Preventing the drift into failure: How do we know when we get it right

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Although there have been many changes over the last fifteen years – ANSPs and managers now have to pay much greater attention to achieving maximum efficiency – for operational staff the priority remains safety. It is important under these new and increasing pressures to continue to support our controllers and to help them achieve high productivity without prejudicing safety.

It has become necessary for some ANSPs to reorganise their operations to achieve greater efficiency, and there is a danger that in so doing their system may have become over complex and risk-prone. The challenge today is to make what is already an exceptionally safe system even more reliable.

ATC operational staff do their best to provide a safe and efficient service. But in their desire to help there is a danger that they might sometimes complicate a situation which the pilots would prefer to remain simple and uncomplicated. Incident analysis reveals that the many variables which controllers have to deal with often make their decision-making more complex and prone to error.

The most common types of error involved in loss of separation are those concerned with perception and consequent decision-making or planning. For example, the controller may fail to see the aircraft on radar, or may not detect the conflict on radar or on strips; wrong decisions may result from assumptions about aircraft performance and co-ordination with other units, and are influenced by the weather.

This simple analysis reflects not only information from all over the ATM world; similar observations are made in other safety-critical industries such as nuclear power, medicine and other transport systems.

To understand how changes in the ATM system have affected the operational staff, we need to understand what is happening and take steps to deal with it. Day 2 Day Safety Surveys (D2D) conducted by trained operational staff can reveal some interesting trends in behaviour. By watching and talking to the different teams it is possible to make more sense of the statistics already known from investigation.

Instead of confining observations to incidents and errors, observing what works well and how ATCO's and their teams manage difficult or risky situations can help us plan better for increases in traffic and changes in procedures and technology.

In practice, D2D reveals four main situations which operational staff do not seem to recognise as being risky. These situations are distraction, time pressure, On the Job Training and handover. The last two categories are not surprising and some of their associated causal factors are well known, however the first two categories may need some more explanation.
Distractions, which are almost always job related, cause the operational staff to juggle too many tasks with resultant increase in workload. Some of these tasks include:

- taking over the tasks of other controllers for short period
- helping other colleagues in an emergency or when a pilot makes a non-standard request
- taking phone calls whilst checking other information
- doing tasks in rest breaks which can interfere with the next operational session

Symptoms of time pressure include the desire to:

- execute a plan early and to 'keep things going'
- 'do it all' although it would obviously be better to split the sector to help the rest of the team
- provide a good service to the aircraft by keeping a climb or decent going
- help out other colleagues when they see problems, despite their own workload

Data from a set of D2D Surveys are shown in the diagram below. This can reveal differences in our underlying behaviour and the opportunities that exist to use tried-and-tested techniques to protect ourselves in risky situations.

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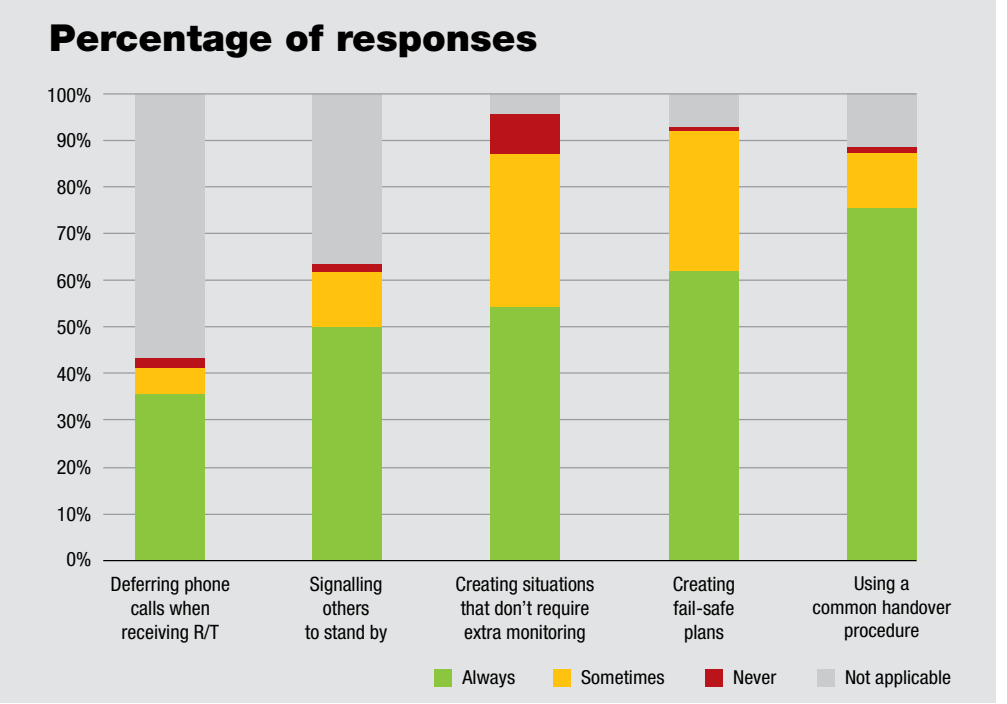

In this study, the incidents encountered were all familiar; however, it was the operational staff themselves who gathered the information about daily good practice and who suggested the mitigation and changes within the system to make an even safer operation.

The data from D2D was reviewed by safety teams at other ATC units and was cross-referenced with the unit's incident data. This helped them to formulate action plans to target the key areas which were identified.

At one unit, a pattern of errors was originally believed to have been caused by problems with strip management. However, review of the D2D observation data, discussion with data analysis experts and Human Factors specialists, and – most crucially – the close involvement of operational controllers from the sectors concerned, led to a different conclusion. With this assistance the unit was able to identify visual scanning patterns of both radar and strips as being the root of the problem. As a result, work commenced on Eye Movement Tracking experiments to determine the sector 'hot-spots' and to identify Best Practice techniques to protect controllers form the most common errors.

The results also confirmed the value of D2D. The overwhelming majority of flights enjoy an entirely safe and incident-free experience: if we relied for information solely on accident and incident reports we would miss many important lessons. D2D observations allow us to see the good techniques controllers employ – and how often they employ them. They help us see when techniques are difficult to employ and may suggest when those that work well may be adapted for use in other areas.

A further important benefit results from the fact that the observations are made by fellow controllers, while the solutions found are developed by operational staff – often the controllers' own colleagues. Those involved experience a sense of safety 'ownership' which leads not only to enthusiasm for driving safety improvement, but also to a related strengthening of the unit's Safety Culture. Safety Culture, of course, is a subject deserving its own separate article. Nevertheless, it is already evident that those units which have committed to D2D observations are already benefiting from developing the next generation of techniques aimed at keeping their decision-making straightforward, defending themselves against common errors, and thereby raising the standard in safety performance.

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