The Sociopolitics of Accident Investigation

Peter Ladkin
University of Bielefeld and Causalis Limited

Abstract

In France two court cases began in 2006 about aircraft accidents. One concerned the Air France Concorde crash in Paris in July 2000, the other the Air Inter A320 crash on approach to Strasbourg in 1992, this 14 years after the accident. The journalist Pierre Sparaco observed in a series of three articles in the trade journal Aviation Week and Space Technology that many countries let legal investigation take priority over scientific investigation of accidents, and that this is widely recognised to be disadvantageous for the engineering investigation, whose main concern is to establish the conditions under which an accident took place and to advise on means to avoid such related occurrences in future operations. His first observations concerned the French investigation system, but before the year was out he had another example: the investigation into the September 2006 mid-air collision of two aircraft over the Amazon jungle, the B737 commercial transport aircraft of GOL, GOL 1907, and an Embraer Legacy bizjet, being delivered to its U.S. owners from its Brazilian factory.

The aircraft collided, despite being equipped with the latest version of TCAS, the collision warning and manoeuvre-advisory system. The U.S. pilots of the Legacy had their passports withheld, were unable to return to the U.S., were confined to a hotel room in Rio de Janiero for a number of months and were threatened with prosecution almost from the beginning of the investigation. The two aircraft were flying in opposite directions at the same altitude on the same airway, and theoretically talking to the same control center. The TCAS systems had not activated on either aircraft, supposedly because the transponder of the Legacy was not operating. The two aircraft were talking to different controllers at two physically separated locations, despite being in one local airspace. The controller had lost communications with the Legacy some time beforehand, had advised an altitude change but had received no acknowledgement from the Legacy. A subsequent investigation by air traffic controllers into display software being used at the control center showed that under certain circumstances (which pertained in the case of the collision) the displayed altitude of the aircraft did not correspond with the altitude at which one would expect that the aircraft was flying.

The Royal Aeronautical Society, the Flight Safety Foundation, and the Civil Air Navigation Services Organisation all issued statements supporting the primacy of scientific over legal investigation of commercial aircraft accidents. According to Sparaco, this primacy is also part of the undertaking of signatories to the International Civil Aviation Organisation, to which France and Brazil also belong.

Also in September 2006, a German magnetic levitation train (maglev) known as the Transrapid suffered an accident on its demonstration track near Lathen in Lower Saxony, North Germany, in which 23 people were killed. The Transrapid maglev hit a maintenance wagon on the track. The public prosecutor's office of Lower Saxony made early statements (on the same day as the accident) to the press that they were looking at human error as the main cause. A few days later, it emerged that the maintenance vehicle was not included in the technical safety system of the maglev. The prosecutor then said that “the main reason is that the maintenance vehicle is not integrated into the train security system.” He also said that “safety is the responsibility of people” and said the prosecutor's office had not yet been able to determine any “suspects”. A couple of days after that, it emerged that the operators of the track (a consortium of two of Germany's most prestigious engineering firms) had been asked two years before by personnel to include the maintenance vehicle in the technical safety system, and had declined. It emerged a few months later that the maintenance vehicle and Transrapid had used different communications systems to talk with the track control center.

Many issues arise from such high-profile accident investigations. The most obvious issue concerns how the sociopolitical goals and constraints of those involved in an investigation support or hinder the scientific goals, or what we may hope to be the scientific goals, of the investigation. My talk with concern itself with this issue, organised by a number of theses.

First, many look for “the cause” of an accident. However, our investigations as well as those of others show that there are usually many causes, and there is no generally-accepted method of assigning a relative importance to each of the causes.

Second, many hold it to be true that accidents are caused by either a technical failure or a proximate human error (i.e., operator error). However, accidents may also be caused in part by: incomplete procedures; incomplete understanding of the operational environment during design; overreliance on human operators to resolve conflicts and emergencies; a failure to incorporate tolerance of the inevitable operator errors into the system design, and so on; as well as by any number of specific causal factors which recur in accidents (such as that of using different communication systems to control two entities moving in the same space, a feature of both the Brazilian and the Maglev collisions).

Third, related to the first point, I don't know of any good reason to prioritise proximate human (operator) error over other causes, yet many legal systems seem to do just this.

I may well conclude that the lessons to be learned from applying scientific techniques for determination of causal factors in accident investigation, such as WBA or STAMP, have not yet been incorporated into the sociopolitics of accident investigation. This suggests that the most important way forward in accident investigation lies more through addressing the sociopolitics, rather than through further scientific advances in investigative techniques.