FLAVOURS OF **SHORT TERM CONFLICT ALERT**

by Ben Bakker

STCA came into being in the mid-1980s. At first a number of leading ANSPs incorporated STCA in their home-grown ATC systems. Soon ATC system suppliers incorporated STCA into their off-the-shelf products and today most ATC systems are equipped with STCA.

It was 2007 before the following definition of STCA was generally adopted. *STCA assists the controller in preventing collision between aircraft by generating, in a timely manner, an alert of a potential or actual infringement of separation minima*.

But having a common definition doesn't mean that there is or ever will be a 'one-size-fits-all' STCA. In order to be effective, STCA needs to be adapted to the environment in which it will be used. This adaptation is in fact a balancing act to find the optimum compromise between warning time and proportion of nuisance alerts.

So, how many flavours of STCA are there? Is the answer as many as there are STCA systems in operation? A typical ATC unit contains TMA sectors as well as en-route sectors. Traffic patterns are quite different: lower speeds, more turns and vertical evolution in TMA sectors and higher speeds, less turns and vertical evolution in en-route sectors. The same STCA system will have to serve both types of sectors and at least in theory each individual sector may have its peculiarities that warrant an ever so slightly different flavour of STCA. Let's stop counting and move on to tastes.

Sweet & Sour STCA

A recent study to which many European ANSPs contributed identified three strategies for adaptation of STCA. The first one could be dubbed 'Sweet STCA' and will lead to early STCA alerts for any potential infringement of separation minima. Its sweetness stems from the fact that there will frequently be nuisance alerts – a term used to indicate that the situation is correctly detected but not unsafe. But wait, another way of looking at these alerts is that they provide gentle reminders that the situation may become unsafe in the near future: better safe than sorry.

The opposite taste is 'Sour STCA' which will provide late alerts and only for potentially significant infringements of separation minima. Nuisance alerts are now less frequent – most alerts are not-so-gentle warnings that safety margins are eroding: somebody probably made a mistake.

It's not difficult to guess that the third strategy provides 'Sweet and Sour STCA'. This is an intermediate solution both in terms of warning time and separation protection.
So far we have looked at the predictive aspect of STCA. Many STCA also will generate an alert in case of an actual infringement of separation minima…sweet or sour?

STCA Turning Bitter

Choosing the appropriate strategy for a given environment involves operational considerations, including safety aspects and human factors.

Simply put, every additional aircraft in a sector doubles the number of potential conflicts. The proportion of vertical evolutions and the number of crossing routes adds to the complexity. More complexity necessitates moving further away from sweet towards sour.

Other, more indirect considerations are related to safety culture. If the chosen strategy is less appropriate for the environment and if there is a 'naming-and-shaming' safety culture STCA turns bitter. STCA does the naming, making it easy for management to do the shaming. In the past this scenario has led to stand-offs between controllers and management, sometimes leading to the worst possible outcome from a safety point of view: disabling STCA in the entire airspace or in significant parts of it.

Clearly, a 'just-culture' attitude to safety is an enabler for avoiding the above scenario, however not a guarantee. Management must also understand the need for establishing, implementing and maintaining an appropriate strategy, and make sufficient resources available. If not, another scenario may unfold: controllers (some more than others) may ignore or delay their response to alerts. Again, safety suffers.
Why is an appropriate strategy important? Because it makes STCA effective and this in turn makes an important contribution to safety.

Adding a Pinch of Salt

Every dish needs a pinch of salt to enhance the final taste. For STCA the final taste is the human-machine interface. An otherwise effective STCA becomes ineffective if the alert doesn't draw the controller's attention when this is urgently needed.

Some of the human factors involved are illustrated in the 'inattentional blindness experiment' conducted by Simons and Chabris in 1999. Observers were shown videos and tasked to only count the number of passes made by players with white or black shirts. At some point in the video an unexpected event occurred: either a tall woman carrying an umbrella or a shorter woman wearing a gorilla suit walked through the scene. More than half of the observers failed to notice this.

One way of drawing attention is by complementing visual information with aural cues. Visual information consists always of some kind of indication in the track label on the situation display and is often complemented with additional information about the conflict, such as changes to speed vectors or predicted miss distance. Aural alarms were once limited to buzzers, bells and sirens, and these were not popular. However, now, the possibilities for aural alarms are almost limitless. As with cooking, proper dosing the 'salt-of-STCA' is the secret to customer satisfaction.

It is often said that tastes differ. Some people love eating fish, others hate it. In any given ATC unit, controllers are unlikely to have identical opinions about their STCA. That doesn't matter if a large majority find that their STCA is well-flavoured, but it's time for action if this is not the case. After all, sooner or later you may need STCA to save your day, no matter if you are a controller, a pilot or a passenger!

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