FILM REVIEW

**Review of British Broadcasting Corporation (BBC) Channel 2
documentary series "Crowded Skies"**

Dr Simon Bennett MRAeS
Scarman Centre
University of Leicester
England
sab22@leicester.ac.uk

The "Crowded Skies" documentary series, shown to air on August 3rd, 10th and 17th 2003, is an excellent advertisement for objective journalism. The three-program series, produced for the BBC by Blast! films production, uses the systems approach to investigate several high-profile aviation accidents (both airborne and ground-based.) To their credit the program makers consider not only the immediate causes of disaster (like pilot, maintainer or air traffic controller error) but also the *underlying* causes (like under-investment, inadequate regulatory oversight and political torpor). The series is an excellent advertisement for the systems approach to accident investigation, where both active *and* latent errors (in Jim Reason's (1997) argot, "resident pathogens") are included in the "causal chain". The series, copies of which (in the United Kingdom) can be obtained from the BBC via the British Universities Film and Video Council (services@bufvc.ac.uk), would make an excellent resource for teachers of risk, crisis and disaster management. At 60-minutes in length the programs could be used to stimulate a seminar discussion on any number of topics, from human factors to isomorphic learning (Toft and Reynolds, 1997) to the impact of tacit (and therefore difficult-to-scrutinize) political agendas on risk exposure.

The three programs mix footage from news agencies and official bodies (like the UK Ministry of Defence) with reconstructions and indepth interviews. The reconstructions are high quality, the sets are realistic, and the actors and dialogue convincing. From an ethnographic standpoint the interviews are compelling and valuable. There is much primary data here. The testimonies of pilots, air traffic controllers (from countries as diverse as Switzerland and India), designers and suppliers of safety equipment (like ground movement radar), victims' lawyers

and the relatives of the dead and injured are frank, focused and illuminating. The to-camera pieces of the relatives of the dead and injured are particularly compelling.

The first program, "Crowded Skies: no room for error" commences with a review of commercial aviation and its predicted expansion. According to the program makers "Air travel is becoming a way of life." In the United Kingdom both primary and tertiary airports are coming under increasing pressure. Heathrow, Britain's "gateway," is now handling 1,200 movements per day. Further north, Newcastle, one of the country's tertiary airports, is dispatching more flights through airspace frequented by fast military jets like the Tornado and Jaguar. An air traffic controller explains that the (necessary) unpredictability of military flying can create problems for civilian scheduled traffic. The fact that some UK scheduled traffic has to fly through uncontrolled airspace exacerbates the problem. Unlike aircraft flying in controlled airspace (which are actively managed by UK air traffic control), aircraft flying in uncontrolled airspace are free to do what they want. In the case of fast jets like the Tornado (capable of flying at twice the speed of sound) this means executing rapid changes of altitude and direction. Inevitably, say the program makers, this impacts UK commercial aviation's risk exposure. Near-misses (or "Airproxes") with military aircraft are not unknown. One is discussed in this first program.

The program goes on to discuss the importance of situational awareness (SA) to safe operation. It is claimed that SA is in part predicated on effective communication. While the International Civil Aviation Organization (ICAO) promotes English as the lingua franca of commercial aviation, in practice countries are free to use whatever language they wish (ICAO's Standards and Recommended Practices (SARPs) cannot be enforced). The program makers suggest that non-compliance by air traffic controllers at Paris/Charles de Gaulle airport may have led to the death of a British pilot. In May 2000 an Air Liberté passenger jet collided with a cargo aircraft operating between London Luton Airport and Paris/Charles de Gaulle. The wing of the Air Liberté aircraft impacted the cargo aircraft's flight deck. Both pilots were injured. One later died in hospital. According to the surviving pilot, their SA had been compromised by the controllers' use of French. If the controllers had issued their instructions to the Air Liberté aircraft in English, he says, the accident might not have occurred. The lesson here is that safe operation is premised—in part— on common standards and practices. Homogeneity reduces risk exposure. Heterogeneity increases it.

In the final case study the program makers draw lessons from a November 1996 mid-air collision between two large passenger aircraft: a Boeing 747 "jumbo jet" and an Ilyushin-76 (Il-76). The jumbo jet was departing Delhi at the same time that the Il-76 was approaching the airport. Both aircraft were on the same track (standard practice at the time of the collision.) The jumbo jet had been cleared to climb to a flight level of 14,000 feet (FL140.) The Il-76 had been cleared to descend to 15,000 feet (FL150.) The Il-76 descended below its cleared level. In the resulting head-on collision several hundred people lost their lives. The accident report criticized the crew of the Il-76. To their credit the program makers look beyond the immediate causes of the collision (human error) and take in the accident's larger technical and procedural context. They point out two potential error-inducing conditions: first, Delhi's practice of allowing aircraft to approach and depart the airport on the same track (or "flight path"); secondly, the limitations of Delhi's air movement radar. While it showed the direction of flight, it did not display altitude. Consequently the air traffic controller in charge of the jumbo jet and Il-76 had no way of telling from his display that the Il-76 had descended below its cleared level. Following the disaster Delhi installed a more capable radar system and ended the practice of funnelling departures and arrivals through the same air corridor. This analysis is an excellent advertisement for the systems approach to accident investigation, in that it scrutinizes the *underlying* causes of the event: procedural and technical deficiencies. For once, politicians, regulators, accountants and managers, and the latent errors they help to create, are put in the spotlight—and rightly so.

The first program also touches on the way in which, in certain countries, those involved in accidents are treated by the local or national police service. The British pilot who survived the collision with the Air Liberté aircraft was subjected to a day of questioning by French police. They questioned him in hospital then told him he may face manslaughter charges. While this is accepted practice under the Napoleonic Code, it is worth asking what, if anything, is to be gained by questioning injured persons in hospital (in this case an injured person whose colleague later died of his injuries) then telling them they may face charges. Given that one of the causes of the accident was the controllers' use of French this behavior would seem ill-judged. The program suggests that the French may be over-zealous in seeking to practice and preserve their mother tongue. It describes Air France's failed attempt to get its pilots to speak only English. It took just eight days of concerted opposition for the company to back down. French is regularly spoken by controllers and pilots

at Paris/Charles de Gaulle. Situational awareness is still an issue for those who use the French gateway. Whether from Europe, the Americas, Africa the Middle East or the Pacific rim, no crew should have to accommodate idiosyncrasy at the end of a stressful and fatiguing flight.

The second program investigates accidents on terra firma. Crucially "Crowded Skies: danger on the ground" takes a holistic view of such accidents. For example, in their analysis of the October 2001 ground collision between a McDonnell Douglas passenger aircraft and a Cessna Citation business jet at Milan's Linate airport (used by UK airlines like British Airways (BA), British Midland and easyJet) the program makers highlight not only the various active errors committed by the Citation's pilot and the duty air traffic controller but also the failure of the Italian authorities to provide Linate with a functioning ground movement radar. Given its vulnerability to mist and fog, Linate had been equipped with a "first generation" ground movement radar system. Although unable to give an audible conflict alert warning, the system at least enabled controllers to track aircraft in low-visibility conditions. In 1994 the airport purchased a "second generation" system from Norwegian company Park Air Systems Radar. This system provided controllers with color displays and audible conflict alerts. Instead of installing the new system, the airport continued to use its old system (where controllers had to watch the screen to anticipate conflicts.) When this system failed in 1999 the airport chose not to install the more capable Park system. It remained in store. The Linate accident demonstrates the importance of considering both the immediate and underlying causes of disaster. Certainly the pilot and controller erred. But so did the authorities. Had they installed the Park system at the earliest opportunity the Citation's runway incursion might have been prevented—and 118 lives saved.

The final program in the series ("Crowded Skies: the blame game") examines Europe's worst mid-air collision in thirty years—that over Überlingen in Germany on the night of July 1, 2002. The collision between a Bashkirian Airlines passenger aircraft and a DHL cargo plane cost the lives of seventy-one people, forty-five of them children. The Russian children, aged 9-15, were on an educational trip sponsored by UNESCO. Again the program makers take a holistic view of the disaster. While agreeing that errors were made by, for example, the controller at Skyguide's Zurich en-route center, they are careful to highlight various contextual factors, like the controller having to work with degraded radar equipment (due to a planned overnight software upgrade) and a faulty telephone system. Additionally the controller, who had been left in charge by his colleague (who had decided to take a break,) was hav-

ing to divide his attention between an aircraft on approach and crossing high-level traffic. This meant a) that he had to physically move between workstations and b) that he had to retain and update two mental models for aircraft in different phases of flight. The controller was under some pressure, therefore. Certainly he erred, but under adverse operational and technical conditions. As Reason has so eloquently put it:

> "[H]uman error is a consequence not a cause. Errors ... are shaped and provoked by upstream ... factors. Identifying an error is merely the beginning of the search for causes. *Only by understanding the context that provoked the error can we hope to limit its recurrence* (my emphasis)" (Reason 1997, p. 126.)

Überlingen was a tragedy for all concerned: for those who were killed just as their lives were beginning; for their relatives and friends; for European aviation; and for the Skyguide controller who found himself the victim of a witch-hunt.

This documentary series maintains the Corporation's high ideals. It both informs and educates. It only remains for educators to use it to promote a more holistic and therefore robust understanding of human error and technical malfunction. Sadly, I suspect that it will have only a limited impact on those who rush to blame such front-line workers as pilots, controllers, maintainers and ground handlers. While such people can and do make mistakes, it is vital that the—perhaps understandable— desire to apportion blame is tempered by a determination to unveil the *root causes* of error. The fact that the unveiling of such causes may embarrass the rich and powerful (CEOs of corporations, civil servants or Ministers of the Crown/Congressmen, for example) should not deter lawyers, journalists and official investigators. Thankfully it did not deter the Columbia Accident Investigation Board (CAIB) whose report into the loss of STS Columbia highlighted not only localized technical failures (like the fracturing of the fuel tank's thermal cladding) but also such contextual factors as NASA's safety culture.

References

Reason, J. 1997. *Managing the Risks of Organisational Accidents*. Aldershot: Ashgate.

Toft, B. and Reynolds, S. 1997. *Learning from Disasters: A Management Approach* (second edition). Leicester: Perpetuity Press, see pp. 61-64