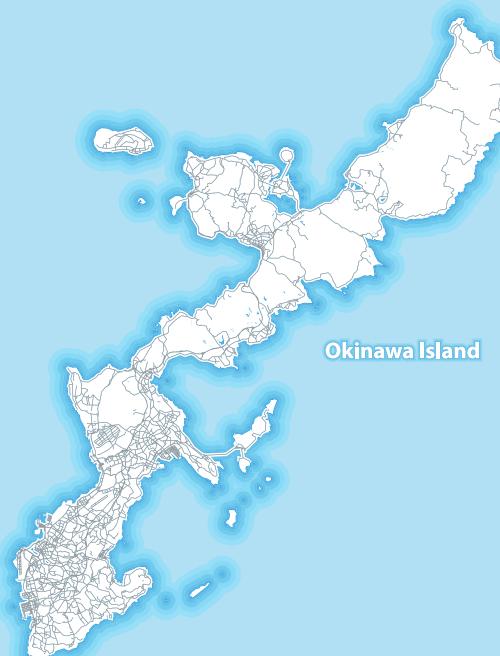


HIDDEN CHANGE

Change is not always obvious, and changes can be hidden by their presentation or how they unfold. From a pilots' perspective, **Nick Carpenter** describes three examples of 'hidden changes' with implications for safety.

KEY POINTS

- **Change can take many different forms: planned and unplanned, slow and sudden, expected and unexpected, obvious and hidden.**
- **Identifying the unintended consequences of change is difficult, but thought must be given to this during the change process.**
- **Understanding the reasons for differences between work-as-imagined and work-as-done can help in change management.**



Change comes in many forms. It can be planned, or it can emerge unexpectedly from situations. It can arise quickly, or occur slowly. It can be obvious or be hidden. Hidden change can be particularly troublesome because it is difficult to see and hard to understand. But in the technological world in which aviation has its roots, avoiding change is impossible, whilst making change can be essential for company growth and prosperity, and also for safety. In this article, I explore hidden change in the context of three examples that are relevant to aviation safety.

NOTAMs

In aviation, we have notices to airmen, or NOTAMs, which are meant to keep pilots up-to-date with short-term changes to airfields and navigational aids. An incident in July 2017, when an Air Canada A320 came within mere feet of colliding with a line of aeroplanes taxiing for departure, has raised the question of whether NOTAMs are an effective method of notifying crew members of the various small, but potentially important changes that they will face on a daily basis. The NOTAM system, which has been in use for many years was described by Robert Sumwalt, the NTSB chairman,

as "a bunch of garbage that no one pays any attention to" (Trautvetter and Lynch, 2018). The danger of important details being lost in the noise of large amounts of information was discussed in a recent United Kingdom confidential human factors incident reporting programme (CHIRP) feedback (Dugmore, 2018). Experience with NOTAMs suggests that the risk of many small changes hiding important information is increased by poor presentation, making information hard to understand. The fact that aviators are not fully aware of all NOTAMs is not non-compliance. It reflects the lack of time available to prepare flights, the amount of information that must be read and understood and the paperwork that must be completed before departure. Unsurprisingly, some information will be overlooked and some forgotten.

Precision Approach Radar approaches at Okinawa airport

Long-term or emergent changes can also be hard to see and can disguise hazards. In April 2014, a Peach Airlines A320 was approaching Okinawa airport in the southern part of the Japanese archipelago. The weather was poor and the captain considered that the ATC-suggested non-precision approach

was inappropriate for the conditions. Instead, a Precision Approach Radar (PAR) was requested, approved and flown. In the course of the approach, the crew descended early, reaching an altitude of 241 feet three nautical miles from the runway before conducting a go-around.

The busiest single runway airfield in Japan, Okinawa airport is constrained by two American Air Force airfields nearby: Kadena and Futenma. The consequence is that approaches to the southerly runway commence at 1,000 feet, restricting approaches to either non-precision or PAR. In a survey of pilots flying approaches there (Carpenter, 2018), it became apparent that many of them do not rely entirely on the instructions of ATC. Instead, they prefer to use onboard navigation systems to augment the ground controller's directions.

Historically, Okinawa airfield was an American air base only handed back to the Japanese Self Defence Force in 1982. PARs have only been conducted by civilian controllers in the last 5 years and Okinawa is the only civilian airfield in Japan where these approaches take place. This historical background has resulted in two issues peculiar to



Okinawa; a low platform altitude of 1,000 feet from which to commence the approach and the PAR itself. Training for both controllers and aircrew can only take place on the job because simulation is not available and, of course, PARs are rarely carried out. The change from military to civilian control has involved a gradual, and yet insidious change. Less well-practised controllers and crews conduct a complicated procedure for which they have limited on-the-job training under demanding real-world conditions. These issues, not identified in the official report, should be of concern. The fact that crews will consider using a GPS approach system in preference to an authorised PAR is, again not a reflection of undisciplined pilots. It is the by-product of a mismatch between design expectation and operational reality.

Carriage of lithium batteries onboard aircraft

In their book 'Nudge', Richard Thaler and Cass Sunstein emphasise the difficulty we have in judging the outcomes of change in areas where we are inexperienced or poorly informed, and where feedback is slow or infrequent. This is a common finding in human factors research. The unintended consequences of changes are masked, leaving latent problems in the system.

This can be seen in the industry change to allow the carriage of lithium batteries onboard aircraft. When the change was first made, some spoke out against the practice because of the associated problems. Lithium batteries carry their own oxygen, burn with extreme heat and create very little smoke, making them difficult to detect and extinguish. ICAO document 9481 'Emergency Response Guidance for Aircraft Incidents Involving Dangerous Goods' was amended so that some Group 9 cargoes, specifically RLI and RLM, lithium ion batteries and lithium metal batteries, had two, hitherto unmentioned, drill letters added. Group 9 drills carry 'no general inherent risk', but the two new drill letters F and Z meant that these particular cargoes were liable to catch fire, and once alight *aircraft fire suppression system may not extinguish or contain the fire*.

Discussions in the pilot community resulted in a general agreement that should lithium be on board, any indication of fire should automatically result in ditching. This was a radical suggestion and yet pleas to management to provide guidance on what should be done went unanswered. Where I work, promises were made

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to document the cargo and load it carefully whilst segregating it from other flammables. The unit load device containers designed by UPS to contain lithium fires were considered to be an unworkable solution because of the risk of damage to them. The Asiana Airlines accident over the Yellow Sea and the UPS freighter accident near Dubai, with the loss of their crews, focussed aviators' minds on the change to allow the carriage of lithium. And yet, as it stands today, lithium can still be carried on

freighters but the Emergency Response Guidance has been changed to remove the troublesome wording regarding the inability of fire suppression systems to contain the ensuing fire. Fortunately, there have been no further incidents and as Thaler and Sunstein would have predicted, the issue has been conveniently forgotten.

Talking about change in human work

In all these cases, an open discussion with the front-line actors could have unveiled the hidden problems. However, front-line employees may fear that what is uncovered in such circumstances could result in a new bundle of procedures, requiring compliance with those that were already being worked around, and potentially, disciplinary action. The terms 'work-as-imagined', 'work-as-prescribed', 'work-as-done' and 'work-as-disclosed' (see Shorrock, 2016) help to reframe the conversations to reflect the fact that front-line workers understand more than policy-makers about the operational reality, but struggle to get their concerns heard, understood or acted upon. Their daily interactions make them more aware of the inconsistencies between current procedures and the difficulties of practically enacting them. Unless these concerns are understood and acted on, to reduce the mismatches, the underlying problems can grow until something dramatic occurs. S



"I don't understand why you pilots are complaining.
All the information is there in the NOTAMs."



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