# Who needs safety nets?

Are you responsible for safety? That's an easy question to answer today, for we all (or most of us anyway) understand that everyone in the aviation industry, from the top to the bottom, is responsible in some way for safety. But it was not always so.

**By Ian Wigmore**

I remember the managing director of an airline I worked for not so many years ago who insisted that safety was the responsibility of the chief pilot and had nothing to do with him. In the end, the Civil Aviation Authority warned him that the airline's air operator's certificate would be withdrawn unless responsibility for safety was exercised at a very senior level. Nowadays, this is the norm in most countries.

Further down the scale, safety in the air is ultimately the responsibility of the aircraft commander, but individual crew members, in the cabin as well as on the flight deck, have a duty to assist him/her in exercising this responsibility. At one time, however, crew members were not encouraged to offer advice or to question the commander's decisions, sometimes with catastrophic results. After a number of avoidable accidents the problem was addressed by the introduction of Crew Resource Management (CRM). CRM training programmes are now mandated in Europe and most other parts of the world.

Similar considerations apply to aerodrome management and in air traffic control. It is now well understood that airport authorities are responsible for ensuring that their airports are equipped and maintained in accordance with international standards, and that air traffic control units are supported by adequate equipment and training to ensure safe standards of operation. Following the example set by CRM on aircraft, Team Resource Management (TRM) training programmes are now conducted to improve co-ordination within the ATC team.

So we are all responsible for safety. Our team members are our first line of defence – our first safety net – but they are not infallible. The real question concerns the manner in which we exercise our responsibility for safety. Are we conscientious and proactive, or do we, like the controller in Bengt Collin's "Friday the 13th is on a Thursday" published in the last edition of Hindsight[1], sit back and wait to see what happens?

In the early days of commercial flight, aeroplanes were unreliable machines that failed frequently. Consequently efforts to improve safety concentrated on improving component reliabil-

1- see http://www.skybrary.aero/bookshelf/content/bookDetails.php?bookId=574


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spent thirty years flying with the Royal Air Force and then commenced a career in civil aviation working for two airlines before joining ERA as Air Safety Manager.

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ity, providing fail-safe mechanisms and later, providing redundancy so that there was back-up to deal with the occasional failure. Later still, efforts turned to improving check lists, standard operating procedures and training.

At the same time, safety nets were gradually introduced in an effort to prevent disaster when all else had failed. At first these were fairly primitive, limited to innovations such as landing gear warning lights and over speed horns. Later, many other devices such as stall and take off configuration warnings were introduced.

Over the last 20 years, safety nets have become more sophisticated. Ground Proximity Warning Systems (GPWS) tell the pilots when proximity to ground may be a hazard and Minimum Safe Altitude Warning (MSAW) systems are gradually appearing to give a similar message to controllers. TCAS shows the pilots where nearby traffic is flying and if it gets too close, tells them how to manoeuvre the aircraft so as to restore safe separation. Short Term Conflict Alert (STCA) provides a similar warning of traffic confliction to the controller. The coverage of these safety nets is being extended to embrace more aircraft and air traffic systems.

New safety nets are under development. Area Proximity Warning (APW) will warn the controller that an aircraft appears to be about to enter controlled or other restricted airspace and Approach Path Monitor (APM) will warn the controller if an aircraft deviates from an instrument approach glide path. In the future, we may expect the appearance of more and more sophisticated safety nets.

At the latest reckoning, the Terrain Awareness and Warning System (TAWS), now mandated for many aircraft, has saved at least 30 and possibly as many as 100 aircraft from crashing into the ground. TAWS is a development of basic GPWS which identifies aircraft position over the ground using an on-board database containing an accurate computer terrain mapping of the world to give more timely warning of a potential ground impact. TCAS has also been extremely successful and has exposed to pilots how often they fly extremely closely to other aircraft, even in good VMC, often without realising it!

There is no doubt that these safety nets are effective but what needs to be clearly understood is how they must be used. Safety nets are intended as a last resort to prevent an accident when all else has failed. In theory at least, our normal operating procedures should make most of these safety nets unnecessary. For example, pilots should know where obstacles on the approach path lie and conduct their flights accordingly And controllers should clear aircraft so that they will not come into conflict with others and should monitor flight progress to ensure that the prescribed separation is maintained. And of course they do – well, most of the time…but what about the following events?

[1] In a series of articles published in 'Aero Safety World', Dan Gurney has described a number of TAWS successes. For example, in the December 2006 edition of the magazine[2], we learn how the pilots had planned for an ILS approach but the ground equipment failed a few miles before the initial approach fix. They were re-cleared for a straight-in non-precision approach on the same runway. The aircraft was 6 NM from the runway threshold descending through 500 ft above ground level when the TAWS generated a "TERRAIN, PULL UP" warning. The crew responded immediately and climbed to a safe altitude. The incident would probably not have occurred had they delayed commencing the procedure until they had briefed thoroughly.

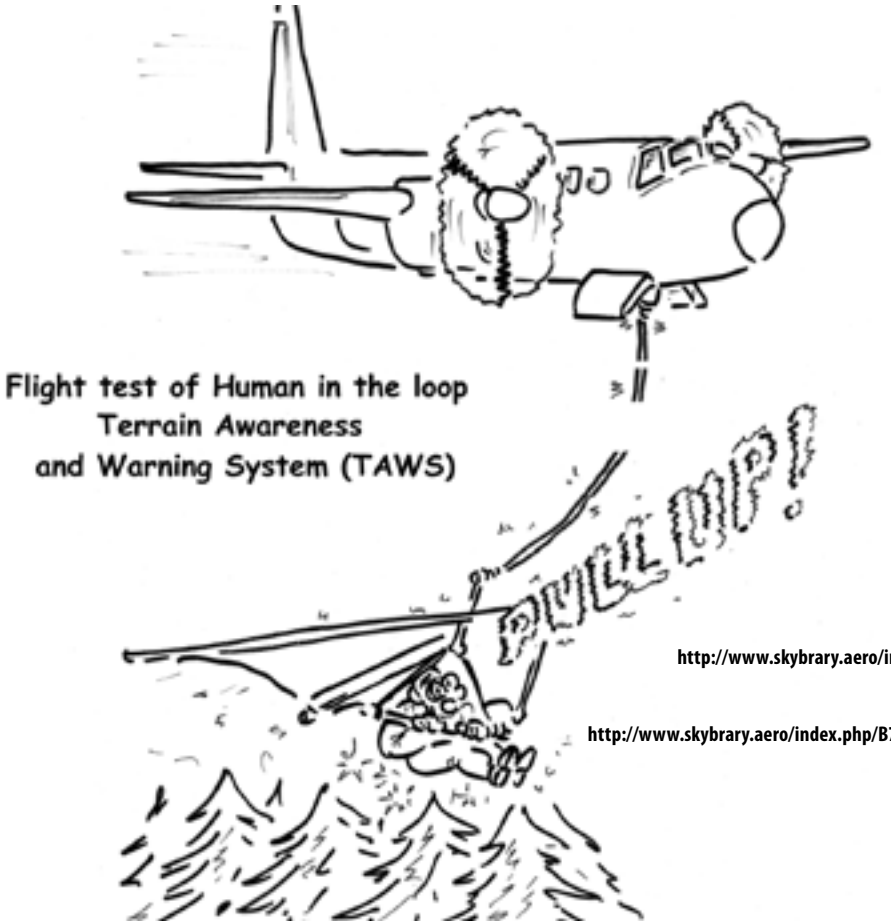
2- see http://www.flightsafety.org/asw/dec06/asw_dec06_p47-49.pdf

## Who needs safety nets? (cont'd)

[2] We all know what happened over Überlingen[3] in July 2002. All 71 people aboard the two aircraft involved in this mid-air collision tragically lost their lives. Almost as notable, in the aviation world at least, is the fact that the pilots of one of the aircraft involved reacted incorrectly to the TCAS Resolution Advisory (RA) received on the flight deck. If they had followed the RA correctly the collision would have been avoided.

After this accident, ICAO reacted quickly to stress that pilots must always follow a TCAS RA even when ATC has issued contrary instructions. OK, you may say, it should never happen again, but that is not the point. The collision did not take place only because of an incorrect response to the TCAS RA. The primary cause was a breakdown in Air Traffic Control which allowed the two aircraft to come into conflict in the first place. I have deliberately said "it should never happen again." You may think I should have said "could not," but I am not prepared to bet any money on it! History tells us that truly unique events are extremely rare.

[3] Another accident involving safety nets which has hit the headlines recently is the September 2006 collision over Brazil between a Boeing 737 and an Embraer Legacy. According to the accident report, at the time of the collision the TCAS on board one of the aircraft was not on. It is probable that the collision would have been avoided if it had been. But once again, it must be stressed that the aircraft did not come into conflict because the TCAS was switched off but because the aircraft were flying on reciprocal tracks at the same flight level. The conclusions of the accident report[4] are complex and worthy of study but are not relevant to this discussion.




Yet another one in a million chance you may say, but also another situation that should never have occurred. Certainly, there is no room for complacency. TCAS, GPWS and the like are invaluable aids – true life-savers. But we are a long way from being able to rely on them as our first line of defence – and I do not think we ever will.

In spite of the very welcome introduction of more and better safety nets, and their increasingly widespread use, we must make sure that we do not drop our guard and become complacent. Responsibility for safety must never be delegated to technology. ■

3- see the official accident report at http://www.skybrary.aero/index.php/B752%2C_Uberlingen_Germany%2C_2002_(LOS)

4- see the official accident report at http://www.skybrary.aero/index.php/B738%2C_Gol%2C_Amazon_Brazil%2C_2006_(HF_AGC_LOS)