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**GRAPPLING WITH COMPLEXITY:
FINDING THE CORE PROBLEMS BEHIND
AIRCRAFT ACCIDENTS**

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Abstract

The purpose of accident investigation is the discovery of causal factors, so that they may be remedied, in order to avert the recurrence of accidents (ICAO, 1994). However, experience has shown that the present intuitive methods of analysis do not always achieve this aim. Investigation failure may come about because of failure to discover causal factors, or to devise effective remedies, or to persuade those in a position to act of the need to do so.

Each of these types of failure can be made less likely by the use of formal analytical methods which can show whether information gathering has been incomplete, and point to the sources of additional information that may be needed. A formal analysis can be examined by formal logical tests. Also, the use of formal change mechanisms can not only devise changes likely to be effective, but can present these changes in such a way that the case for them is compelling.

Formal methods currently available are concerned with *what* happened, and *why* it happened. To produce generic remedies which might avert future accidents of similar type, some formal change mechanism is needed. The Theory of Constraints has become widely adopted in business as a way of replacing undesirable effects with desired outcomes. The Theory of Constraints has not previously been used for safety investigation, and a principal object of this thesis is to see whether it can usefully be employed in this area.

It is demonstrated that the use of formal methodology can bring to light factors which were overlooked during an official accident investigation, and can ‘tell the story’ in a more coherent manner than is possible with present methods. The recommendations derived from the formal analysis are shown to be generic in nature, rather than particular to the airline involved and the accident studied, and so could have a wider effect in improving safety.

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