# Learning from Incidents

# Occurrence Reporting in Denmark The first 5 years

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### I plan to cover:

- Why do we need a reporting system ?
- How was it implemented in Denmark?
- Acceptance by users ?
- Lessons learned
   – strenghts and weaknesses in occurence reporting

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# We are doing quite well – so why do we want more reports ?



### "Normal" accidents

- Why do we want reports on the minor incidents ?
  - Without Data, One Can Only Have An Opinion
  - Learn from others mistakes because you won't live long enough to make them all yourself
  - Accidents does not only happen because of deviation from rules or mistakes
    - Deviations can become the normal situation
      - Challenger accident
      - Alaska Airlines

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# **Capturing the Drift**

### Ideal performance

### Ideal performance

# System design deployment

Operational performance

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Mexico City 10 – 11 April 2007

"Practical

# **Capturing the Drift**

### Reactive systems – Failures

- Accident investigation
- Major incident investigation

Proactive systems – Routine operational events

- Voluntary self-reporting systems (Aviation Safety Action Programme a.o.)
- Electronic safety data acquisition systems (Flight Operation Quality Assurance)
- Direct observation safety data acquisition systems (Line Oriented Safety Audit)
- Mandatory reporting systemsn (2003/42/EC and BL 8-10)

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# "Dress rehersal for disaster"

#### December 1974:

- FO: "I hate this altitude jumping around – gives you headage after a while"
- 11:09:20 Capt: "Get some power on
- 11:09:22 Sound of crash
- TWA hits the terrain before Round Hill on approach to Washington
- 92 fatalities
- Led to creation of first reporting system in USA



BOEING 727-231, N54328 BERRYVILLE, VIRGINIA DECEMBER 1, 1974

#### SYNOPSIS

At 1110 e. s. t., December 1, 1974, Trans World Airlines, Inc., Flight 514, a Boeing 727-231, N54328, crashed 25 nautical miles northwest of Dulles International Airport, Washington, D. C. The accident occurred while the flight was descending for a VOR/DME approach to \_\_\_\_/ runway 12 at Dulles during instrument meteorological conditions. The 92 occupants -- 85 passengers and 7 crewmembers -- were killed and the aircraft was destroyed.

The Mational Transportation Safety Board dete'rmines that the probable cause of the accident was the crew's decision to descend to 1,800 feet before the aircraft had reached the approach segment where that minimum altitude applied. <u>The crew's decision to descend was a</u> result of inadequacies and lack of clarity in the air traffic control procedures which led to a misunderstanding on the part of the pilots and of the controllers regarding each other's responsibilities during operations in terminal areas under instrument meteorological conditions. Nevertheless, the examination of the plan view of the approach chart should have disclosed to the captain that a minimum altitude of 1,800 feet was not a safe altitude. "The alarming thing is that we do not take advantage of our good fortune. Here we have a brush with disaster; a live crew and an intact aircraft to tell the story. *And yet we never opened the* 

> Bobbie R. Allen Director Bureau of Safety of the Civil Aeronautics Board (later the NTSB) - 1966

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book."

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# "Opening the book" The birth of the danish system

- 1997: CAA-DK forced to reveal contents of occurrence reports (i.a.w. freedom of information act)
  - Reproach from the operators
  - AIB stopped providing supplemental information to CAA
- 1998: number of reports fell to half compared to 1996
- 1998: Dialogue with MoT on new reporting system started
- 2001: Air Navigation Act changed with unanimous agreement from Parliament

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**§ 89 b.** The Minister of Transport may give regulations stating that, for the use in the Civil Aviation Administration - Denmark's preventive flight safety work, persons covered by § 35 or § 74 companies and employees in companies of well as aircraft owners shall report to the Cwir Aviation Administration - Denmark any operational interruption and other irregular circumstance of importance to flight safety that has not resulted in an aircraft accident or aircraft incident, cf. § 135. The Minister determines in which situations reporting shall be made, when and in what form the notification shall be given and what it shall contain.

(2) The Civil Aviation Administration -Denmark's personnel and any experts called in shall, under §§ 152 and 152 a-e of the Danish Criterial Code, be under the obligation to keep secret any information reported in accordance with regulations late down in pursuance of subsection (1), cf. however, subsection 3.

# The Air Navigation Act

§ 149 a. A person who in accordance with rules laid down in pursuance of § 89 b has reported circumstances that have not resulted in an aircraft accident or aircraft incident, caproc be punished for the circumstance in question for violation of § 42, regulations laid down in pursuance of §§ 31, 52, 54, 82 or 83, or regulations in EUL explations in areas covered by the Act.

**She The Minister of Transport and Energy may sende that the Civil Aviation Administration - Dennale - in addition to the same authority given by the provisions of this Act - shall exercise certain power O enferred to the Minister under this Act.** 

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Flight safety occurrence (occurrence): Any operational interruption, defect, fault or Regulations on mandatory reporting of flight safety oc. h other irregular circumstance that has or may have influenced flight safety and that has not resulted in an accident or serious incident, cf. § 135 of the Air Navigation Act and BL 5-40.

BL 540, Order on the duty to report

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-550, Regulators on approval of traf-

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BL 8-10



## How about media / the public ?

- No freedom of information
- CAA publishes annual anonymized report.
  - until 2003 mainly statistical information
  - from 2004 expanded with analysis, CAA reactions and campaigns
- Annual reports supplemented with ad-hoc electronic newsletters and presentations for interested parties (hospitals, shipping)

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#### Occurrences month by month

Total number of occurrences per 27th march 2007: 20.722 Maximum number any month: (September 2003) 444 Minimum number any month: (December 2001) 205 Average number per month: 308 Average number per year: 3.700 Statens Luftfartsvæsen Mexico City 10 - 11 April 2007 14 **Civil Aviation Administration, Denmark** 

# Coding of occurrences



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1     Runway Incursions       11     Pilot handling	
2 Uautoriseret indtrængen i luftrum	
3 Loading error 13 TCAS	
4 Altitude deviation 14 Ground handling	
5 Air condition & Pressure 15 De-Icing	
6 Provision of ATM service 16 Maintenance	
7 Fejl i overvågningsfunktion 17 Engine problems	
8 Fejl i kommunikationsfunktion 18 Landing gear	
9 Fejl i dataformidling 19 Nav equipment	
10 Ingen radioforbindelse 20 Passenger behaviour	
Formularvisning	



Accident, i.e.loss of or substantial damage to the aircraft and or serious injury or death of occupants.Near accident, i.e. or serious incident where an accident pacty accurs. No active barriers remaining The outcome is	Catastrophic or serious					
not under control and could very I	occurrence					
A large reduction in safety margins. The outcome is controllable by use of existing emergency or non.normal procedures and/or emergency equipment. The safety barriers are only one or very few going to none, Minor Injury to occupants and/or minor damage t	Hazardous occurrence					
A significant reduction in safety margins but several safety barriers remain to prevent an accident. Reduced ability of the flight crew to cope with the increase in w orkload or as a result of the conditions impairing their efficiency. Minor injury to occu	Major occurrence					
Operating limitations and/or use of alternative or or emergency procedures. Only during rare occasions can the occurrence develop into an accident. The occurrence may indicate deficiencies in the Safety management/quality system. Nuisance to the occupants	Minor occurrence					
No direct or low safety impact. Use of good operational praxis and/or existing safety barriers to avoid safety impact.	Low effect occurrence					
	Probability of Occurrence	Extremely improbable	Extremely remote	Remote	Reasonably Probable	Frequent
Aviation Risk Assessment Matrix Legend: Unacceptable Rewiev	Qualitative definition	Should virtually never occur.	Unlikely to occur, but nevertheless, has to be considered as being possible.	Unlikely to occur, but may occur several times.	May occur once or a few times.	May occur onc or several time:
Severity classification is defined by one or more of the specified criteria. The Probability can be expressed	Quantitative definition	< 10 <sup>-9</sup> per flight hour	10 <sup>-7</sup> till 10 <sup>-9 per</sup> flight hour	10 <sup>-5</sup> till 10 <sup>-7</sup> per flight hour	10 <sup>-3</sup> till 10 <sup>-5</sup> per flight hour	> 10 <sup>-3 pr</sup> flight hour
n exposure time, operational cycles, per unit or aircraft novements apart from the normal flight hour expression.	Occurrence time span (World Av.)	Once in a 100 vears	Once in 25 vears	Once in 10 vears	Once a year	0,12 times a

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## How are the reports used ?

- Internally in CAA:
  - Initially classified by Q+A
  - Every report goes to specialist for final classification
  - Specialist responsible for any required immediate action
  - Central analysis persormed regularly to locate areas of interest
  - Areas of interest coordinated between specialists
  - Classification on seriousness to be implemented 2007
  - Fact Based Ressource Allocation (select areas of interest)

### • Externally:

- Special comparative analysis for operators
- Bird Strike information to airports
- Information on Runway Incursions to Airport Safety teams



# **Runway Incursion Campaign**

- Broad campaign in autumn 2002 towards operators, managers, ATM, training establishments, aero clubs, uarterly magazine
- Analyses show the problem mainly relevant for lesure flying and confined to a single airport with complicated lay-out and large number of training flights)
- Figures show gradual improvement

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## **Results – Runway Incursions**



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# The EU Directive 2003/42/EC

- Adopted june 13th 2003
- Implemented july 4th 2005
- Calls for a mandatory, confidential and nonpunitive reporting system
- Directs member states to exchange information from national databases

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## BL 8-10 vs. 2003/42/EC

- Goes hand in hand
- 2003/42/EC covers also certain serious incidents reportable to AIB's
- BL 8-10 needed slight amendment due to new mandatory reports from Ground Handling and work on air navigation facilities





#### **Factors influencing reporting**



### **Potential benefits**

- Identify and fix problems before they turn into costly accidents
- Share lessons learned across communities
- Provide insight into how the system actually works
- Large pool of data enables trend monitoring
- Increased visibility of everyday risk maintain vigilance
- Employees feel they can make a difference

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### Potential weaknesses

- Reporting issues
  - Bias
  - What is unsafe ?
- Analysis
  - Depth vs. Breath ?
  - System view or Human Error view ?
  - Taxonomy limited
- Follow-up
  - Difficult to select follow-up (what action is best ?)
  - Are the same old solutions being reiterated ?





# Just because it's difficult doesn't mean we shouldn't try!

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