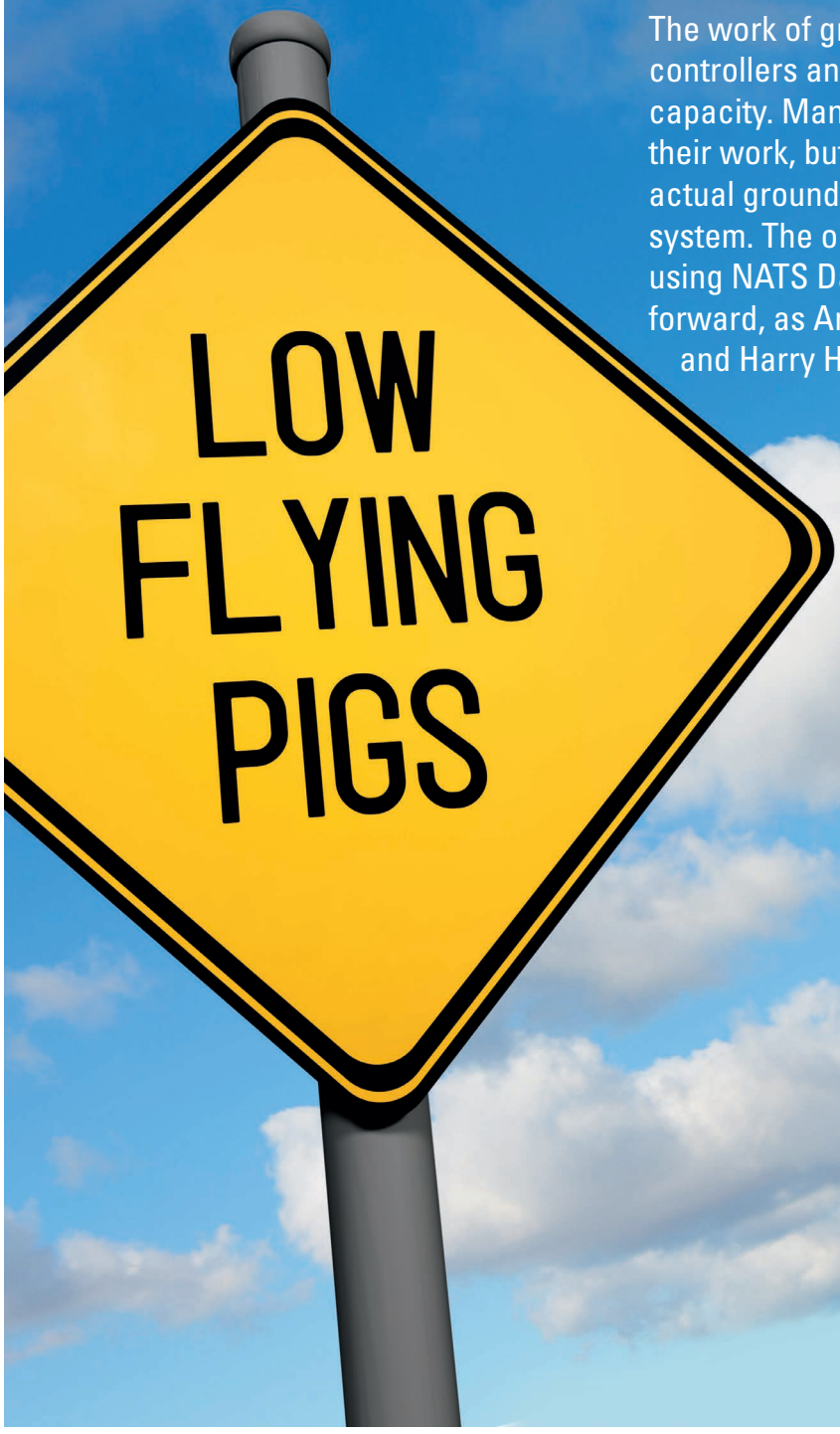
PROACTIVE SAFETY WITH GROUND HANDLING TEAMS… **AND PIGS MIGHT FLY!**



The work of ground handling staff is, like the work of controllers and pilots, critical for safety, efficiency and capacity. Many people have some imagination about their work, but little time is spent trying to understand actual ground handling work as part of the overall system. The observation of ground handling using NATS Day 2 Day method is one way forward, as Anne Isaac, Jason Cawdron and Harry Harrad explain.

KEY POINTS

1. **Surveying work as done, using the Day 2 Day Safety Survey method, will inform the safety management system (and managers) about how operational staff adapt their work to adjust to the demands of the system.**
2. **Often, those who manage highly integrated safety systems have a 'gut feeling' about how the system is being safely managed, but by observing the system, with well-structured observation criteria of actual behavioural data, factual evidence concerning work-as-done is highlighted.**
3. **In this study of ground handling, the adjustments and workarounds were mainly concerned with the constraints, and communication between the ground handling teams and the pilots.**

Aviation is considered an 'ultra-safe' system with very small numbers of serious incidents and accidents. However, even in ultra-safe industries, accidents happen that surprise us. Often in these cases, performance of the individuals, teams and organisation itself 'drifts into failure'. Small changes occur over time that are hard to notice because they gradually become normal. Alternatively, performance can simply become more variable, with no specific trend. This is often made more complex because what an organisation thinks is being done to maintain safety is, in fact, not always working as imagined.

Most airports, airlines and air navigation service providers have systems for event reporting, incident investigation and lesson learning. However, even mature systems related to these functions have three problems. Firstly, the data is reactive rather than proactive; the event has already happened. Secondly, accidents and incidents are often unique events, with different patterns of contributing factors; preventing future incidents is rarely possible. Lastly, since there are few accidents and serious incidents, we should not rely solely on such data for safety monitoring and improvement[1].

The figure 1 indicates the numbers of ground handling events by attribution from fifteen airports over 3 years. All events reported during the three years:

- were associated with more than one 'actor' in the airport environment
- have causal factors associated with air traffic controllers, pilots and drivers.

These and other reports of incident data demonstrate that this picture is not only complex, but also involve several interfacing teams; a situation which requires a new approach to risk analysis and safety.

System safety experts also agree that traditional approaches to improving safety are coming up against the laws of diminishing returns and are looking towards other leading safety indicators to help them understand safety and

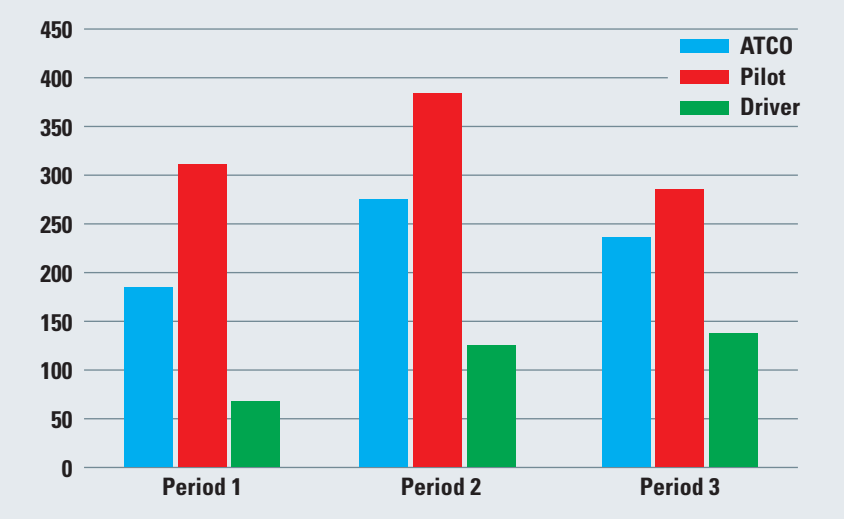


Figure 1: The attributable teams in ground handling events

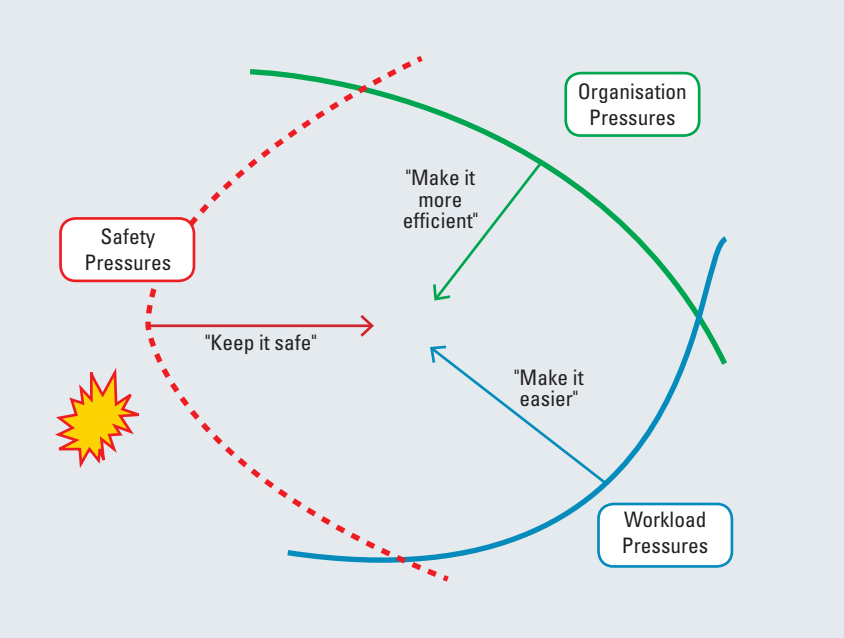


Figure 2: A safety framework (adapted from Rasmussen, 1997)

human performance. The diagram above shows the different pressures which all operations are continuously under.

Organisations place pressure on the operation to 'make it more efficient'. For example, we cannot fund every initiative, provide every variant of equipment or have unlimited funds for operational staff. The organisation must make a profit and there will always be a drive towards greater efficiencies. The green line indicates this.

Individually, there is only so much work that can be done and therefore workload pressures also play a part. If workload is too high then overloads can result and the operation may breakdown, resulting in actions such as 'stopping departures'.

Similarly, if there is too little work then the operation may be 'under-loaded' and there may also be safety incidents. The failure of the operation due to workload imbalance is shown by the blue line and the arrow shows the pressure to reduce workload.

1- In the UK, NATS only has 3 in 100,000 air traffic movements which result in an adverse event. This statistic compares with many other ANSP's and other comparable industries.

Lastly, there are safety culture programmes, safety initiatives, assurance methods and other activities all pushing away from the safety line where an accident could occur. These activities ensure that we keep the operation safe. We do not know where this accident line is; the only certain way to find out would be to have an accident. Therefore, we have a safety margin from the accident and we have other lines such as losses of separation or runway incursions which tell us something about whether we believe we are approaching the red accident line.

These three pressures change constantly and the point where we are operating will be in a different place from day-to-day and from minute-to-minute.

It is clear that with so few serious adverse events and the complexities of large safety critical teams working so closely together, we need to look at another perspective of safety. It is for this reason the relatively new concept of Safety-II (Hollnagel, et al, 2013) may deliver improvements to safety. The following principles of Safety-II need to be considered when developing this alternative perspective:

- Understand current performance, and how performance varies, to understand safety.
- Understand the pressures that cause the operating point to vary its position and drift towards danger.
- Develop the safety actions that will counter this increased pressure.
- Understand the trade-offs that are made in the operation to support efficiency, workload and safety.
- Understand the gap between work as imagined and work as done.
- Understand what actions we take to anticipate risk and whether we are approaching our safety margins.

Alternative safety observation methodologies have therefore been developed to examine these issues. These safety survey methods have several things in common:

- They focus on safety improvement.
- They are 'over the shoulder' observations by trained observers, who are also operational staff.
- The observations are confidential and non-punitive.
- The observations focus on the whole system not individuals per se.
- They are periodically recurring rather than continuous programmes.

The surveys have several key stages of development, including preparation, planning, data collection, data analysis, reporting, safety improvement activities and evaluation.

Day 2 Day (D2D) Safety Survey programme has been running in NATS for 9 years, and was introduced as a new initiative within a busy UK airport. The airside teams at London City Airport approached NATS last year to adopt this proactive safety approach and discovered some highlights about how work is done rather than work-as-imagined.

NATS safety specialists from Operational Safety and Analytics worked with members of the London City Airport Airside Compliance Team, NATS London City Air Traffic Control and Flybe Ground Operations, to define the issues of interest. Initially, a workshop was held to identify the key aspects and associated safety concerns of the turnaround and ground handling operations. The desired behaviours, attitudes and practices that helped to prevent the escalation of safety issues were explored and an observation form was created.

Following training by NATS, the London City Airport observers carried out a series of D2D Safety Survey observations on the apron, during summer 2016.

At London City, most aircraft turnarounds are within half an hour, due to limited aircraft parking and airline schedules. A typical turnaround involves:

- guiding the aircraft on and off stand
- connecting and disconnecting the auxiliary power unit (APU)
- connecting and disconnecting the stairs
- setting up and removing PIGS
- marshalling the unloading and loading of passengers/luggage
- refuelling, cleaning and special cargo loading.

This is a complex process involving communication and team working between various parties, within a limited time period. An error at any point could potentially impact on the safety of the aircraft and personnel.

Observations were undertaken during the arrival, turnaround, and departure phases of the operation, capturing the frequency of the positive behaviours identified on the observation form, across the following areas:

- monitoring for clear stand area
- speaking/listening/hand signals
- safeguarding of aircraft
- co-ordination between all teams working on stand
- monitoring all movement of vehicles – reversing, etc.
- control of passengers
- management of interruptions and distractions
- pressures associated with on-time departures.

The observations looked at the criteria that would allow the teams to positively achieve the objectives set around each phase of the 'turn-around'. However, for several of the above areas it was observed that teams would adjust their working protocols from those assumed or imagined. Examples were seen in the arrival and positioning of aircraft, which was not always planned from the ATC viewpoint, and then altered the timing and co-ordination of the ground teams. If this phase of the turn-around was not anticipated then the passengers were either delayed or marshalled 'out-of-sequence'.

Another example included the timing of the departure, which could be changed because of the aircraft status (cleaning, fuelling or baggage and cargo). Extra co-ordination was then required with ATC to accommodate the increased demand on the stands and their allocation. These situations then led the teams to use restricted, reduced or non-standard communication, and an increase in assumptions, which often led to delays in the turn-around activity itself. This was most apparent between the ground crews preparing the aircraft for departure and the flight-crews responsible for the pre-flight checks and assurance of the load sheets. The time

restrictions imposed on the teams in the turn-around phase demonstrated an efficiency-thoroughness trade-off (ETTO; Hollnagel, 2009).

So where do the flying PIGS come in?

Well it was known that in the dynamic environment of City Airport, the passenger inline guidance system (PIGS) was vulnerable to bad weather, jet blast and injury to those working and moving around the aircraft as well as being potentially a danger to passengers. These issues were highlighted during observation, as were the behaviours and task load that were associated with the system when the analysis of the Day 2 Day Safety Survey was complete. These data were then used, together with incident reports, to make a case for the purchase of more appropriate and effective PIGS – ones which are hoped will not be flying anywhere!

Figure 3: A new PIG with PIGLET

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