents as required can be appended to each inspection point.

The screenshot shows the 'Audits' application window. The title bar indicates 'Business applications > Audit management > Audits'. The main window has a breadcrumb trail: 'Audit 00000001 • Annex 14 Vol 1 - 2013'. Below this, there are tabs for 'Audit results' (1/1 Documents, 1/9 Activities). The 'Audit results' tab is active, showing details for ID: 69. The form is divided into several sections: 'Type' (Checkpoint), 'Title' (2.1.3. Protection of electronic aeronautical data...), 'Explanation', 'Int. info', 'Ref. rules' (ICAO), 'Info', 'Category A-D', 'Applicable' (checked), 'Checked' (checked), 'Accept' (unchecked), 'Date' (01/04/2015), 'Compliance' (low, with a green traffic light indicator), 'Info' (CRC algorithm is currently being implemented...), 'Deviation degree' (medium, with a yellow traffic light indicator), 'Deviation frequency', 'Deviation consequence', 'Ext. rating' (MINOR), 'Ext. explanation Text' (Level of implementation of SARP less protective or partially implemented or not implemented), and 'Ext. info'.

Reports and Statistics

eControl provides many different reports and statistics in order to generate the saved audit information specifically for the respective recipients. In this connection a differentiation can be made between which information should be compiled to which extent. A database can be printed out in full for a follow-up by Safety Management or reduced for an external investigator to individual findings, its compliance assessments and the subsequently initiated countermeasures.

eControl also has audit statistics at its disposal – for example for the comparison of audits with one another or the outline of audit information as a Management Summary.

Our services

for the software life cycle

We are with you during the conception and commissioning of the safety management system; we are able to support our customers because of our experience, which extends over corporate boundaries, and our in-depth knowledge of the various software functions.

The installation of the system can be mainly handled by the customer independently, or by the manufacturer, or in collaboration with management consultants.

Our consultants, project partners and our development department look after eControl SMS just as much as you want – from the initial idea to servicing.

Needs analysis

If desired, our consultants can carry out gap analyses which compare already installed systems and regulatory requirements to the particular demands specific to the company in question.

Training

We offer training courses and workshops for the safety management, in order to ensure smooth running of the entire system. In customer-specific in-house seminars, our consultants consider the specific circumstances and requirements of the company in question and make it easier to locate potential for increased productivity and optimization.

Commissioning & data migration

The introduction of a safety management system generally links to other procedures, not always supported by software. Our consultants make sure that digital or digitizable data archives can be imported with as little fuss as possible and with an eye to the reporting date.

Interfaces

Interface requirements can as a rule be incorporated into the service programmes which form part of the delivery package for the system. If necessary our consultants can help with the integration of firewalls, gateways, backup systems, virus scanners and other system elements.

Industrial software development and readiness for use

eControl software is under continuous development and improvement. We offer updates as required, from software patches to complete upgrades.

Our hotline is available to customers to deal with anything from system documentation to technical questions. We offer service in both English and German, as standard.

Database management

Arconda Systems AG is available, as an experienced Oracle partner company, to cover all your needs in relation to Oracle databases.

This support extends from help with system problems to the provision of conceptual management and high availability. eControl is an official Oracle database product. We also offer special Oracle user licences for eControl, at reduced cost.

Customizing

eControl is a branch-specific modularized standard software with extensive opportunities for altering parameters. As a general rule, the product can be installed without the need for specific software-technical adaptations. Should individual software functions be required, as manufacturers we can of course fulfil this need. Our consultants focus on an objective, universal optimization of the range of functions, through which in the past, the most varied individual adjustments were embedded in the system standard. In this way, we ensure continuous development, while keeping customization and servicing costs to the minimum.

eControl

Process Management | Operation Management | Safety Management | Audit Management | Qualification Management | Compliance Management | Environmental Bird Control Management

Customers:



International customers:

