

# Chapter 13

## Aviation Incident Reports

We aim to explain incidents with air traffic systems involving new-generation aircraft as examples of complex OHRS's. Since significant system failures (for example, incidents and accidents) occur moderately frequently in comparison with other OHRS's (such as nuclear power plants), there is some basis for generalisation. Furthermore, ICAO contracting states undertake to investigate thoroughly each and every significant system failure, including accidents. The final incident reports from various of the accident investigation bodies are finely-detailed and carefully-reasoned documents. However, they are not without their weaknesses, amongst which are reasoning mistakes.

In order to demonstrate the worth of the Lewis semantics for the notion of causal factor in analyses of accident reports (Chapters 23, 24 and 25), we started from the 'complete' set of significant facts as established by the investigators and stated in the report. This is one form of incident report, but one already needs to have a completed analysis, the added value coming from checking whether the analysis is correct. But how is this analysis (the 'findings' and their causal interrelation) obtained in the first place?

A full WBA provides a method for determining which facts are relevant or significant; which facts may be relevant but nevertheless missing or even unattainable; whether the determined facts suffice to determine the sequence of events or whether one has only a selection from a determinate range of possibilities; and finally whether one's analysis is correct and sufficient via formal proof.

To illustrate WBA, we use a running example involving a commercial airplane landing at the wrong destination, without the flight crew (CRW) or Air Traffic Control (ATC) determining until the last minute or so that they had mutually different ideas about where the aircraft was headed.

First we reproduce three reports of the incident that we're analysing. The reports are by no means complete, which makes them ideal to show how a WBA can proceed from cursory descriptions to detailed analysis. We start a WBA from a 'time line', as shown in the formal statement 14.1 in Section 14. A time line is a report of the temporal succession of noteworthy events (formally speaking,

a conjunction of statements asserting the temporal precedence of one significant event over another). Time lines are common in accident synopses, as we show by giving some examples due to Peter Mellor in Section 13.2.

## 13.1 Three Reports of the Example Incident

### 13.1.1 DC-10 misses Frankfurt runway – by 300km

Report from *Flight International* [dWL95]

A Northwest Airlines McDonnell Douglas DC-10-40 carrying 241 passengers from Detroit to Frankfurt missed its intended destination by 300km (160nm), landing at Brussels Airport by mistake on 5 September.

The pilots of Flight 52 only realised their error when they lined the aircraft up for the approach at Brussels. In spite of that, they decided to land anyway. [...]

Early reports from Brussels air traffic control (ATC) attributed the original error to Shannon ATC, alleging that an incorrect code had been entered into the aircraft's ARC flight-plan data, redesignating the aircraft's destination to Brussels.

The Irish Aviation Authority denies this, saying that the crew had acknowledged its destination as Frankfurt, and that the correct data was passed to the London Air Traffic Control Center, the last such center before Brussels.

By the time the aircraft entered the Brussels control region, however, its destination has been redesignated, Brussels ATC maintains. [...]

The aircraft's planned track for Frankfurt would normally have taken it over Belgium at its cruising altitude of 37,000ft (11,300m), according to ATC conditions. The upper-airspace (above 24,500ft) over Belgium, however, is handed by the Maastricht ATCC in the Netherlands.

A senior Brussels ATC official confirms that the aircraft was cleared by the LATCC as it left the London control region to descend to 24,000ft and contact Brussels. The crew started the descent and called Brussels on the assigned frequency, addressing the controller as "Frankfurt" and announcing its intention to land.

Brussels did not question the addressing error which, Northwest says, occurred more than once in subsequent transmissions.

Brussels approach instructed the crew to descend in-bound via Bruno, a VOR navigation beacon on one of the standard approaches to Brussels Airport. The crew had to ask ATC for the VOR's frequency. The aircraft was subsequently cleared for an instrument-landing system (ILS) approach to Brussels's runway 25L, which is the same runway orientation as at Frankfurt, but with different ILS frequencies.

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At some point the crew finally realised they were landing at the wrong airport and opted to continue the landing for safety reasons, says Northwest. The airline has said that, whatever errors ATC may have made, if any, the crew must “share responsibility” for what happened.

### **13.1.2 Fly NorthWest Airlines to unknown destinations**

Report from the RISKS Forum [Lad95a]

<ladkin@techfak.uni-bielefeld.de> Sun, 8 Oct 1995 17:14:49 +0100

The International Herald Tribune for Monday Oct 2, p1, has a report on a DC10, NorthWest Flight 52, on its way to Frankfurt from Detroit. They landed in Brussels, much to everyone’s surprise except for the passengers, cabin crew and air traffic control.

A controller in Shannon changed the destination in the en-route computers for some reason no-one has fathomed. So everyone after that sent NW52 merrily on the way to Brussels. The cabin crew and passengers noticed, because the cabin flight-path display was showing them going to Brussels rather than to Frankfurt (the cities are 200miles=325km away from each other). The flight crew first noticed when they broke out under the clouds on approach to Brussels, and noticed that the layout of the airport was not similar to Frankfurt. Sensibly, they decided to continue the landing. And will remain landed until the investigation figures everything out. A spokesman for NorthWest pointed out that the crew \*should\* have known where they were.....

That reminds me of the time I was flying Chicago to SFO and following the ground on my WAC (World Aeronautical Chart). The routing went south of the Colorado/Wyoming boundary, past Aspen, and then over the Green river canyon, which is some 250km past Aspen. Just then, the captain announced ”We’re just passing Aspen, Colorado, out of the left window.” But we got there OK. Even United pilots can recognise the Mina and Coaldale transitions to the Modesto arrival when it hits them ;-)

Peter Ladkin.

### **13.1.3 Re: Fly NorthWest Airlines to unknown destinations**

Report from the RISKS Forum [Lad95b]

<ladkin@techfak.uni-bielefeld.de> Wed, 18 Oct 1995 08:20:00 -0700

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An article in Flight International, 11-17 October 1995, p8, entitled 'DC-10 misses Frankfurt runway—by 300km', considers the aftermath.

Brussels ATC attributed the original error to the Shannon ATC controller entering an incorrect code to the ATC flight-plan data. The Irish Aviation Authority denies this, saying the correct code was passed to London ATCC, the last such ATCC before Brussels. Brussels maintains that when the aircraft got to them, the destination data had been changed. 'A senior Brussels ATC official' confirms that NW52 was cleared by London ATCC as it left the London control region to descend to 24,000 ft (I think they mean Flight Level 240 but I'm not sure – I'll use FL's anyway). The aircraft's planned track for Frankfurt would have taken it over Belgium at FL370 under control of Maastricht ATCC in the Netherlands, which handles traffic over FL245 across Belgium.

NW52 also addressed Brussels as 'Frankfurt' on contact, and numerous times thereafter. Brussels ATC didn't question the 'addressing error', apparently. They were also cleared to a VOR, Bruno, that they didn't recognise, and asked for the frequency. They were cleared for an ILS RWY 25L approach, which is the same runway orientation as at Frankfurt, but with a different ILS frequency. NW says that the crew must share responsibility, no matter what happened with ATC (this is in any case what aviation law requires).

It looks like there is a lot for them to discuss.

Peter Ladkin

## **13.2 Typical History Summaries (Peter Mellor)**

### **13.2.1 26th June 1988, Mulhouse-Habsheim in eastern France. Air France A320-100, registered F-GFKC**

During a display flight (carrying fare-paying passengers on a sight-seeing trip) over the little aerodrome of Habsheim (near the town of Mulhouse), the aircraft failed to regain height after a low pass with flaps and gear extended. Intended fly-over height was 100ft. Actual fly-over height was 30ft. Aircraft struck forest at end of runway, crashed and caught fire.

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**13.2.2 5th December 1989, Lille, France Air Inter, A320 (type not given), registered F-GHQB Private aircraft, Mooney, registered PH-WJO**

On a regular scheduled flight from Paris-Orly to Lille-Lesquin, the A320 was approaching Lille in poor visibility (fog on the ground, visibility about 500m). At the same time a private pilot was about to take off for Amsterdam, and managed to be on the same runway. The A320 was unable to go-around in time, hit the Mooney from behind, ran over it, spinning it around and taking off the wings and tail, and came to rest on the runway.

**13.2.3 14th February 1990, Bangalore, India. Air India, A320-231, registered VT-EPN**

On a regular scheduled flight from Bombay, aircraft lost height and speed on final approach, descended below the planned approach path, struck the ground short of the runway, bounced, hit an embankment, disintegrated and caught fire.

**13.2.4 20th January 1992, Strasbourg in eastern France Air Inter, A320-111, registered F-GGED**

On a regular scheduled flight from Lyon-Satolas to Strasbourg-Entzheim, the aircraft (after a last-minute change of flight plan) descended three times as fast as it should have done on its final approach, and struck a mountain 10.5 nautical miles from the airport. It was flying at night in instrument flight conditions (thick cloud).

**13.2.5 14th September 1993, Warsaw, Poland Lufthansa, A320-200, registered D-AIPN**

On a regular scheduled flight from Frankfurt to Warsaw-Okecie, the aircraft landed in a heavy rainstorm with strong gusting winds. Only the right main gear made proper contact with the runway, and the crew were unable to deploy ground spoilers or reverse thrust for 9 seconds. It ran off the end of the runway and struck an earth bank 7m high. It went over the top, crashed on the other side and caught fire.

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