MANAGING GOAL CONFLICTS IN FLIGHT OPERATIONS

Not only do we each have to balance multiple goals, our goals can be in conflict with others' goals. **Captain Brian Legge** explains how we might not always realise how our goals diverge, nor the risks involved, but that we need to take time to understand each others' perspectives.

KEY POINTS

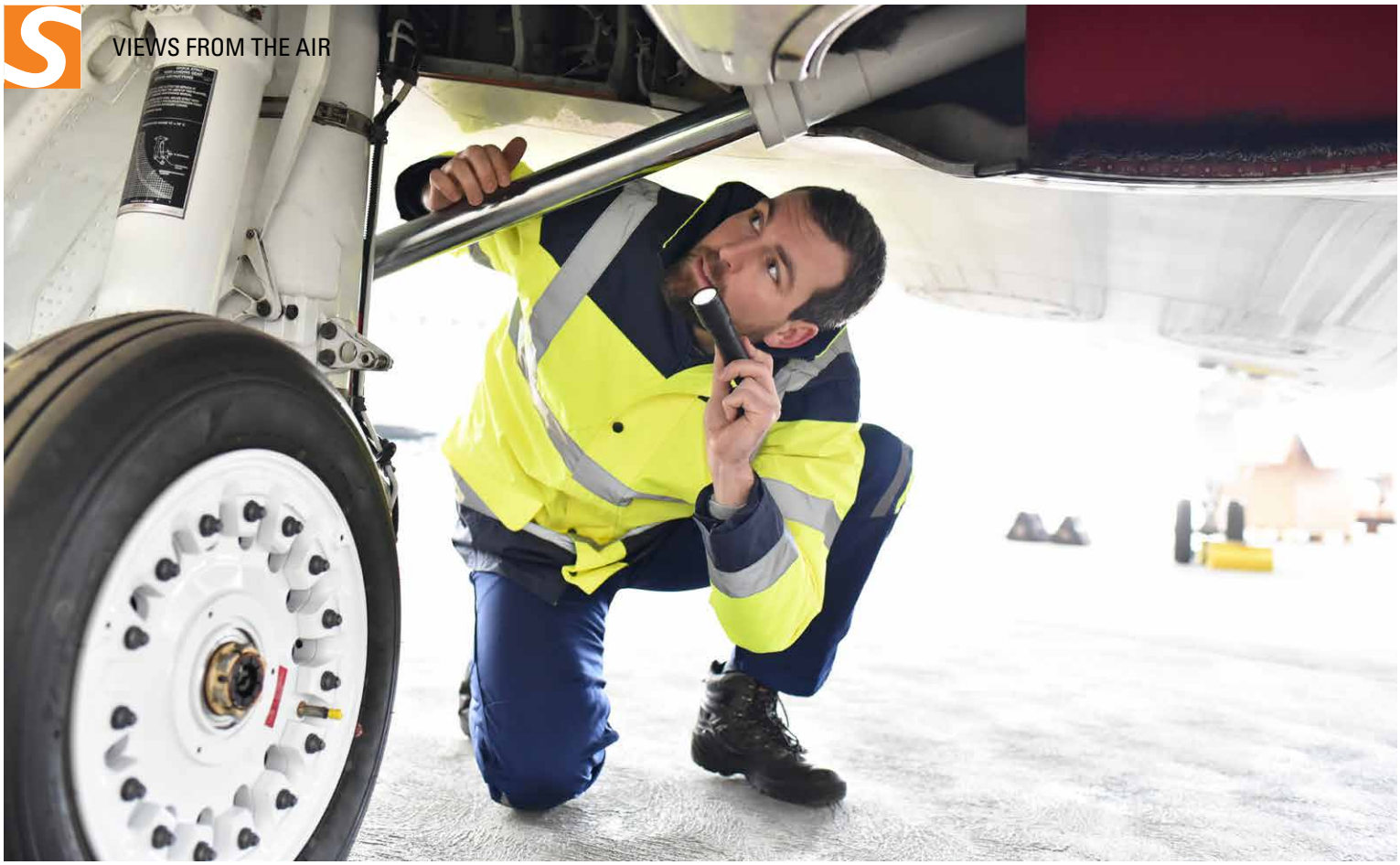
- **Goal conflicts are not limited to an internal pursuit of multiple goals simultaneously. Different people operating within the same system can view conflicts differently from inside their own operational reality.**
- **If not managed successfully, goal conflicts between actors can create a tug-of-war as different groups work to satisfy their own demands.**
- **To solve problems effectively, we need information, expertise that includes a systematic way of making decisions, and time to complete the process.**
- **It is impossible to maximise efficiency and thoroughness at the same time. However, we operate on a continuum that allows us to shift from one end of the spectrum to the other. Our movement from efficiency to thoroughness should not be driven by time or available resources alone, but also our assessment of risk.**

Nothing that a bit of oil or duct tape can't fix!

"Is that fuel pouring out the bottom of our airplane?!", the First Officer asked. I remember my heart sinking as I rounded the corner and saw fluid flooding out from nearly every vent and opening in the bottom of our shiny new jet.

Airline pilots, like air traffic controllers, make thousands of decisions in the course of their workday. Most of these are mundane or easy to resolve because they require previously acquired knowledge and expertise, recall of common experiences, or else the trade-offs are inconsequential. Nevertheless, to make these and many of the more challenging decisions we are faced with, people need the same thing: data. Data not only provides the contextual cues we need to interpret situations but also contains the technical knowledge, policies, procedures, and other resources needed to resolve conflicts. The work of airline pilots has changed significantly over the last 30 years. Whereas our biggest challenge was once the limited access to accurate, reliable data (such as weather, NOTAMs, aircraft status information, and company policies) the most frequent shortcoming now is the time we have available to make sense of it all.

For long-haul pilots and cabin crews, the efficiency-thoroughness trade-off (ETTO), as characterized by Erik Hollnagel, is particularly problematic. Aircrews are expected to be efficient processors of information; after all, on-time performance is a metric that drives passenger satisfaction, a key goal of airline management performance.



However, we are also expected to be thorough, as the safety of our system often depends on our ability to proactively detect and mitigate problems either within the data or our operating environment. As a result, there will always be pressure, either experienced directly, or as a byproduct of contradictory messages received from managers who oversee the system. The message is to be efficient, but if something goes wrong that message can shift to one that blames crews for not being thorough enough. Psychologist Dietrich Dörner remarked, "Contradictory goals are the rule, not the exception, in complex situations."

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To illustrate the ETTO concept, consider a flight from Toronto to Hong Kong. On the flight today, pilots must review a 17-page flight plan, eight pages of weather information, and 104 pages of NOTAMs! In his investigation of an Air Canada flight that nearly landed on a taxiway in San Francisco, NTSB Chairman Robert Sumalt expressed his frustration with the process, referring to NOTAMs as "just a pile of garbage that nobody pays attention to." But pilots are expected to pay attention to, and make meaning of, these data, as there might be an important piece of information buried deep within.

The amount of time allocated to this task varies but averages only 10-15 minutes before crews need to move on to the flight preparation phase. In addition to this, the flight duty clock starts once the crew arrives at dispatch or the aircraft. On a long-haul flight that approaches 16 hours, there is typically less than one hour of 'fat' available for contingencies. There is an opportunity to extend the crew duty period, known as Commander's Discretion, but the risks of increased fatigue and future demands of the flight must be considered. These are the constraints of a 'normal flight', before any mechanical or passenger management problems surface.

Returning to our leaky aircraft, we were scheduled to operate the flight from Toronto to Hong Kong in the evening. The aircraft had arrived less than two hours prior to the start of our duty. The mechanic approached us straight away and told us what happened. Here is how the conversation unfolded:

Mechanic: "*Prior to landing in Toronto, a pipe connecting the potable water tank to the aircraft galleys and lavatories burst. But you don't have to worry. We've already repaired it, so you won't be delayed.*"

Me: "*What about the water?*"

Mechanic: "*The water tank has already been refilled and confirmed to be free of leaks.*"

Me: "*Not that water, I'm referring to the water that was pouring out the bottom of our aircraft.*"

Mechanic: "*Oh, I can't fix that, I'm afraid. Once you get back to Hong Kong they will deal with the mess.*"

As a crew, we were conflicted. The mechanic said the aircraft was safe to fly yet his response did not instill confidence and we still had many unanswered questions! How much water was still pooled at the bottom of the aircraft? We were already near maximum takeoff weight, would the extra weight from any additional water

invalidate our takeoff performance? Where did the water go and what damage could it have done? Did it reach the Main Equipment Center (MEC), which houses the 'brains' of the aircraft where most of the electronic components are supported? What impact would the pooled water have if it were pooling up against the outermost layer or skin of the aircraft?

The most valuable lesson I learned from this experience was the need to take the time to understand and empathise with the challenges faced by other stakeholders in the same system.

It was at this moment I realised that our goals had diverged. It's not that the mechanic was unconcerned with our safety. Rather, he didn't appreciate the risks that his decision, which favoured efficiency, exposed us to. We didn't realise it at the time, but the mechanic had other conflicting goals as well. There was another aircraft arriving in less than an hour that needed his services and our parking bay. Moreover, he had only one apprentice to assist him and limited resources to complete the task, which should have included pumps, fans, dehumidifiers, and a large supply of towels. The design of the aircraft also made it difficult to determine the extent of the damage as the metal walls of the cargo area have a thick insulation lining to assist the heating system to regulate temperatures, as we operate in temperatures in below -50° Celsius at altitude.

Water did not reach any electrical components but a squishy walkthrough of the cargo area told us the insulation and areas around the metal skin were saturated. Water had pooled up against the outer skin layer under the insulation meaning it would be exposed to very cold temperatures as we transit through the polar region to reach our destination; as water freezes it expands and can damage surrounding structures. Unfortunately, the risk was lost on our engineer, so I turned to an analogy. "*Have you ever put an aluminum can of soda in the freezer to get cold quickly and forgotten about it? We are the can!*", I exclaimed.

Now that the mechanic understood our dilemma, the final task was to secure the resources necessary to do the job effectively. This required a frank discussion with operations that included the phrase, "*We aren't going anywhere until this is fixed properly.*" Faced with the alternative of securing 300 hotel rooms, the company agreed to remove some of the insulation, which came at a cost of payload as cargo had to be offloaded. In addition, our ground staff was able to obtain the necessary tools, including a large supply of towels and blankets, and recruit several extra hands from around the airport to assist in getting the job done and the plane back in the air without too much delay.

We did what was necessary to ensure a safe outcome and the flight was completed without exceeding our flight time limitations. The most valuable lesson I learned from this experience was the need to take the time to understand and empathise with the challenges faced by other stakeholders in the same system. Only by communicating our needs and challenges effectively, and actively listening to understand those of our mechanic, could we find a resolution. In this case, the resolution involved the getting extra resources to satisfy both of our goals.

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