Risk of bird strikes
A discussion of current tools and practices

Ove Njå, Pål Ranestad, Geir Sverre Braut, Rodney Fewings & Espen Kurthi

University of Stavanger

What are we talking about?

What is the risk of this?

No this is history

We think of ”similar” events, not occured yet, but they can!

This is risk:

“The probability that an adverse event will occur within a specified time period or as a result of a particular event or series of events” (Allan, 2006)

But do we know the true risk?

Risk = (p, C | A) or often seen Risk = p x C

What is the uncertainty involved here?

Uncertainty ”aspects” in the ”true risk”

- Theory – how it is to be considered
  - Relative fraction of times
  - Objective risk
  - True underlying risk
  - Estimates are provided

- Confidence interval – statistical variation
- Model uncertainty (if this is provided)

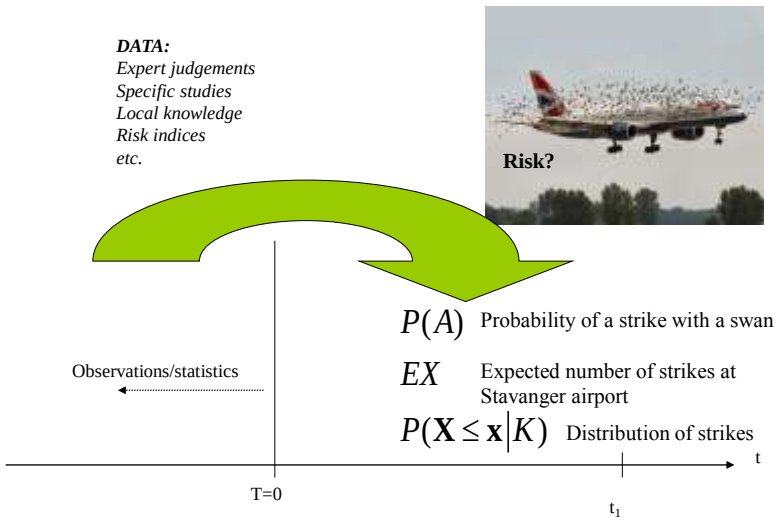
- Uncertainty is rarely discussed
- Focus on fictional quantities

An alternative thinking on bird strike risk

- Observable quantities
- We (analysts) are uncertain about these quantities and what they will be in the future
- ”Models” are tools to express uncertainites
- All predictions are based on our (the analysts’) knowledge
- Uncertainties are partly expressed by probabilities/frequencies or by probability distributions

$$P\left(X < x \middle| K\right)$$

Risk perspectives - summary



Our study – data material

A Protocol for Bird Strike Risk Assessment at Airports. J**. Allan** 2000
A Heuristic Risk Assessment Technique for Birdstrike Management at Airports, **Allan** 2006
A Development of Birdstrike Risk Assessment Procedures,
Their Use on Airports and the Potential Benefits.., **Allan et al** 2003
Bird Strike Risk Assessment for Athens International Airport, **Anagnostopoulis**, 2003
A quantified species specific Bird Hazard Index, **Both, van Gastern & Dekker**, 2010
Interspecific Variation in Wildlife Hazards to Aircraft:.., **DeVault et al**. 2011
Guidance on Assessing the Risk of Attractions of Birds by Areas ……, **Ditlevsen et al**, 2010
Bird Risk Assessment Model for Airports and Aerodromes, **Paton**, 2010
Wildlife Risk Evaluation Model, **Portland Int. Airport**, 2009
Risk Assessment: Quantifying Aircraft and Bird Susceptibility to Strike. **Shaw, McKee**, 2008
Airport Bird Hazard Risk Assessment Process, **Sowden, Kelly & Dudley**, 2007
Experience of Using Bird Hazard Risk Assessments …., **Witter**, 2008
Two risk assessments carried out by **Kurthi and Ranestad** in 2011

Our study approach

Conceptualisation:

- Risk
- Performance
- Decision

Analyses:

- Models
- Data
- Assumptions

Use (analyses as decision support):

- Risk acceptance criteria
- Risk mitigation measures
- Decision making

Results - Risk

- A variety of understandings
- Subordinate constructs based on sensible thoughts
- Allan's definition of a framework for risk assessments dominates the literature
- Underlying true risk
- Pragmatism – little focus on theory of risk
- Historical data the major building block

Results - Performance

- Close reading of the literature does not indicate that assessing mitigation effects has been part of the protocols or risk assessment methodologies conducted
- None of the documents discusses the connection between the risk assessment processes and the wildlife management plan and performances.

Results - Decisions

- None of the works reviewed have reflected over the decisions that were meant to be supported by the risk assessments.
- Many of the tools developed emphasizes its need to be simple and easy to use.
- Don't we deal with a complex system?
- Nothing seems to be left to the decision makers themselves

Results - Models

- Semi quantitative
- The aggregation of the assessments of quantities leading to the placement in a risk matrix is rarely argumented for, but it follows some kind of reasonable judgements
- Relationship between portion of damage and the bird weight
- Bird Hazard Index as a risk measure to base the development of a bird control system without relying on the bird strike statistics

Results - Data

- All the authors employ hard data, either from observations or recorded events.
- The data selected for risk assessments could be contextual and event oriented (either local or national)

Results - Assumptions

- Existing aerodromes in operational phases
- The major goal is to clarify how dangerous the aerodrome area is, and this is assumed to be sufficiently measured by the risk assessment approaches

Results – Acceptance criteria

- Red, yellow and green zones
- The reasoning for these general risk acceptance criteria does not reflect the facility, regulations or other company or authority preferences
- The authors of the risk indices have been more concerned about the construction of the index rather than cut-off limits, claiming safety to be compromised

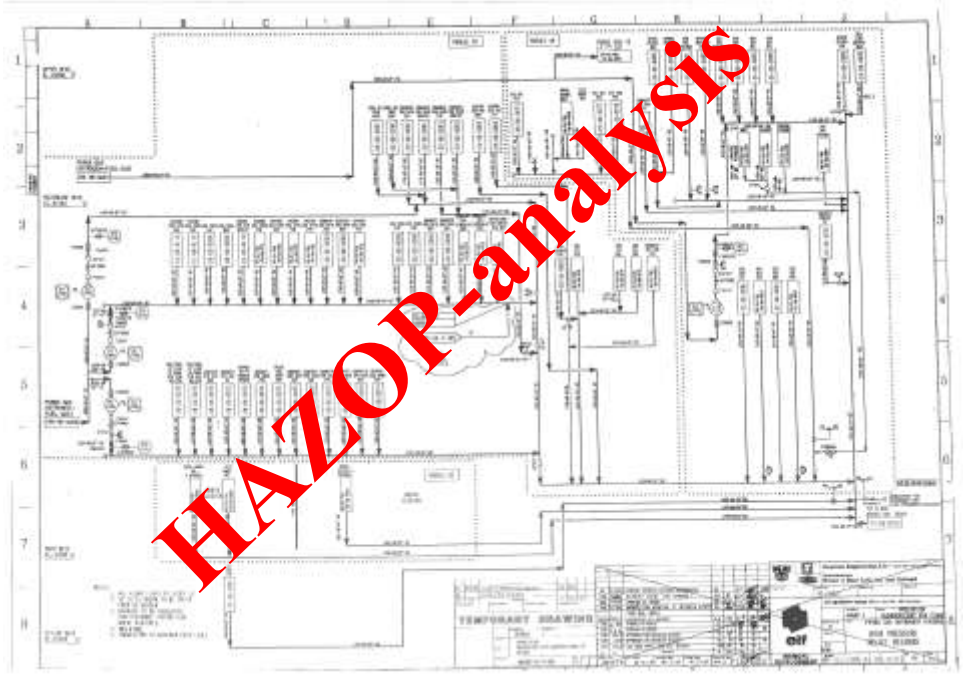
Results – Risk mitigation measures

- In general the sample of literature that we have reviewed pays little attention to concrete risk reducing measures and their associated performances.

Results – Decision making

- In general studies investigating implementation and use of risk assessment are scarce and thus, critical reviews of different risk assessment and management approaches are seldom seen.
- Bird strike risk community is no exception

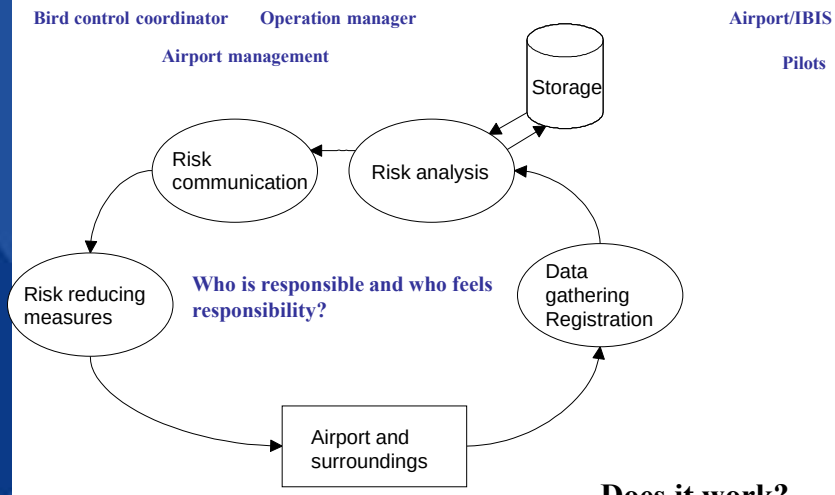
- Witter reports very good results with risk management practices in the UK



Why have Hazop-analyses become a success in the Norwegian oil & gas industry?

- Clear decision making context
- Decision makers sees the benefits – improved safety, improved operational procedures/practices, economical benefits
- Easy technique
- Participatory approach, ”experts” contributes with their own experience and expertice
- Ownership to the analysis - involvement
- A ”culture” in the petroleum industry to address technical safety

Bird strike safety information system



Does it work?

Possible building blocks for the future

Risk image
- Analysis must invent a risk image
- Analysis as basis for sharing
- Analysis for continuing development

Uncertainty an important issue!

Requires:
Willingness to change
Willingness to understand how systems work - confirmation
Willingness to understand why bird strikes occur and do not occur in relation to the systems performances - comprehension

→ **C^3 - Learning**

Panel discussion

"the methodologies employed are not risk analysis"

- Are the definitions not clear?
  - Risk
  - Performance
  - Other?
- Could we improve the way that objectives of the analyses are stated?
  - Which issues are we capable to answer with the risk analyses?
  - What are the expectations for the use of the analyses?
- How could we organize the analysis processes in better ways?

- What is the pros and cons by presenting risk pictures vs risk indices?
  - What will serve the airport and aviation system most
  - How could we say that the risk indices is good representations of risk?
- Background knowledge, K
  - What is a relevant data material?
  - How could we improve the situation?
- Modelling – is the current knowledge sufficient?
  - Avifauna characteristics?
  - Birds' susceptibility to conflict situations?
  - Logic modelling?

"safety proposals are put forward on declining basis"

- How can we increase credibility in the recommendations?
  - The development and use of acceptance criteria?
  - ALARP?
  - Connections between recommendations (risk reducing measures) and risk results?
  - Performance analyses?
  - Politics in the analysis process?
- What influences the use of the analyses?
  - Report format?
  - Organisation?
  - Unclear decision making processes?
  - Economy?

"proposed solutions are suboptimalizations which have served the airport operators poorly over time"

- What are the experiences with the solutions?
  - Bird control plan?
  - Specific risk reducing measures?
  - General operation procedures?
  - Responsibilities?
- How are evaluations of risk analysis processes conducted?
  - Systematically?
  - Experience based?

What now IBSC?