Towards a more data guided risk evaluation process
DGAC (FRENCH CIVIL AVIATION AUTHORITY)
DGAC/DSAC (DIRECTORATE FOR CIVIL AVIATION SAFETY)

SSP coordination
REGIONAL OFFICES
AND APPROXIMATELY

• 8 800 registered aircraft
• 10 000 referenced UAVs
• 190 CAT organisations
• 15 000 commercial pilot licences
• 50 000 private pilot licences
• 72 aerodrome certificates (55 European certificates) + hundreds of others AD
• 80 air navigation service providers
• ...

(55 European certificates)
One State Safety Programme

- **Aims to ensure the implementation of actions:**
  - regulation
  - oversight
  - Safety promotion

- **SSP aims at the efficiency of actions:**
  - Risk analysis
  - Risk mitigation action plan
  - Safety performance indicators
  - Action plan adjustments

By allocating human and financial resources accordingly
WHAT DATA DO WE HAVE IN HANDS?

Data from oversight (audit reports for instance)

Safety reports from organisations

Ad hoc data, as trajectories data (from radar surveillance or ADS-B for instance)
WHAT ARE WE DOING WELL WITH THOSE DATA FOR YEARS

• Follow-up of received safety reports
• Collegial safety reviews
  • to analyse information from safety reports and
  • To identify appropriate actions
• Safety issue case studies
WHAT ARE WE DOING WELL WITH THOSE DATA FOR YEARS

• Follow-up of received safety reports
• Collegial safety reviews
  • to analyse information from safety reports and
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• Safety issue case studies

Always through an approach per oversight domain (airlines, airports, ansp, ...)

Combined with an

SSP transverse approach

At both regional and national level
WHAT ARE WE DOING WELL WITH THOSE DATA FOR YEARS

Production and use of 2 Acceptable Level of Safety Performance
(1 for commercial aviation, 1 for general aviation)
WHAT ARE WE DOING WELL WITH THOSE DATA FOR YEARS

Production and use of 2 Acceptable Level of Safety Performance
(1 for commercial aviation, 1 for general aviation)

ALoSP chosen definition: "The SSP aims to place France among the leading European countries whose operators are the safest in commercial aviation. A comparison with the main European countries, as a five-year rolling average, serves as an indicator."
WHAT DOES THE SSP ALLOW US TO DO

• To identify risks
• To define appropriate actions
• To elaborate tools as risk portfolios
MOST COMMON QUESTIONS WE ARE ASKED FOR

• « How is this portfolio produced ? »
• « What (scientific) process is it the result of ? »
• « What the hell do you do with our data ? They’re falling into a black hole, we never get any feedback »

Nowadays, it is mainly a synthesis of experts, based on the previous described process And a continuous collaborative work with professionals

No magic tool
HOW TO IMPROVE OUR SSP TO KEEP OUR ALOSP AT ITS REACHED LEVEL

• Improve the way we use the data to complete our risk assessment awareness

• Make the link between safety data and SSP outputs more visible to organisations that provide some of the most important data
WHAT WE ARE BUILDING,
FOCUS ON THE USE OF ECCAIRS SAFETY REPORTS DATABASE

Number of organisations registered in France ECCAIRS Database, nov. 2018
+ 400 aéroclubs
& 100 entities in charge of oversight

Yearly Nb of safety reports recorded into French Ecairs Database

Direction Générale de l’Aviation Civile
Ministère de la Transition écologique et solidaire
WHAT WE ARE BUILDING,
FOCUS ON THE USE OF ECCAIRS SAFETY REPORTS DATABASE

• Exploration and appropriation
• Revision of the data collection process
• and update of associated procedures

(is of no interest to everyone but is crucial)
WHAT WE ARE BUILDING,
FOCUS ON THE USE OF ECCAIRS SAFETY REPORTS DATABASE

Eccairs is a data collection tool,

it allows us to consult the stored data,

But it is not an analytical tool
WHAT WE ARE BUILDING, FOCUS ON THE USE OF ECCAIRS SAFETY REPORTS DATABASE

Eccairs is a data collection tool, it allows us to consult the stored data, But it is not an analytical tool

Thanks to modern data visualization tools, the database can become intelligible to non data analysis experts (interactive dashboards)
WHAT ARE WE BUILDING,
FOCUS ON THE USE OF ECCAIRS DATABASE

1 / Back to basics

• Compliance of organisations regarding safety report notification process
• Data quality
WHAT ARE WE BUILDING, 
FOCUS ON THE USE OF ECCAIRS DATABASE

1 / Back to basics

Complexity due to the variety of organisations at stake

and the corresponding oversight organisation
WHAT ARE WE BUILDING,
FOCUS ON THE USE OF ECCAIRS DATABASE

1 / Back to basics

• Compliance of organisations regarding safety report notification process
• Data quality
WHAT ARE WE BUILDING,
FOCUS ON THE USE OF ECCAIRS DATABASE

1 / Back to basics

Goals:

• Identify technical issues into the data collection process
• Adapt the analysis to each type of organisation
• Detect gaps in the information provided
• Etc
• Useful for inspectors, safety analysts, managers, ...
WHAT ARE WE BUILDING,
FOCUS ON THE USE OF ECCAIRS DATABASE

2 / Go further : issues at stake

Choosing from which angle to look into data

ADREP Taxonomy / Event Type
WHAT ARE WE BUILDING,
FOCUS ON THE USE OF ECCAIRS DATABASE

2 / Go further: issues at stake

Choosing from which angle to look into data

ADREP Taxonomy / Event Type
WHAT ARE WE BUILDING,
FOCUS ON THE USE OF ECCAIRS DATABASE

2 / Go further : issues at stake

Choosing from which angle to look into data
WHAT ARE WE BUILDING,
FOCUS ON THE USE OF ECCAIRS DATABASE

2 / Go further : issues at stake

Decide and build what to focus on : groups of interest -> same issue related reports
WHAT ARE WE BUILDING,
FOCUS ON THE USE OF ECCAIRS DATABASE

2 / Go further: issues at stake

Decide and build what to focus on
WHAT ARE WE BUILDING, FOCUS ON THE USE OF ECCAIRS DATABASE

3/ Deep further

Focus on one and investigate on what it means (or does not) ?

<table>
<thead>
<tr>
<th>Groups of event type of interest</th>
<th>Safety issues of interest</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perte de Contrôle</td>
<td>38% avtis</td>
</tr>
<tr>
<td>Péril animalier</td>
<td>12% avtis</td>
</tr>
<tr>
<td>Intrusion dans un Espace Contrôle</td>
<td>2% avtis</td>
</tr>
<tr>
<td>Feu/Fumée</td>
<td>7% avtis</td>
</tr>
<tr>
<td>Perte de séparation</td>
<td>32% avtis</td>
</tr>
<tr>
<td>Phénomène météo</td>
<td>3% avtis</td>
</tr>
<tr>
<td>Approach non stabilisée</td>
<td>2% avtis</td>
</tr>
<tr>
<td>Additional</td>
<td>3% avtis</td>
</tr>
<tr>
<td>Incursion sur piste</td>
<td>3% avtis</td>
</tr>
</tbody>
</table>
WHAT ARE WE BUILDING, FOCUS ON THE USE OF ECCAIRS DATABASE

3/ Deep further

Focus on one and investigate on what it means (or does not)?
3/ Deep further

Is it really relevant to count an overall national number of « runway incursion related » events
WHAT ARE WE BUILDING, 
FOCUS ON THE USE OF ECCAIRS DATABASE

3/ Deep further

airports of corresponding « runway incursion related » safety reports
WHAT ARE WE BUILDING, FOCUS ON THE USE OF ECCAIRS DATABASE
WHAT ARE WE BUILDING, FOCUS ON THE USE OF ECCAIRS DATABASE

3/ Deep further

**Caution**: for this presentation, need for de-identification of the airports

But, for the CAA internal process, of course we must work on non de-identified data
WHAT ARE WE BUILDING, 
FOCUS ON THE USE OF ECCAIRS DATABASE

3/ Deep further

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WHAT ARE WE BUILDING,
FOCUS ON THE USE OF ECCAIRS DATABASE

3/ Deep further

Computation of « nb of runway incursion related report per 10k ops »
WHAT ARE WE BUILDING,
FOCUS ON THE USE OF ECCAIRS DATABASE
WHAT ARE WE BUILDING,
FOCUS ON THE USE OF ECCAIRS DATABASE

3/ Deep further
Link with each corresponding safety report
WHAT

FOCUS ON THE USE OF ECCAIRS DATABASE
WHAT ARE WE BUILDING,

FOCUS ON THE USE OF ECCAIRS DATABASE

<table>
<thead>
<tr>
<th>UTC Local C.</th>
<th>Provenance</th>
<th>Headline</th>
</tr>
</thead>
<tbody>
<tr>
<td>20/04/2016</td>
<td>Evénement TC : Disque Dur HS SESAMME AR</td>
<td></td>
</tr>
<tr>
<td>28/07/2016</td>
<td>REMISE DE GAZ</td>
<td></td>
</tr>
<tr>
<td>01/02/2018</td>
<td>Erreur de cheminement - Roulage sur un TWY non homologué pour le type avion</td>
<td></td>
</tr>
<tr>
<td>29/03/2018</td>
<td>Quasi-incursion sur piste - clairance conflictuelle</td>
<td></td>
</tr>
<tr>
<td>06/04/2018</td>
<td>Erreur de cheminement - Dégagement de piste</td>
<td></td>
</tr>
<tr>
<td>12/04/2018</td>
<td>Erreur de cheminement - Dégagement de piste</td>
<td></td>
</tr>
</tbody>
</table>
WHAT ARE WE BUILDING, 
FOCUS ON THE USE OF ECCAIRS DATABASE

3/ Deep further
And of course we would d like to make the link with most significant of those events

(depending on the quality of the corresponding information measured previously)
WHAT ARE WE BUILDING,

FOCUS ON THE USE OF ECCAIRS DATABASE
WHAT ARE WE BUILDING, FOCUS ON THE USE OF ECCAIRS DATABASE
WHAT ARE WE BUILDING, FOCUS ON THE USE OF ECCAIRS DATABASE

4/ and back to the usual business

we have to go back to experts (people in charge of oversight) to understand how organisations use risk classification and what it means,

To decide how to interpret it ...

<table>
<thead>
<tr>
<th>Airport: Airport 973</th>
</tr>
</thead>
<tbody>
<tr>
<td>Runway incursion notification rate: 0.7 notifications per 10,000 operations</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>UTC Local C.</th>
<th>Provenance</th>
<th>Headline</th>
<th>Risk classification</th>
<th>Groupe Risque (MEAS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>28/07/2016</td>
<td>REMISE DE GAZ</td>
<td>10</td>
<td>Non Significatif</td>
<td></td>
</tr>
<tr>
<td>01/02/2018</td>
<td>Erreur de cheminement - Roulage sur un TWY non homologué pour le type avion</td>
<td>Absence de classification</td>
<td>Absence de classification</td>
<td></td>
</tr>
<tr>
<td>06/04/2018</td>
<td>Erreur de cheminement - Dégagement de piste</td>
<td>Absence de classification</td>
<td>Absence de classification</td>
<td></td>
</tr>
<tr>
<td>13/04/2018</td>
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<td>Absence de classification</td>
<td>Absence de classification</td>
<td></td>
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</tbody>
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WHAT ARE WE BUILDING,
FOCUS ON THE USE OF ECCAIRS DATABASE

5/ in order to conclude on the most relevant actions that must be taken

General actions
WHAT ARE WE BUILDING, FOCUS ON THE USE OF ECCAIRS DATABASE

5/ in order to conclude on the most relevant actions that must be taken

More targeted and relevant actions
INTEGRATED AND COOPERATIVE USE OF THE DATA

This exemple highlights the key aspects of the more « modern » use of data from our french CAA perspective:

• Work with what you have in hands,
• And know what you have in hands,
• Involve all stakeholders, from oversight inspectors to top management
• Move step by step
The above process focused on safety reports applies whatever the output we are interested in:

- Risk portfolio updates
- Audit preparation
- Topic of interest
- Case studies
PERSPECTIVES

And whatever the type of data we are using,

as for instance ADS-B data

Experiment conducted in 2018, based on a one month of 3 ADS-B data samples
PERSPECTIVES

Caution: the one event investigation temptation as a first step
Main goal: analyse trends (use of QFU, ratio of non compliant approaches, ...)
Key advantages: no reporting culture bias & general overview (even if gaps still exist)
But important technical barrier to handle the data
The holy grail of data sources does not exist

Need to figure out how to correlate many data sources.

Moving from individual safety report analysis toward comprehensive risk evaluation.
Towards a more data guided risk evaluation process

Paul-Emmanuel Thurat

French safety management coordination office
Head of commercial air transport division

paul-emmanuel.thurat@aviation-civile.gouv.fr