ECCAIRS WORKSHOP

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Port Moresby, Papua New Guinea
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Goal

To provide an understanding about the relationship between the investigation of occurrences and the safety information management, as part of the SMS and SSP.

Guidelines

- ADREP – ICAO Annex 13
- Safety Data Management – ICAO Annex 19
- Safety Performance Indicators (SPIs)
- ECCAIRS in practice
- Safety Studies/Reports –What to consider?

ICAO – ADREP

- ADREP – Accident Incident Data Reporting System
- A database of accidents and serious incidents reported to ICAO by States
- Maintained in the Air Navigation Bureau
- Contains 43 000 plus occurrences from 1970 to present

ICAO – ADREP

- 1974 – AIG Divisional Meeting defining the need for data on accident and incident.
- 1976 – ADREP implementation, adapting the NTSB structure.
- 1976 – ADREP requirements included in Annex 13 fourth edition.
- 1987 – New parameters (up to 5 events and ATA 100)
- 2000 – ADREP 2000 taxonomy development (SHEL)

ICAO – Annex 13 and ADREP

- The Annex 13 “Standards and Recommended Practices on Aircraft Accident and Incident Investigation” defines responsiblities for contracting States with regard to the notification during the course of an investigation.

ICAO – Annex 13 and ADREP

TO	Notification	ADREP		Final Report
		Preliminary Report	Data Report	
State of Registry	Accidents and serious incidents – All aircraft types	Aircraft accidents Above 2.250 kg Airworthiness or issues of interest, below or equal to 2,250 kg		Accidents and incidents of all aircraft types
State of Operator				
State of Design				
State of Manufacturer				
Other States (Information, fatalities, interest)				
ICAO	Accidents and serious incidents Above 2,250 kg or turbojet	Accidents above 2,250 kg	Accidents >2,250 kg Incidents >5,700 kg	Accidents and incidents above 5,700 kg

ICAO – Annex 13 and ADREP

- Channels for reporting
  - List of Accident Investigation Authorities.
    - http://www.icao.int/safety/AIA/Pages/default.aspx
  - ICAO – AIG Section
    - http://www.icao.int/safety/AirNavigation/AIG/Pages/default.aspx
    - AIGinbox@icao.int

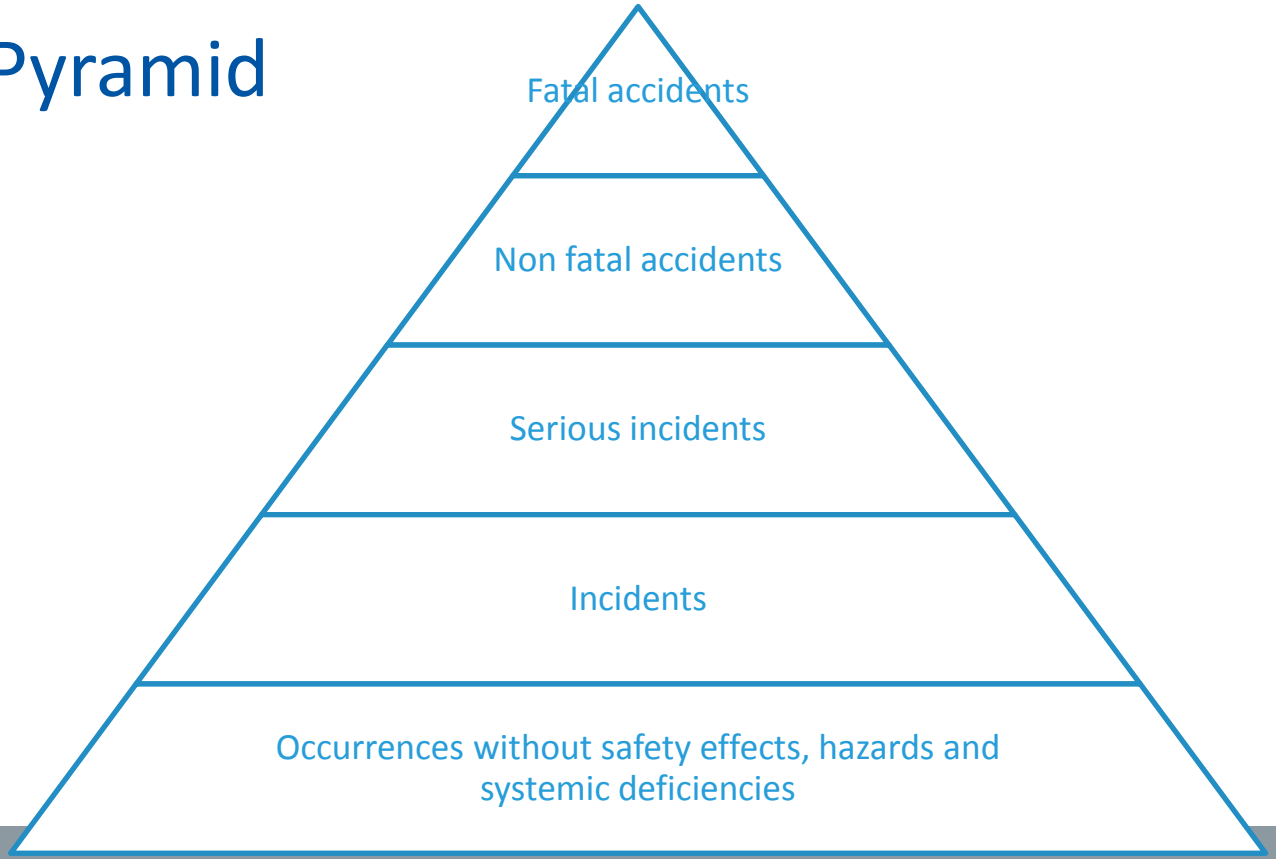
ICAO – Annex 19

- Safety
- Safety performance
- Safety performance indicator

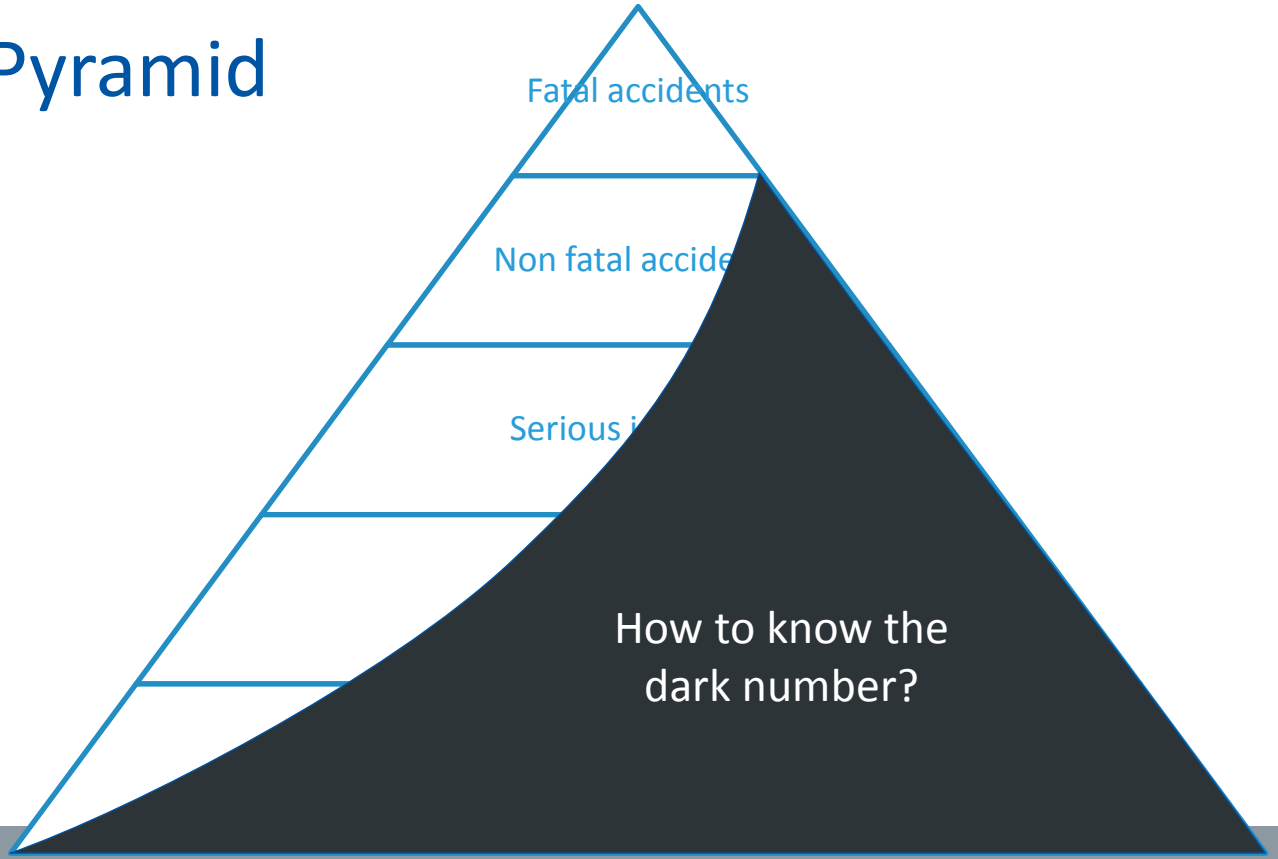
ICAO – Annex 19

- Each State shall establish an SSP, to reach an acceptable level of civil aviation safety performance
- As part of its SSP, each State shall require service providers under its authority to implement an SMS

Safety Pyramid

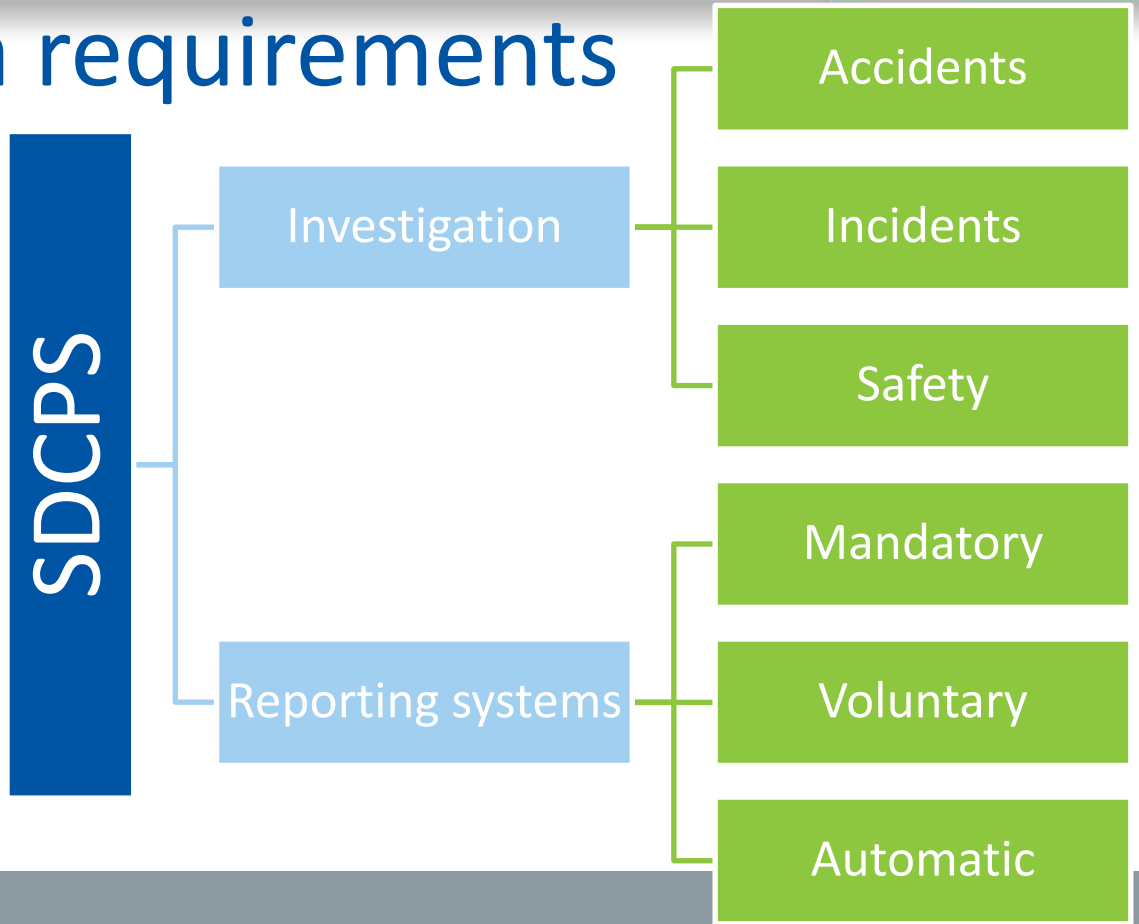


Safety Pyramid



Different sources of information

Annex 19 – Data requirements

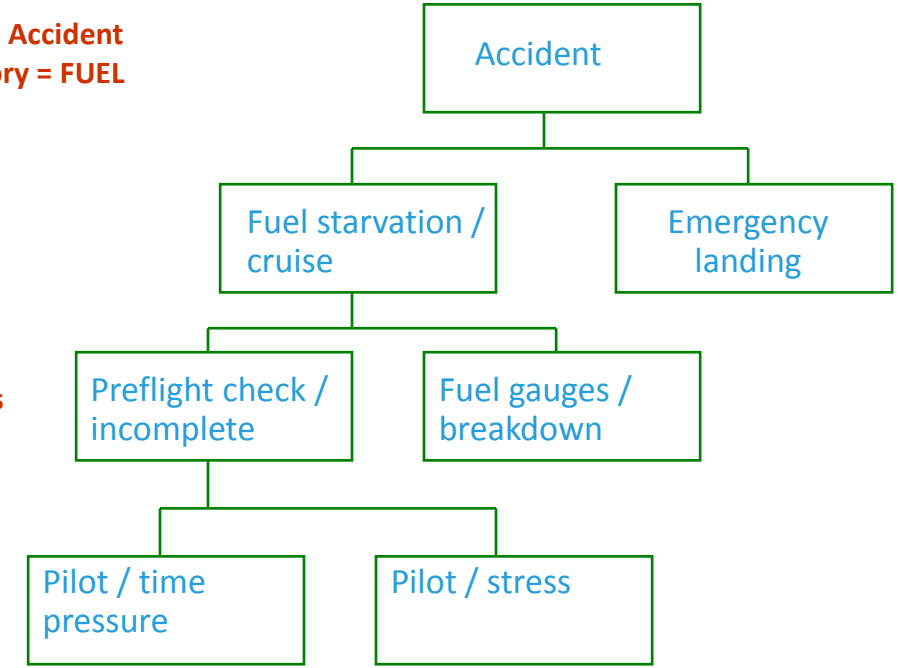


Example

- During cruise flight, there was an engine shutdown (single engine airplane). Consequentially, the pilot made a forced landing on unprepared ground, resulting in the aircraft being destroyed. There were no injuries.
- The investigation revealed that the pilot had not carried out a complete preflight check, without noticing that he did not have enough fuel for the flight. In addition, the mechanisms of the fuel gauges were broken on the inside and did not show the amount of fuel on board.
- The pilot stated that, on his way to the airfield, previous to the flight, he get stuck on traffic, but he could not continue delaying his boss, so he asked to prepare the plane by telephone and had to perform the pre-flight quickly.

Example

Occurrence class = Accident
Occurrence category = FUEL

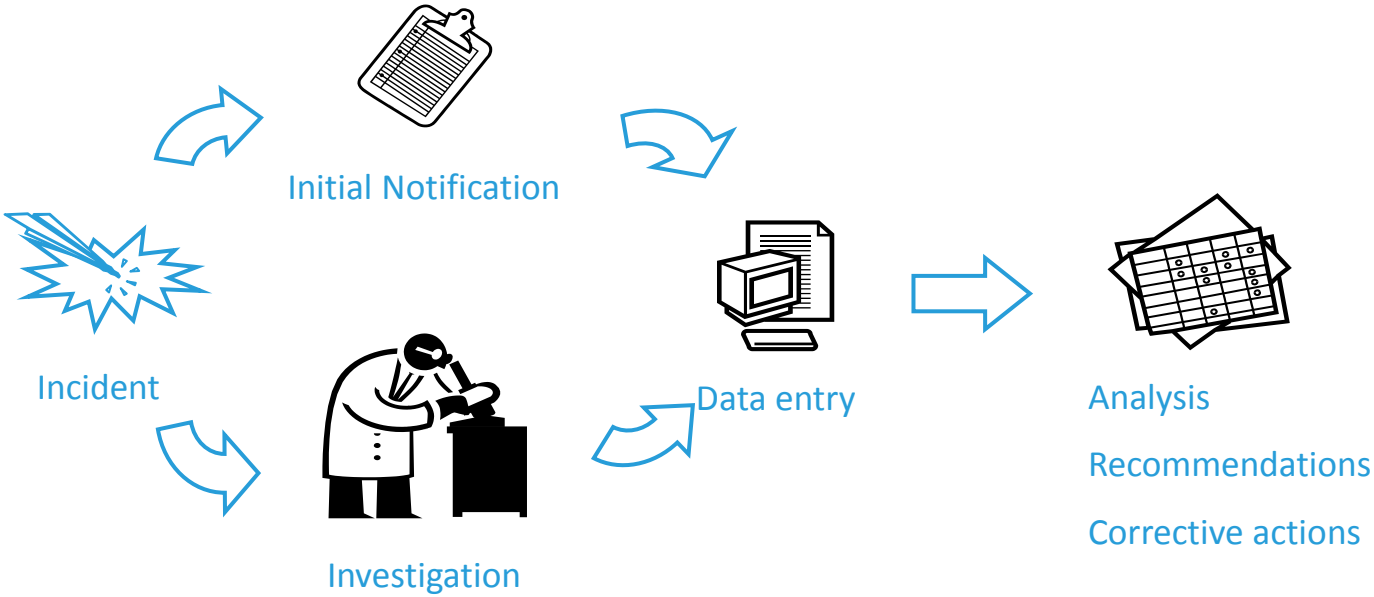


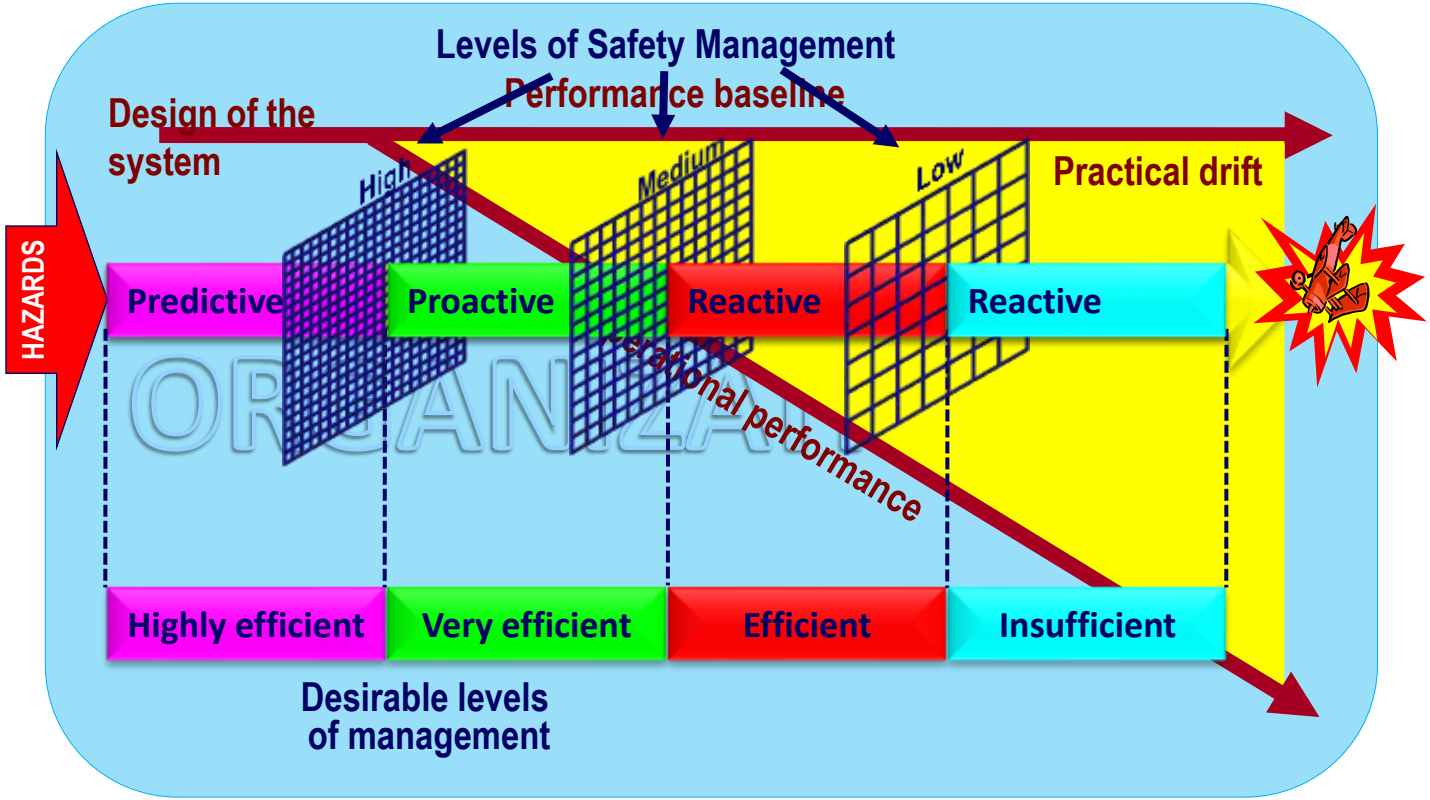
Example

Events

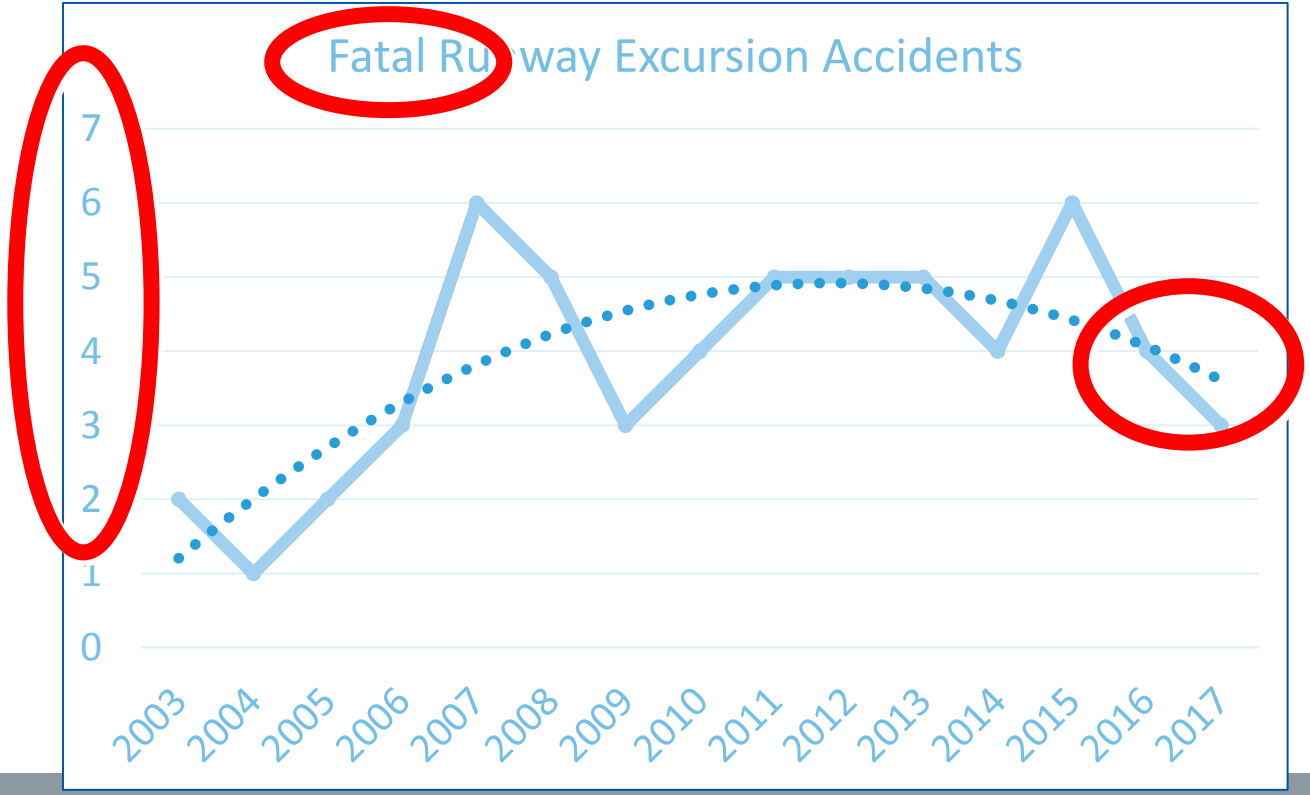
- Reciprocating engine - fuel starvation related event, during Cruise
  - Pre-flight check: Incomplete
    - Pilot, Time pressure factors:
    - Pilot, Impairment-stress:
  - 2840 Fuel indicating system: Broke

Typical Workflow

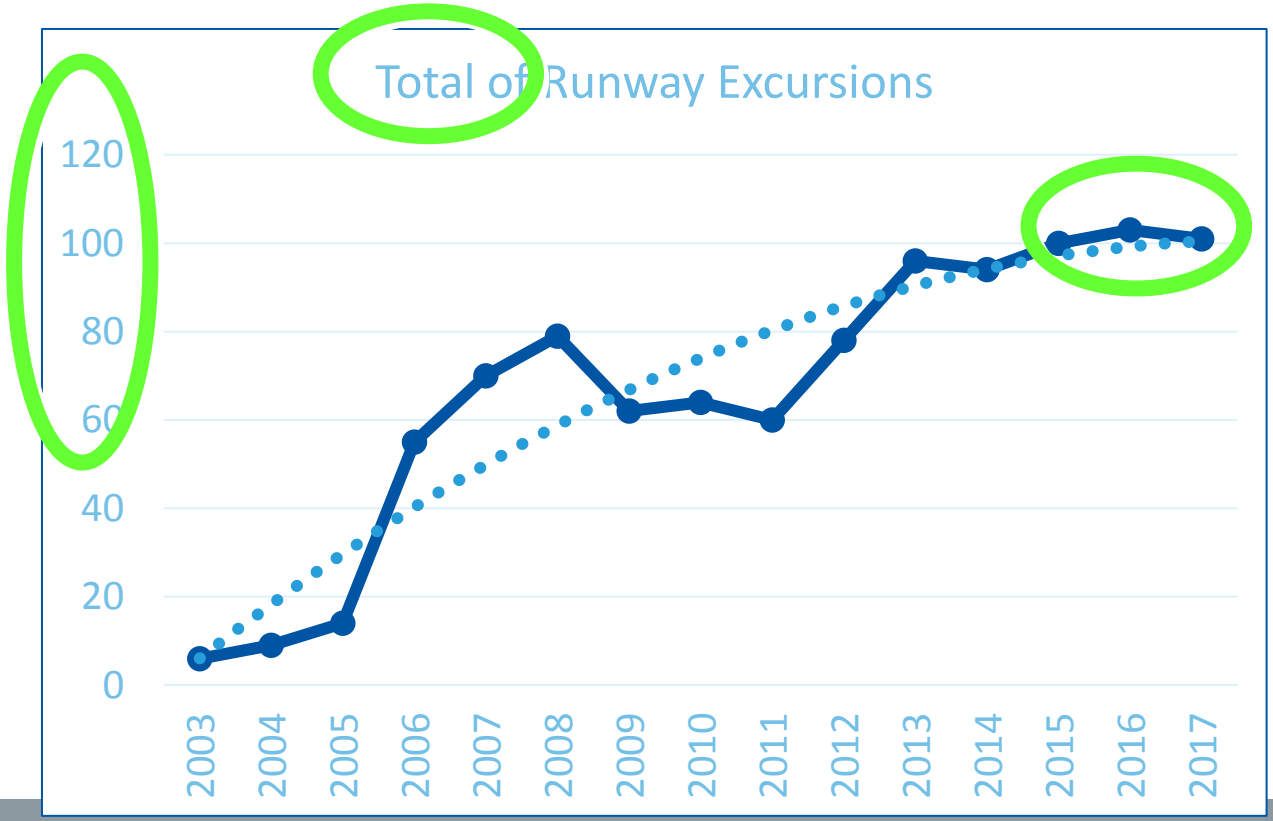



Levels of Safety Management
Performance baseline
Design of the system
Practical drift
HAZARDS
High
Medium
Low
Predictive
Proactive
Reactive
Reactive
Operational performance
Highly efficient
Very efficient
Efficient
Insufficient
Desirable levels of management

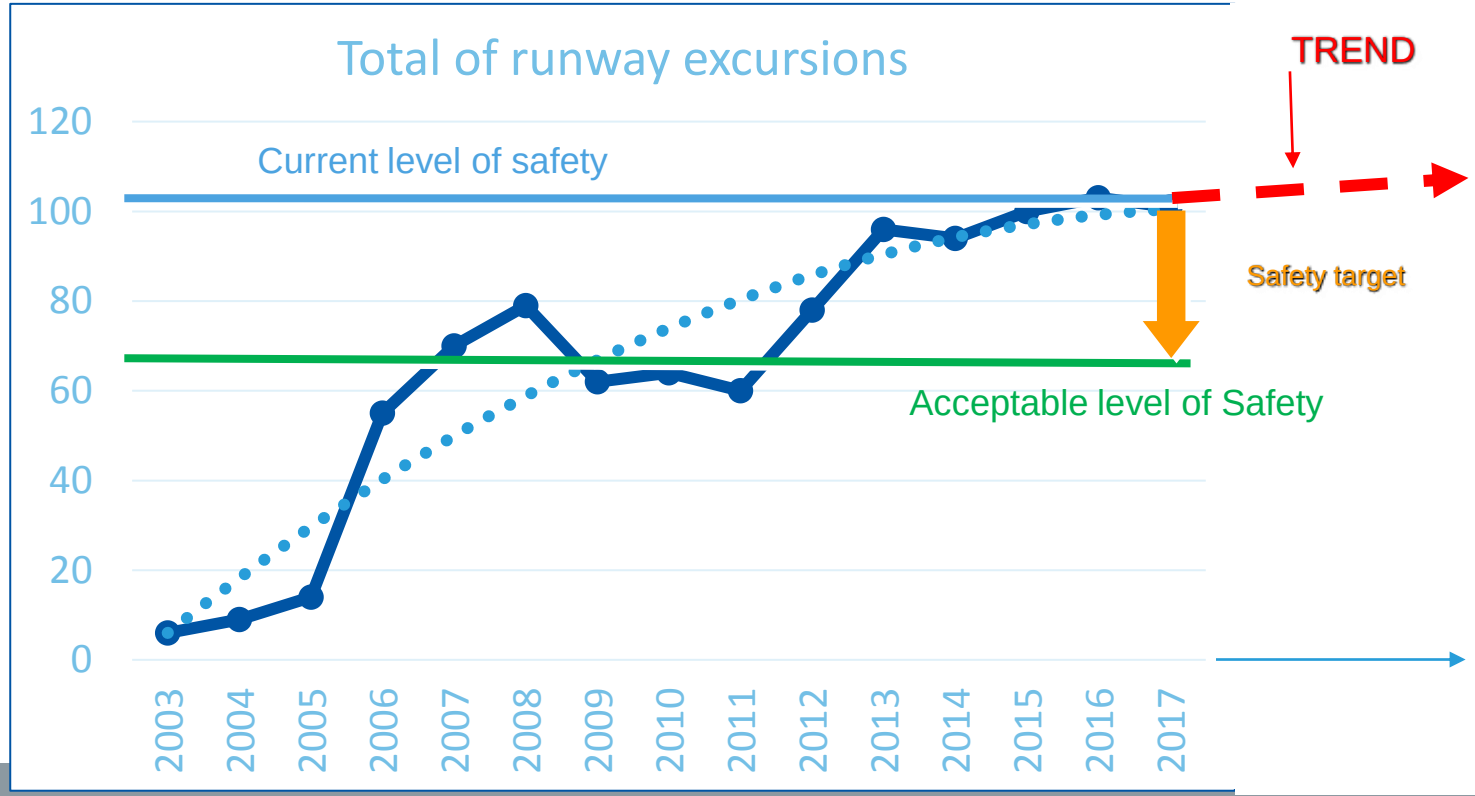
Safety Performance Indicator



Safety Performance Indicator

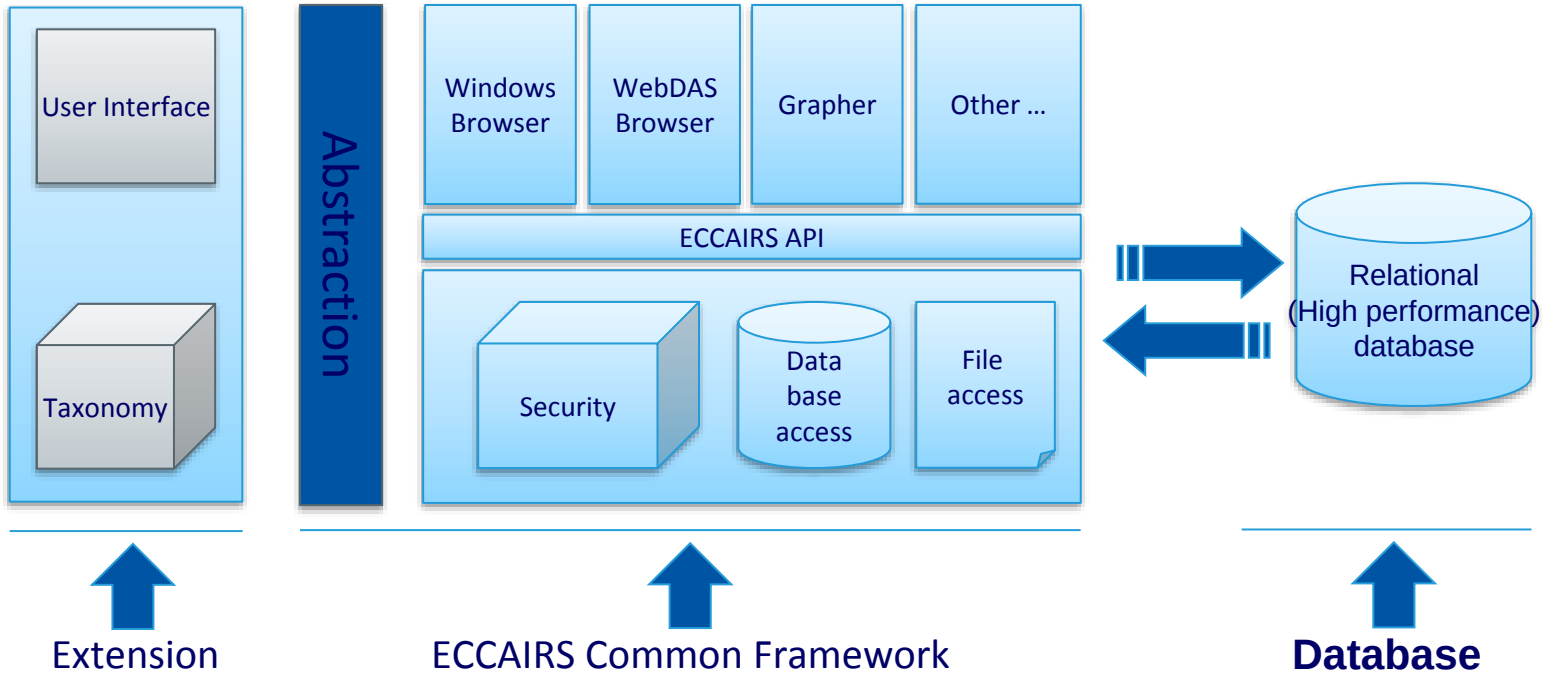


Improving performance



ECCAIRS ARCHITECTURE

Software Architecture in Pictures



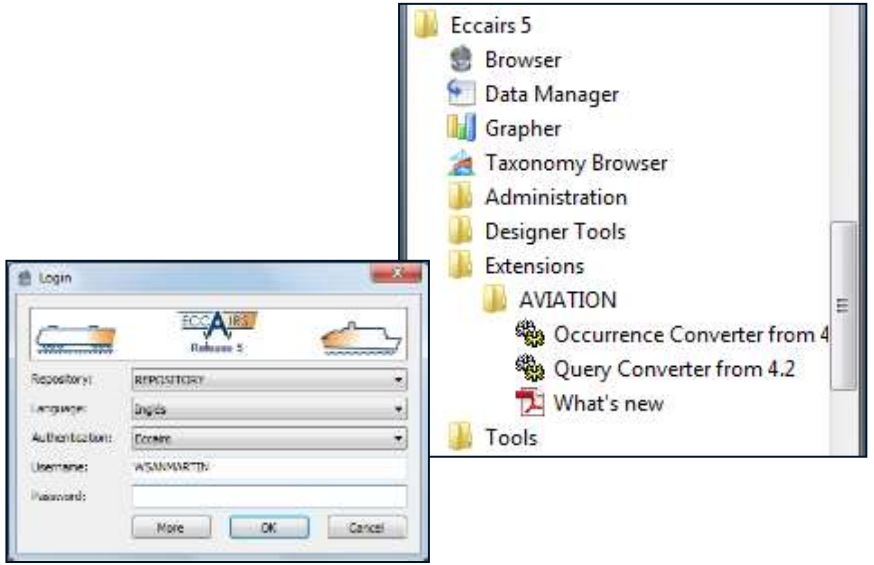
INTRO TO ECCAIRS

Basic concepts

- ECCAIRS System
- Occurrence
- Topics, Sections, Attributes and Views
- Taxonomy
- Query
- Query library and category
- Occurrence file

ECCAIRS System

- Collects and exchanges occurrences data
- Can be used in different domains of transportation
- Security and encryption protocols



Ocurrence

- It is the basic record.
- Described by the ECCAIRS taxonomy.
- Stored in databases and occurrence files.
- Accesible through queries built by users.

File
File number 1848WS — Occurrence: Intial notification
Responsible: Chile - DPA

Categories

Headline
Fuel starvation immediately after takeoff

When
Local date 12-02-2018 12:50
UTC date 12-02-2018 15:50

Where
State/area of: South America - Chile
Location name: Región Metropolitana

Weather
Weather: VMC
Light conditions: Daylight

Injuries

	Fatal	Serious	Minor	None	Unknown	Total
Total on ground						
Total on aircraft				2		2
Grand total				2		2

Severity
Occurrence: Accident
Injury level: None
Highest damage: Substantial
Third party: Yes - Yes - by impact

Narrative
The pilot was intending to fly one hour, flying over an area close to the airfield, and also, practicing some touch-and-go manoeuvers. After approximately 40 minutes of flight, and while performing a takeoff in one of the touch-and-go practices, the engine stopped and the pilot performed a forced landing in a field nearby.
The aircraft suffered substantial damage, but no injuries were reported.
The investigative actions conducted on site revealed there was approximately 1 US gal of fuel on each tank, which was below the 2.5 US gal established as minimum usable.

Events
1. 7300 Reciprocating Engine Fuel Starvation, Initial climb
Fuel consumption calculation: Not made

Add/remove/select aircraft
CESSNA - 172 - UNDESIGNATED SERIES

Aircraft and operation
Manufacturer/ CESSNA - 172 - UNDESIGNATED SERIES
Operator
Operation type: Non-Commercial Operations - Pleasure - Local
State of: Chile
Aircraft
Schedule type
Operator type: Private owner

Flight
Last departure: Chile SCCV : Curacavi
Planned: Chile SCCV : Curacavi
Call sign
Duration of: 1 Hour(s)
Flight phase: Take-off
Occ. on ground: No
ICAO: None

Injuries on aircraft

	Fatal	Serious	Minor	None	Unknown	Total
Crew total				1		1
Passengers				1		1

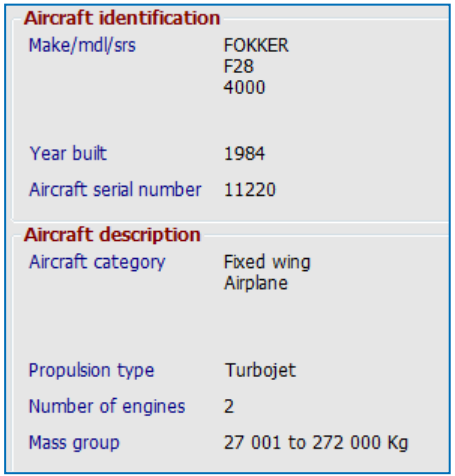
Topics, sections, atributes and views

- Data is collected in hundreds of different **ATTRIBUTES**.
- Each **ATTRIBUTE** has one or more **VALUES** associated.

Make/mdl/srs	FOKKER F28 4000
Year built	1984
Aircraft serial number	11220

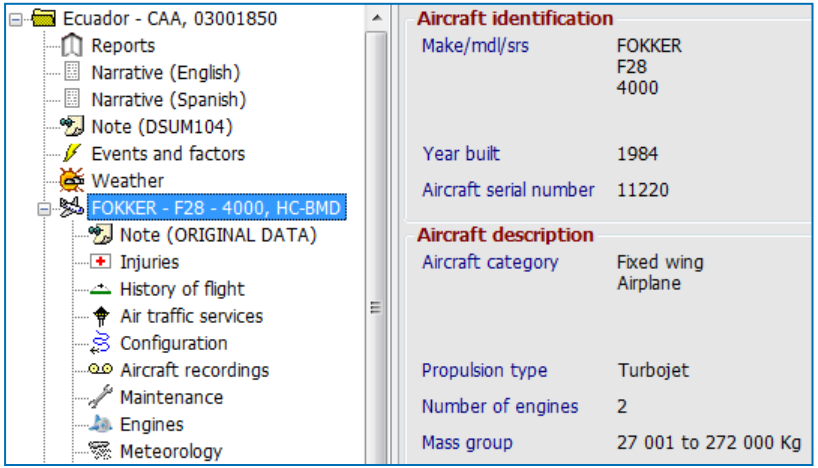
Topics, sections, atributes and views

- **SECTIONS** are groups of **ATTRIBUTES** organized for visualization and edition purposes.



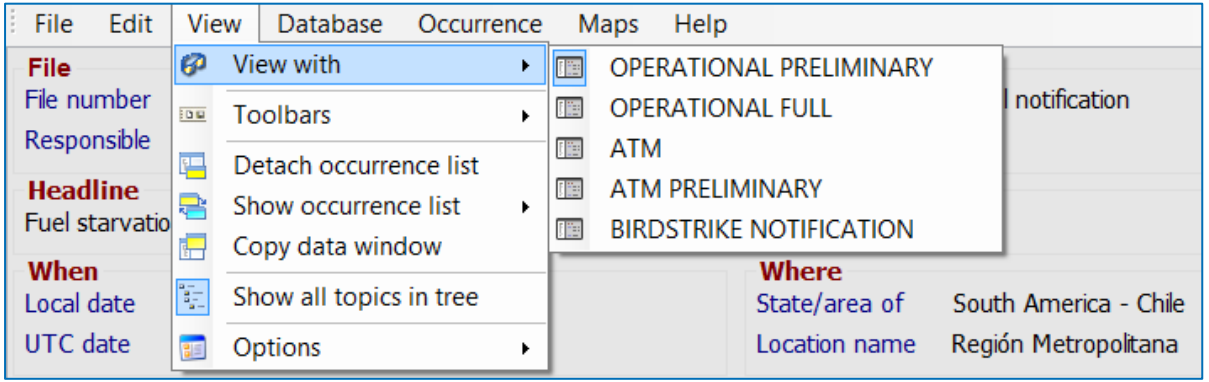
Topics, sections, atributes and views

- **TOPICS** are groups of **SECTIONS** organized for browsing.



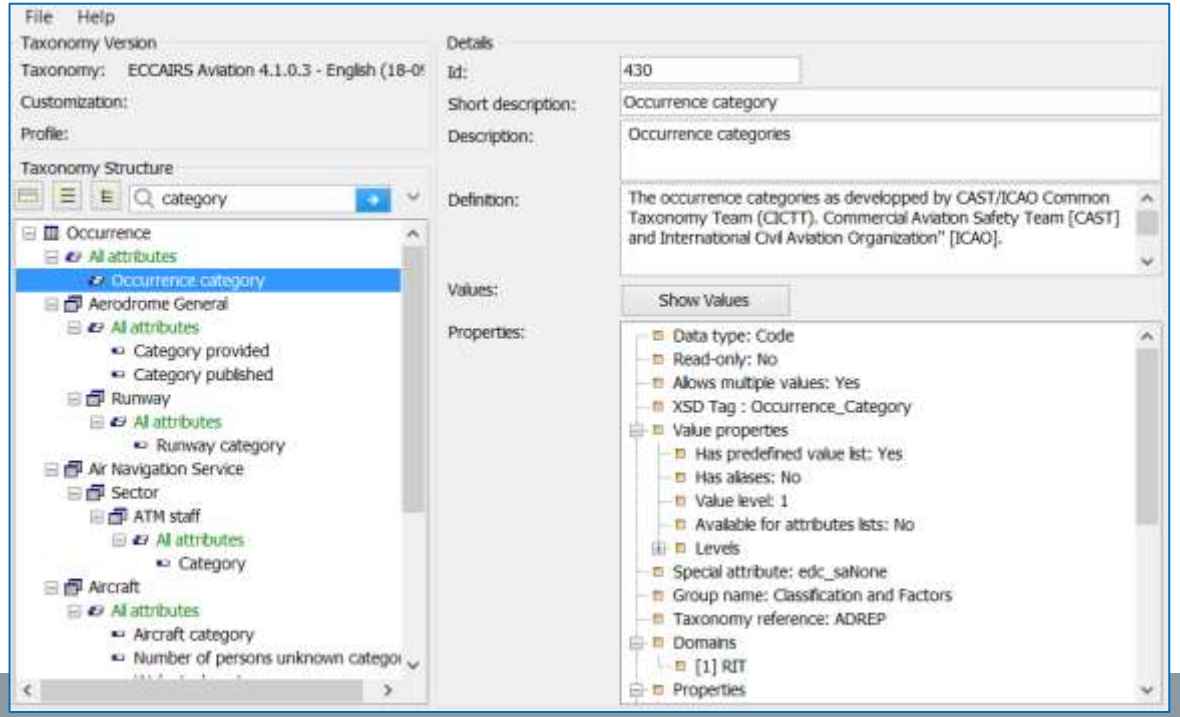
Topics, sections, atributes and views

- **VIEWS** are groups of **TOPICS** allowing user interaction.
- **VIEWS** change the way of presenting data.



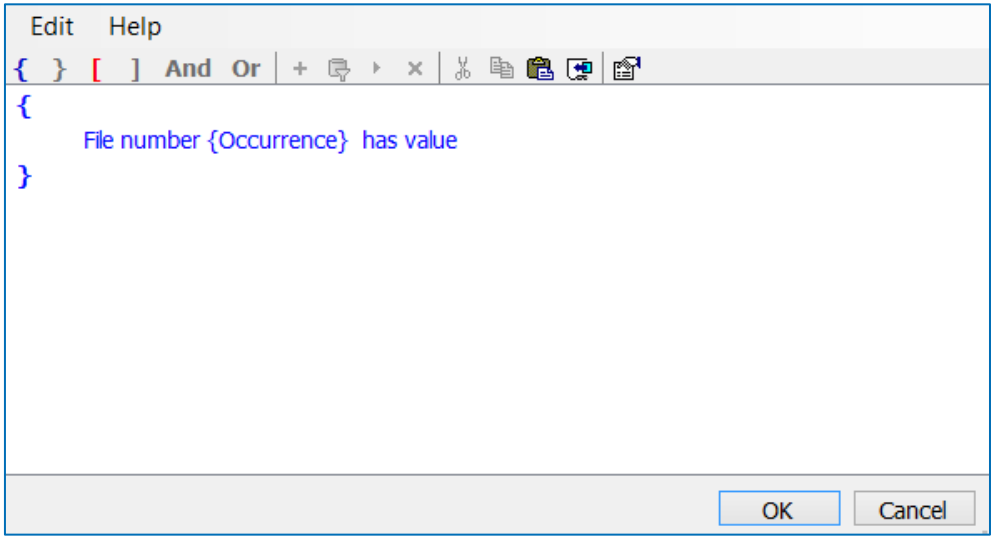
Taxonomy

- It is an information catalogue
- Describes how to code data to enter it into ECCAIRS



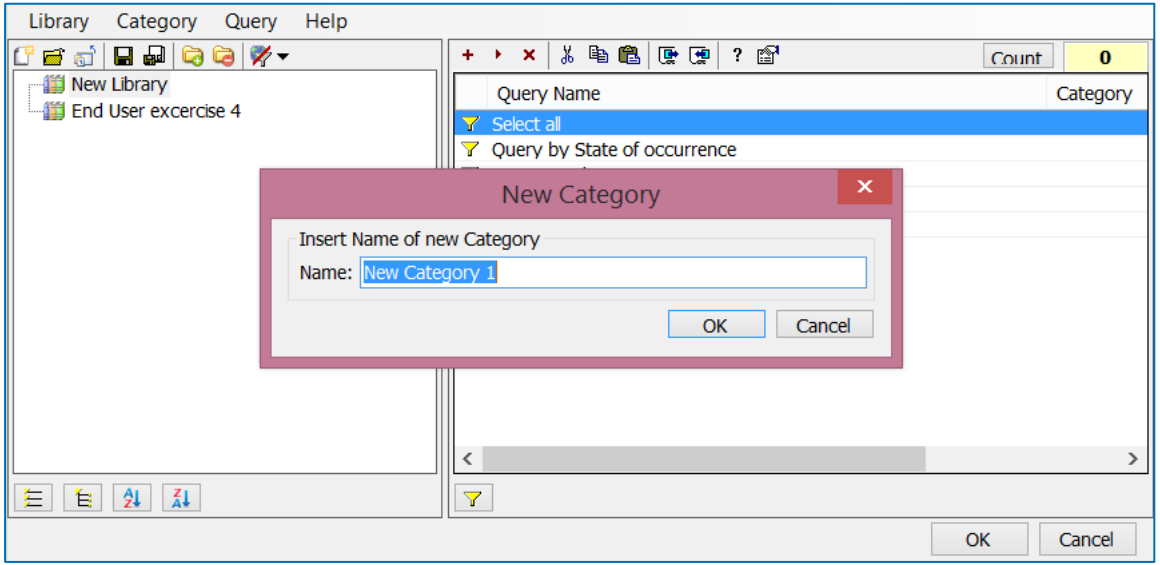
Query

- Allows to recover occurrences from the database.
- Has to be built by the user.
- It is stored in a query database.



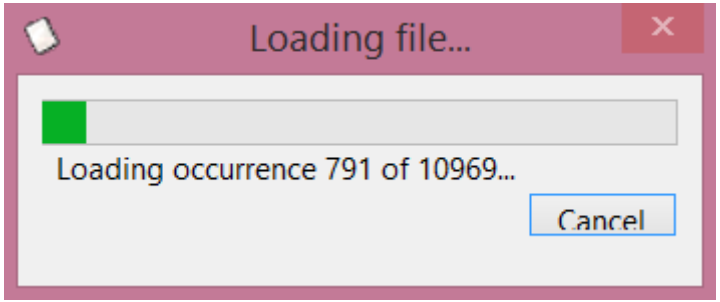
Query library and category

- The **LIBRARY** is where **QUERIES** are stored.
- In a **LIBRARY**, it is posible to create **CATEGORIES**, in order to organize the **QUERIES** in a logical manner.



Occurrence file

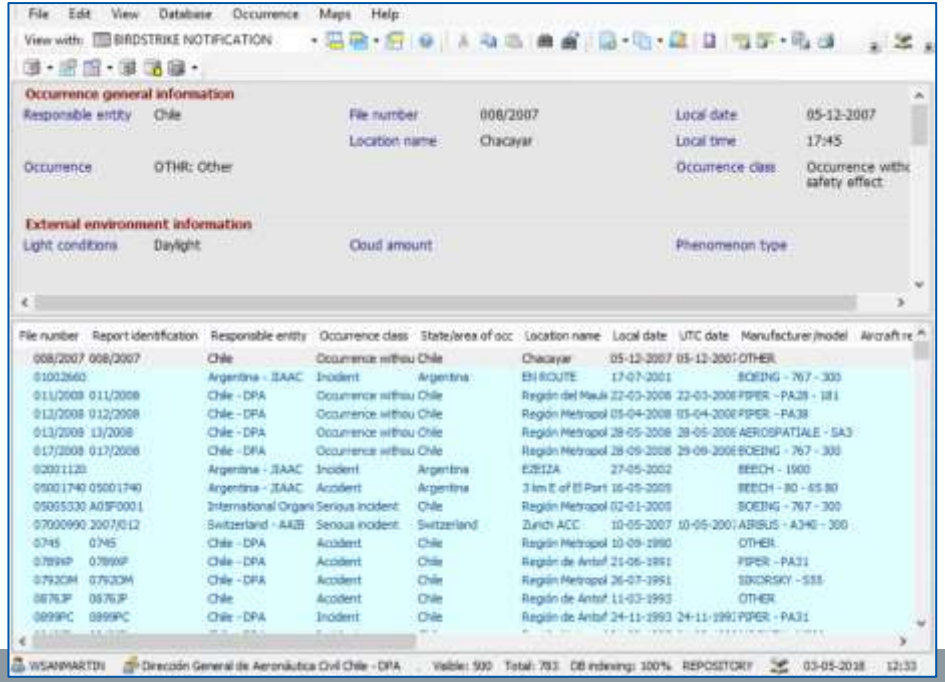
- **FILES** group occurrences for exchanging purposes.
- An occurrence weights between 50 to 200Kb (+ attachments).
- Open a file **DOES NOT** send it automatically to the database.



BROWSER

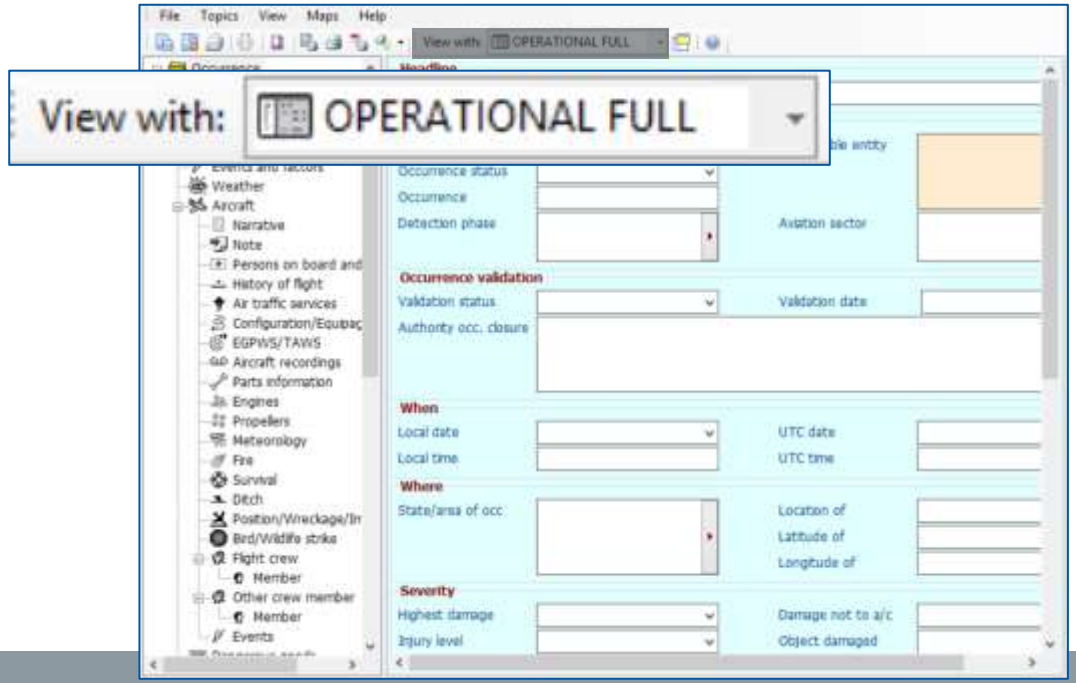
The Browser

- Is the tool for entering, modifying, visualizing and printing occurrences.



How to create/edit occurrences

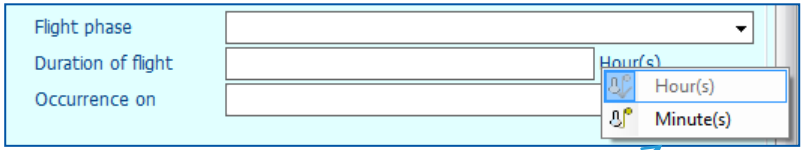
- Using the edit window
- Choosing the corresponding view
  - Operational Preliminary
  - Operational Full
  - Birdstrike notification
  - ATM
  - …



How to create/edit occurrences

There are several ways to enter a value:

1. Text or free value

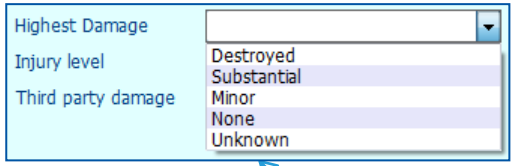


Measurment units can also be modified

How to create/edit occurrences

There are several ways to enter a value:

1. Text or free value
2. Predefined value

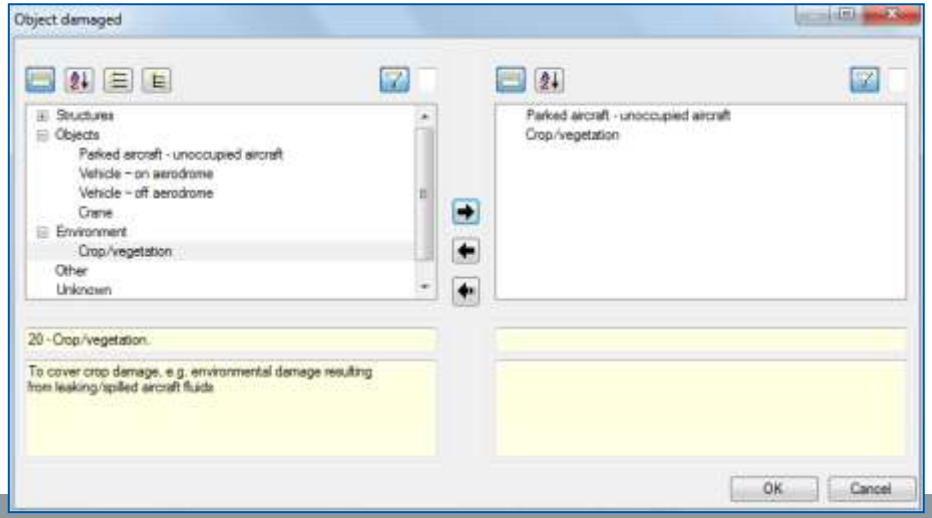


The value is chosen from a deployable list

How to create/edit occurrences

There are several ways to enter a value:

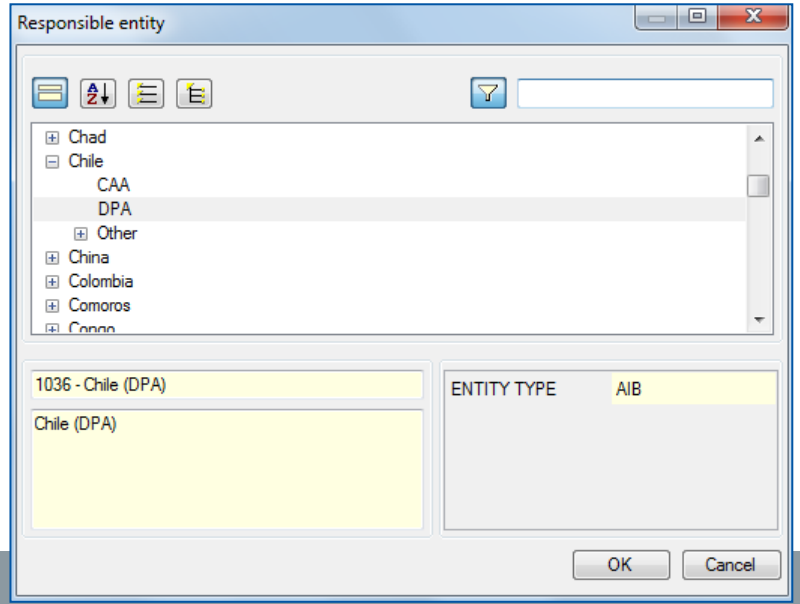
1. Text or free value
2. Predefined value
3. Multiple predefined value



How to create/edit occurrences

There are several ways to enter a value:

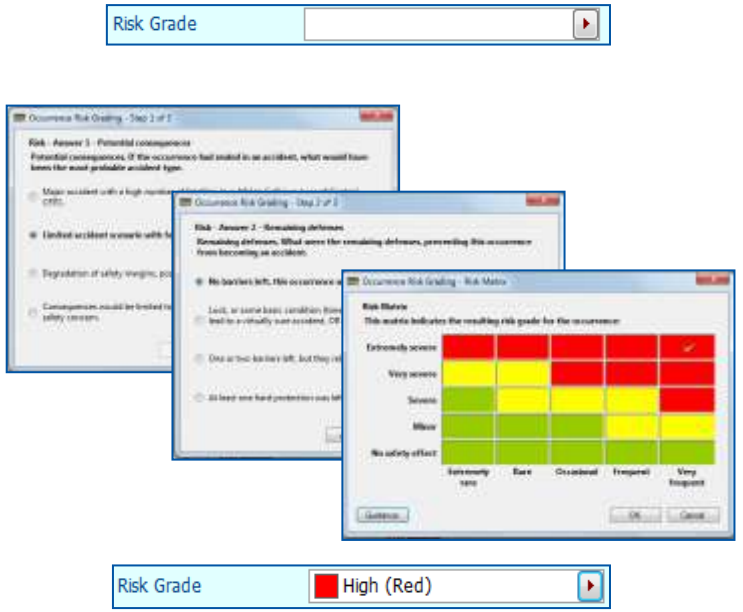
1. Text or free value
2. Predefined value
3. Multiple predefined value
4. Multiple levels value



How to create/edit occurrences

There are several ways to enter a value:

1. Text or free value
2. Predefined value
3. Multiple predefined value
4. Multiple levels value
5. Values guided by an assistant



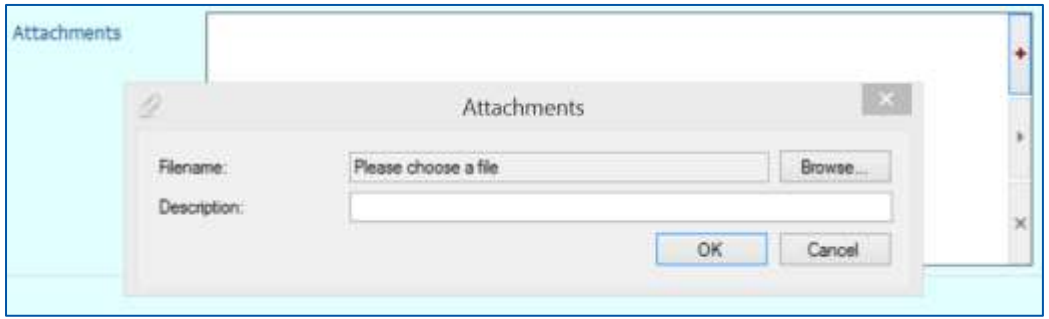
How to create/edit occurrences

There are several ways to enter a value:

1. Text or free value
2. Predefined value
3. Multiple predefined value
4. Multiple levels value
5. Values guided by an assistant
6. Calendars

How to create/edit occurrences

It is posible to insert attached files.



NOTIFICATIONS USING ECCAIRS

Notifications

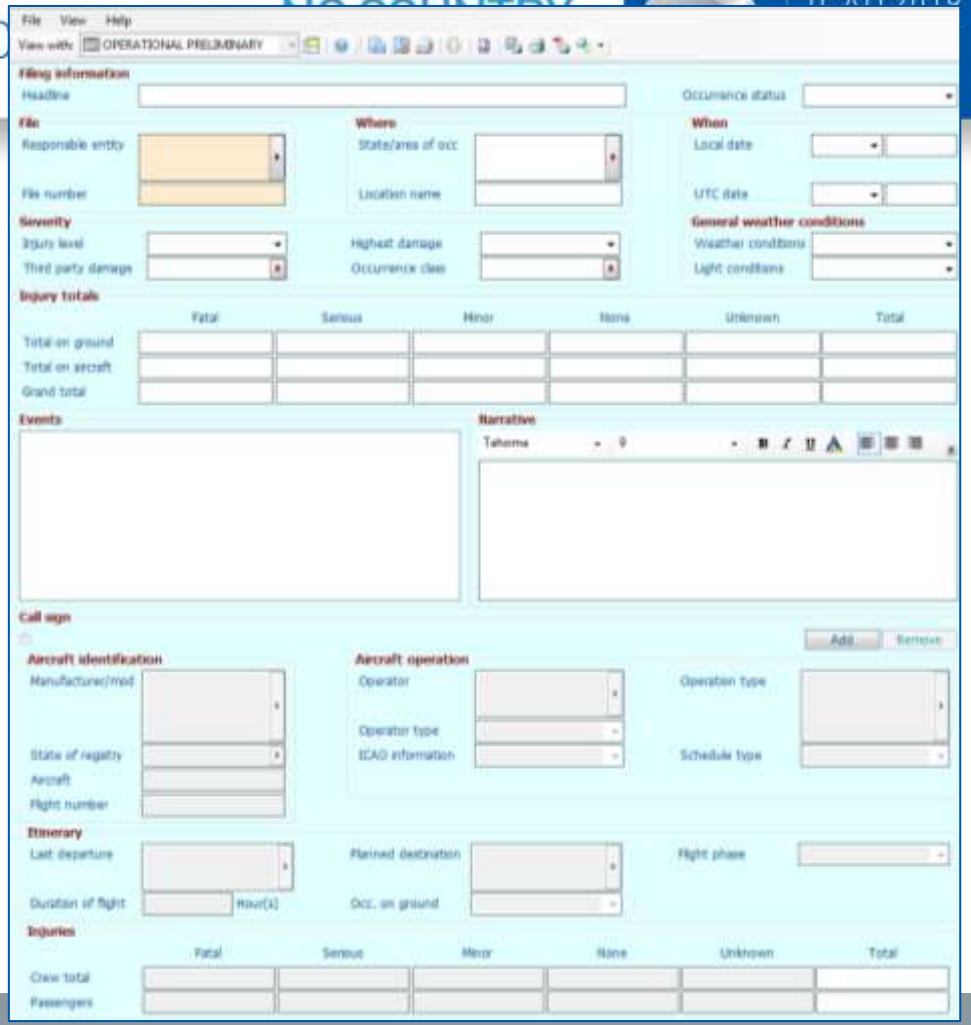
Always, information must be:

- Valid
- Consistent
- Relevant
- On time
- Etc.

How to notify using ECCAIRS

Straight into the database

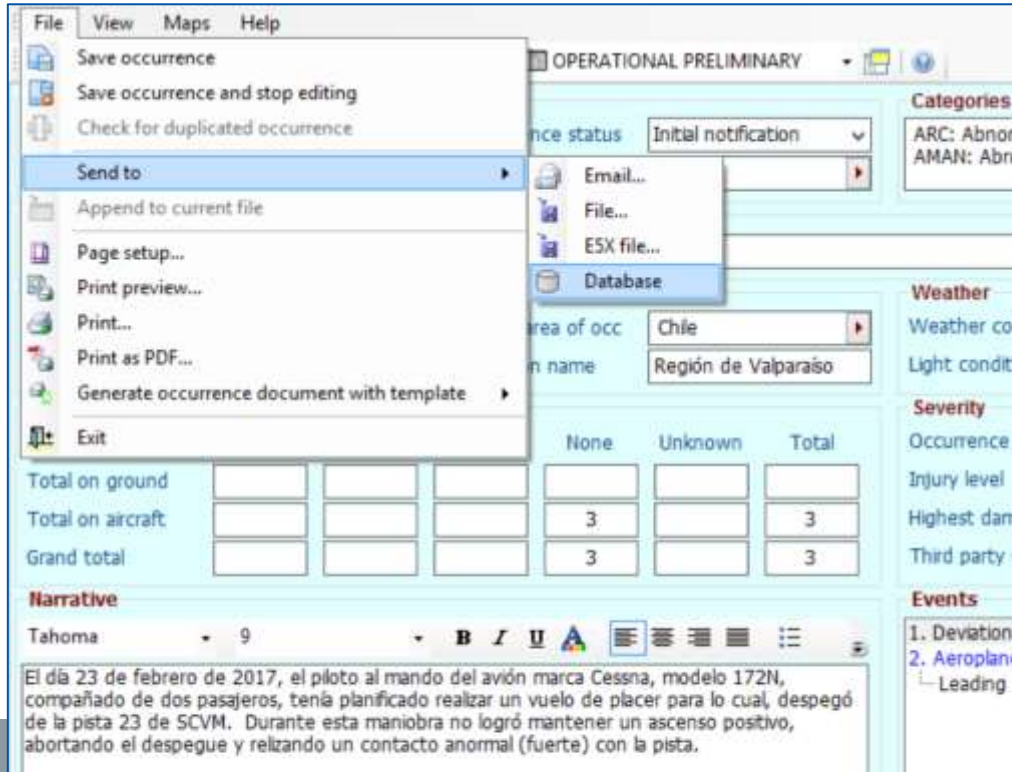
- What type of data?
- When?



How to notify using ECCAIRS

Straight into the database

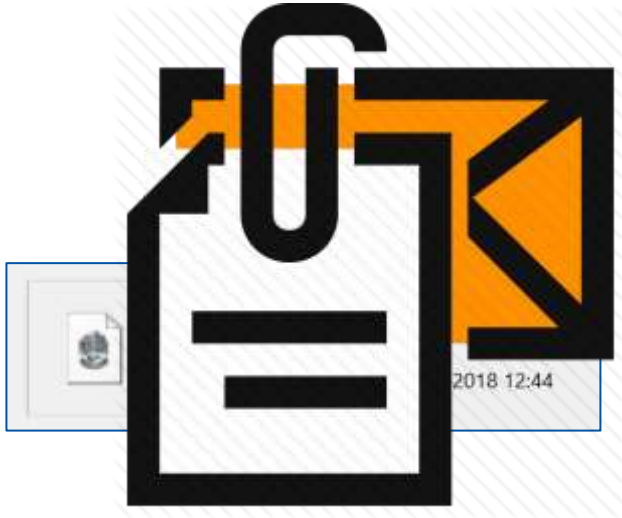
- What type of data?
- When?



How to notify using ECCAIRS

To organisations **with** ECCAIRS

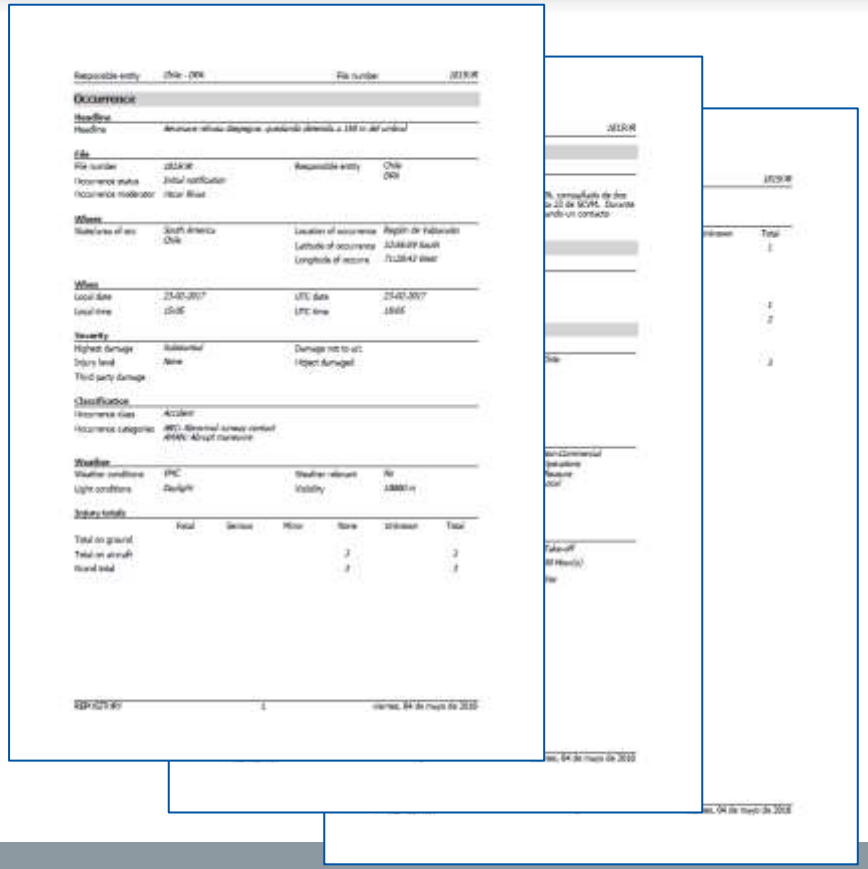
- E5f files
  - For instance, ICAO aiginbox@icao.int



How to notify using ECCAIRS

To organisations **without** ECCAIRS

- Pdf files
  - For instance, another State



OCCURRENCES CLASSIFICATION

Occurrence classification

- Class:
  - According to severity
    - Using Annex 13 definitions
      - And additional sub-categories for incidents
        - » Eurocontrol
    - Additional Guidance on „substantial damage“ in Attachment F of Annex 13
- Category:
  - Accident/incident categories
    - CAST-ICAO Common Taxonomy

Occurrence classes

- Accident
- Serious incident
- Incident
- Major incident
- Significant incident
- Occurrence without safety effect
- Observation
- Occurrence with no flight intended
- Not determined

Exercices

Piper PA-28 aircraft, suffered the failure of its dual magnetos (design error), and performed an emergency landing. Pilot uninjured and aircraft without damage

Boeing 737-200 aircraft, lost two engine covers from N°2 engine during takeoff roll and aborts takeoff. There was no damage reported.

Beechcraft Super King Air 350 aircraft, at FL 280 the windshield of the copilot side resulted entirley fractured for no apparent reason.

The aircraft landed with no additional observations.

Cessna 172N aircraft, during the landing roll excursioned runway by the end (long landing). The pilot was uninjured and the aircraft without damage.

Other cases

- Gross failure to achieve predicted performance during initial climb.
- Smoke in the cockpit, extinguished by the use of extinguishing agents.
- Multiple malfunctions of one system seriously affecting the operation of the aircraft.
- Insufficient fuel quantity level, requiring the declaration of an emergency by the pilot.

Occurrence Categories

- 36 categories
- Representative of the occurrence
- More than one can be selected
- Note: use of some exclude the use of others
  - E.g. CFIT and LOC-I
    - You cannot or at least it is mighty unlikely to have lost control and then have a controlled flight into terrain

List of occurrence categories (1)

1. ADRM: Aerodrome
2. AMAN: Abrupt maneuvre
3. ARC: Abnormal runway contact
4. ATM: ATM/CNS
5. BIRD: Birdstrike
6. CABIN: Cabin safety events
7. CFIT: Controlled flight into terrain
8. CTOL: Collisions with obstacle (s) during take-off or landing
9. EXTL: External load occurrences
10. EVAC: Evacuation
11. F-NI: Fire/Smoke (non-impact)
12. F-POST: Fire/smoke (post-impact)

List of occurrence categories (2)

13. FUEL: Fuel related
14. GCOL: Ground collision
15. GTOW: Glider towing related events
16. ICE: Icing
17. LALT: Low altitude operations
18. LOC-G: Loss of control – ground
19. LOC-I: Loss of control – inflight
20. LOLI: Loss of lifting conditions en-route
21. MAC: AIRPROX/near miss/midair collsion
22. MED: Medical – occs. involving illness of persons on board the A/C
23. NAV: Navigation errors
24. RAMP: Ground handling
25. RE: Runway excursion

List of occurrence categories (3)

26. RI: Runway incursion – vehicle, a/c or person
27. SCF-NP: System/component failure or malfunction (non-powerplant)
28. SCF-PP: Powerplant failure or malfunction
29. SEC: Seurity related
30. TURB: Turbulence encounter
31. UIMC: Unintended flight in IMC
32. USOS: Undershoot/overshoot
33. WILD: Wildlife encounters on landing surface
34. WSTRW: Windshear or thunderstorm
35. OTHR: Other
36. UNK: Unknown or undetermined


BEWARE OF PROPELLERS
16 5:34 PM


ir.com


FedEx
Express


CAUTION

Private-cross country
Registration: PNGAIC1
Date: 29.09.2018
Time: 18:26 local

RY
ND

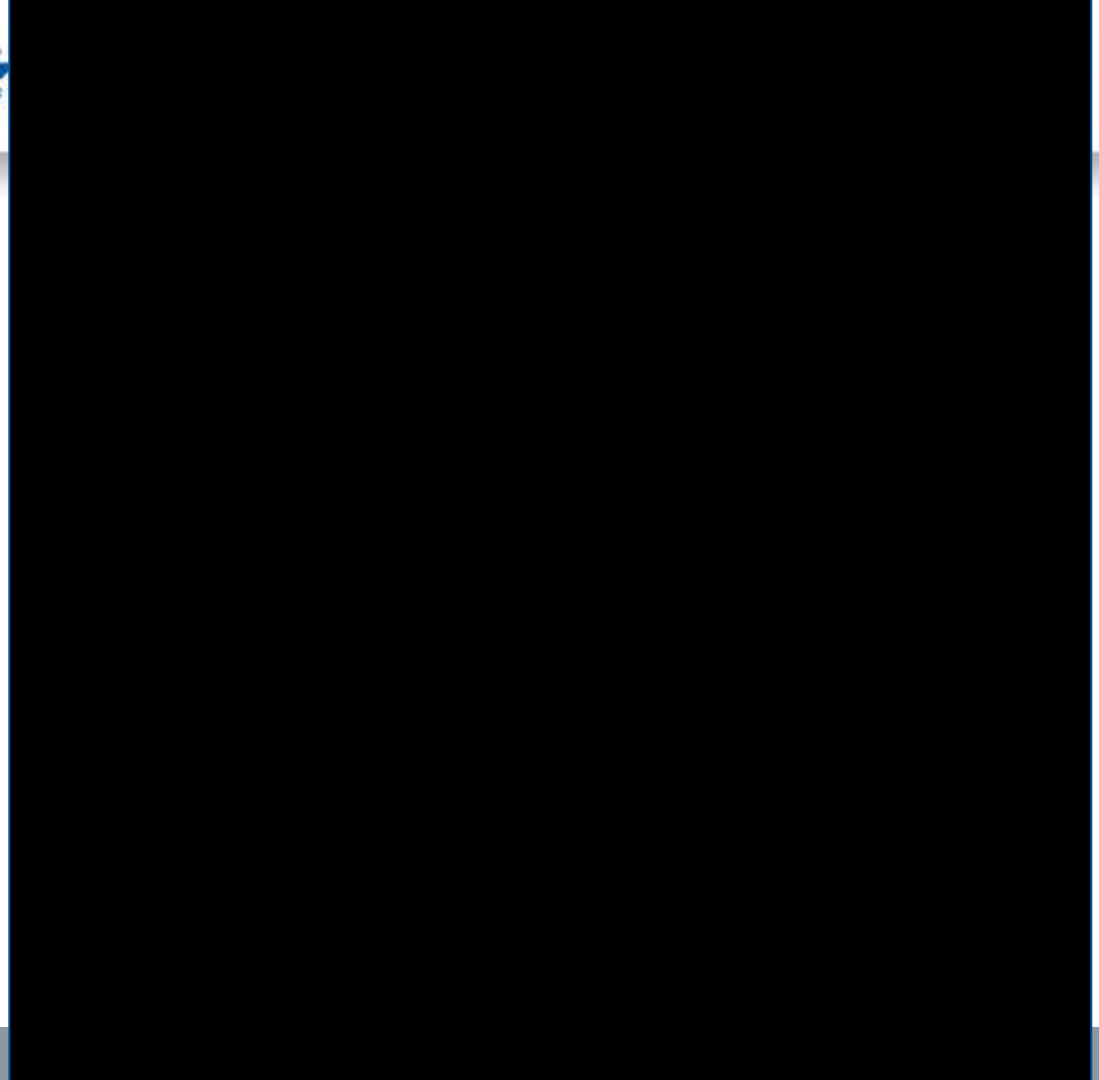
ICAO 2019
75 YEARS OF CONNECTING THE WORLD

Service-Passenger transport

Registration: PNGAIC2

Date: 30.09.2018

Time: 16:00 local



Private-local
Registration: PNGAIC3
Date: 01.10.2018
Time: 14:00 local

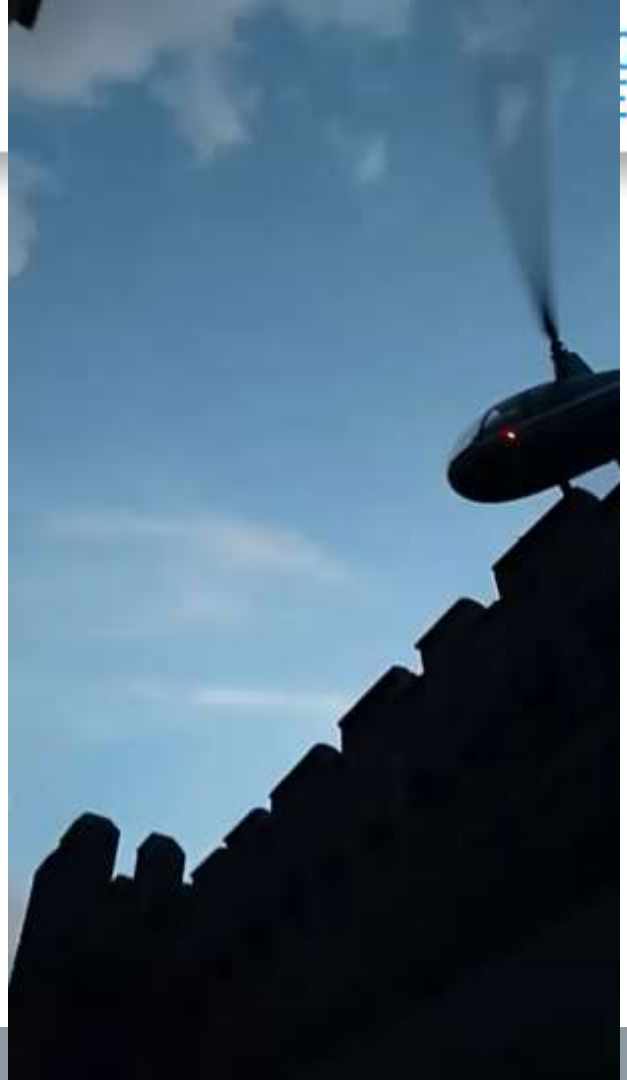
Service-MEDEVAC
Registration: PNGAIC4
Date: 25.09.2018
Time: 12:00 local

Private-cross country
Registration: PNGAIC5
Date: 01.09.2018
Time: 11:30 local

Private-cross country
Registration: PNGAIC6
Date: 01.10.2018
Time: 16:00 local

COSCAP SEA


Service-Passenger transport
Registration PNGAIC7
Date: 02.10.2018
Time: 19:30 local

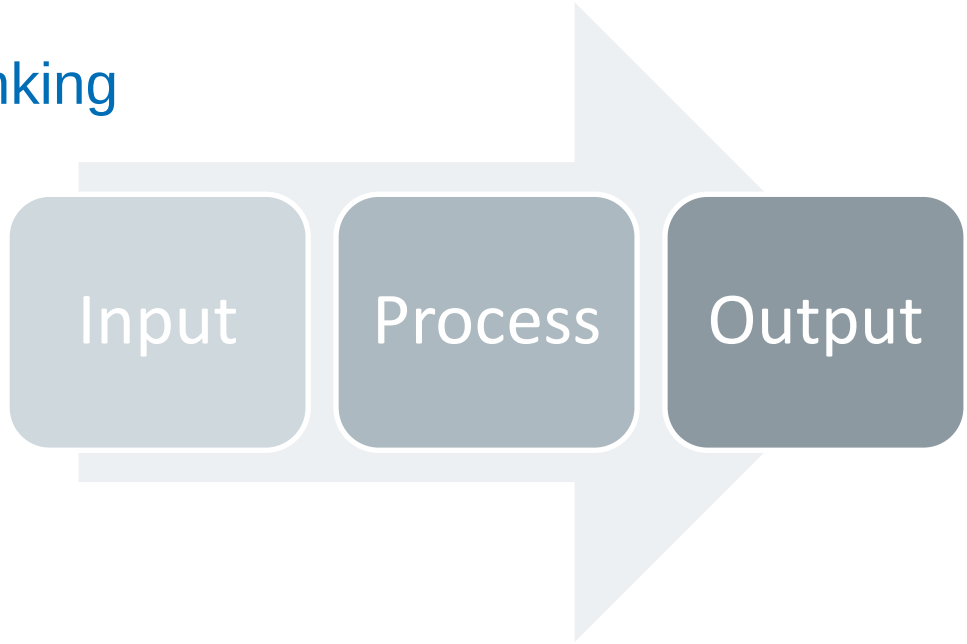


Safety Data Analysis

- In general terms
  - Practical usage of data
  - Shows areas of concern
  - Developed through an analysis process

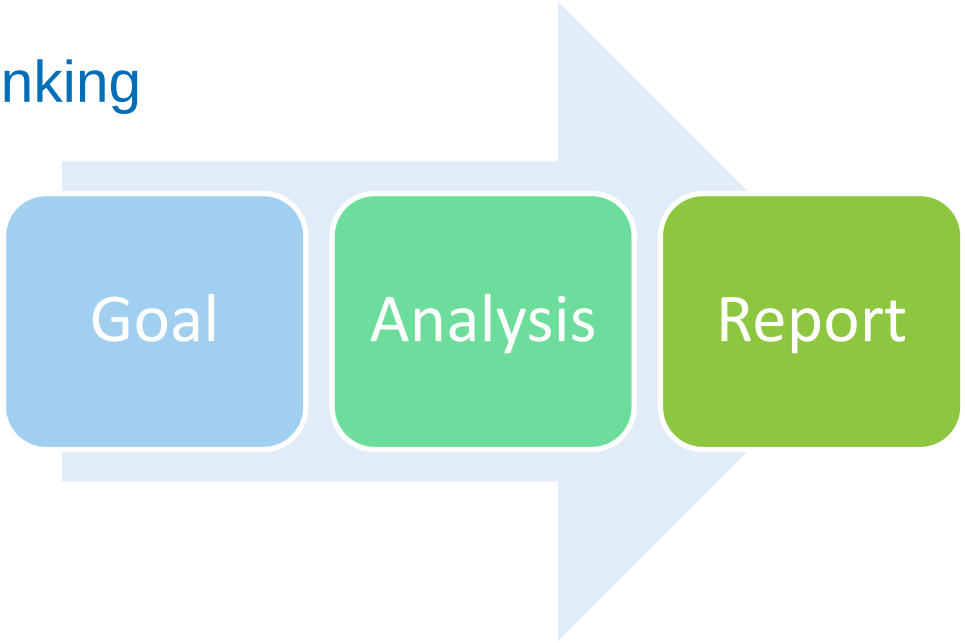
How to structure it

- Process thinking



How to structure it

- Process thinking



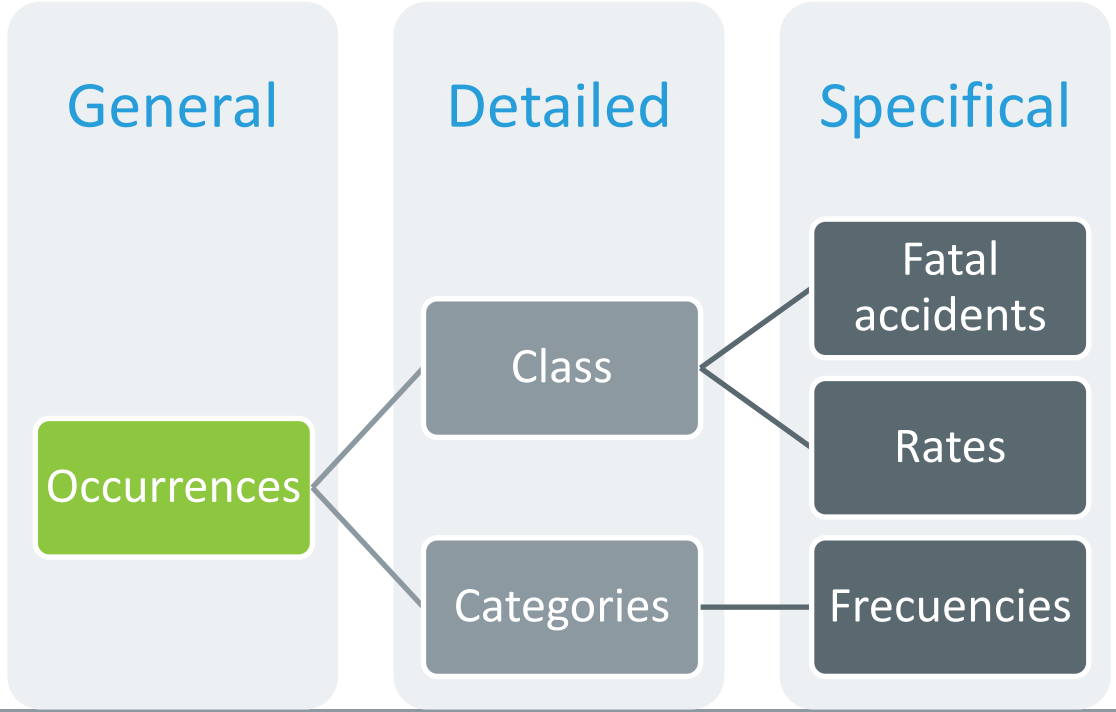
Some recommendations

- While developing:
  - Should include the complete data set for the study
  - All data shown should be analyzed
  - Going in-Depth depends on the objectives of the study

Some recommendations

- About the methodology
  - Begin with the most general aspects
  - Go through more detailed issues.

An example


General
Detailed
Specifical
Occurrences
Class
Categories
Fatal accidents
Rates
Frecuencies

Some recommendations

- Conclusions:
  - Highlight the main findings
  - Brief explanations
  - Did we fulfill the expectations?
- Consider acronyms, sources, links of interest, etc.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THANK YOU!

ECCAIRS WORKSHOP

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ICAO Trainair Plus Instructor

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29 June 2020 – 3 July 2020

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