

Beyond Covid: The Biggest Security Risks We Face Right Now

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Aviation has always been a **reactive** industry – because it needs to be.

Over time, forces beyond our control have continued to influence the way the industry moves forward and the way we operate.

For the past eighteen months, our reactive energies have been focussed primarily on one thing – a global pandemic. But it is important that we continue to react to **other changes** too – particularly when it comes to security, and the types of threats that we face are evolving.

As the industry begins to recover from Covid and press on into the decade, here are some of the biggest security threats that it will face.

Operating Near Conflict Zones

While the lines between aviation and politics are often blurry, they undeniably intersect. The point is that regardless of which side we choose to take, **we continue to operate aircraft over or in close proximity to active conflict zones**. Which means risk.

The past eighteen months have shown that conflicts can erupt with very little warning in busy flight corridors and with significant dangers to the aircraft flying above them.

This was the case last year in Azerbaijan, where almost **all west/east bound airways were closed** by the conflict below. Only months ago, Israel's Tel Aviv FIR was heavily affected by **widespread rocket attacks** while just this week, Afghanistan's Kabul FIR has been left with **no ATC services** following an overwhelming Taliban offensive.



More than 3000 rockets affected Israeli airspace over an eight day period in May 2021. Aircraft were immediately under threat from not only them, but widespread use of high-tech air defence systems.

Things can change quickly and the problem isn't going away in a hurry.

But perhaps more concerning is that the aviation system relies on the **sharing of information to keep us safe up there** (and ICAO Annex 17 demands it). But practically speaking, concerns remain over inadequate government intelligence sharing, especially in states involved with conflicts.

OPERATORS ARE REQUESTED TO EXERCISE PARTICULAR CAUTION DURING FLIGHT OPERATIONS IN WESTERN SAHARA AS PART OF FIR CANARIAS. IT IS RECOMMENDED TO AVOID OVERFLIGHT AT FLIGHT LEVELS BELOW FL200 ON THE FOLLOWING ROUTES: UY601, UN728 AND UT975.
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Your flight is tomorrow and you're not familiar with the politics of Western Sahara. Here's what the notams have to say. Is it safe to overfly?

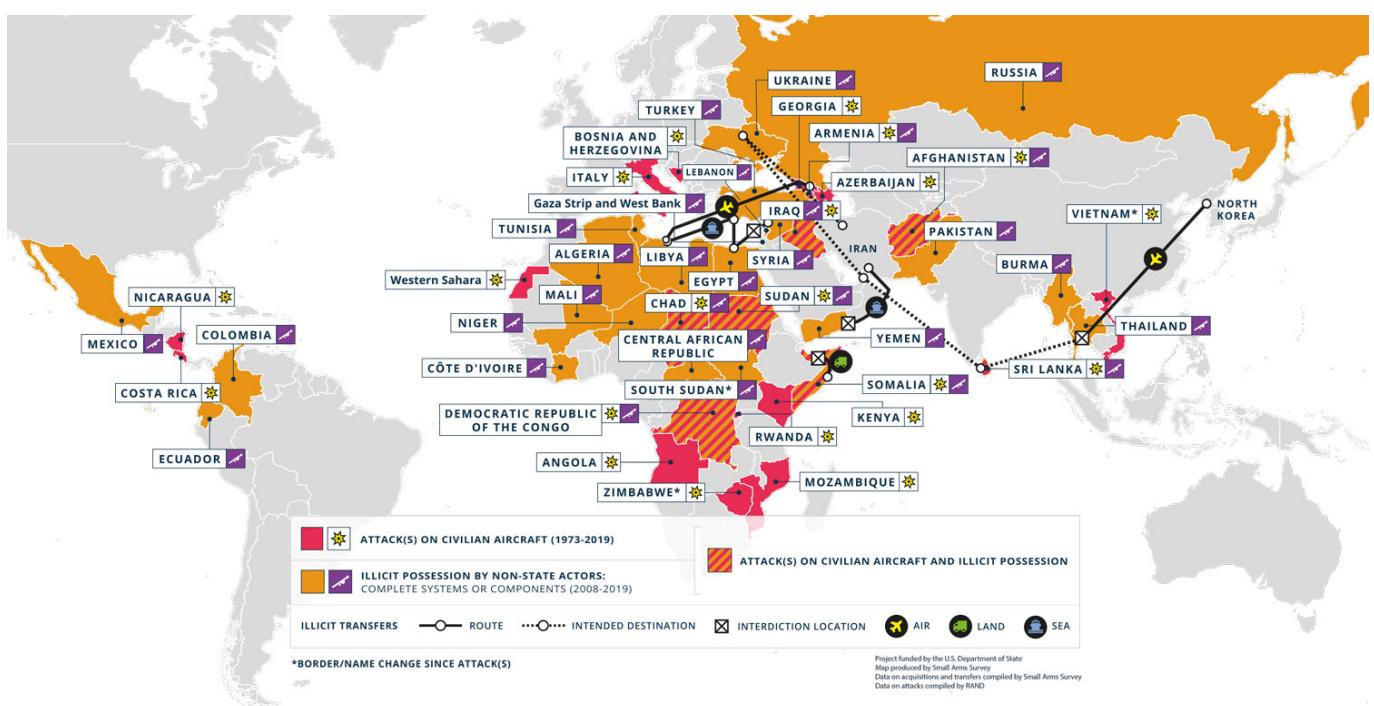
Until things change, reliable risk assessments will remain a challenge firmly on the shoulder of operators – and these will rely on **timely, unbiased and accurate information**. As we have often seen, that can be very hard to get.

Terrorism

Unfortunately, aviation will continue to be a target for terrorism.

While security at airports remains tight, the challenges of breaching it have led terrorist groups to develop new ways of targeting aviation interests. While large-scale attacks the likes of 9/11 seem more far-fetched with today's protocols, there is a renewed interest by terrorist groups in attacking so-called 'soft targets' – primarily **aircraft in flight** or **airports with poor security infrastructure**.

To make matters worse, non-state actors and large terrorist organisations (such as ISIS and Al Shabaab) are encouraging smaller groups or even just lone-wolf individuals to attack by proxy, which makes the threat difficult to prevent. These attacks don't need obvious leadership, and can be accomplished by low-tech means. Weapons such as **rockets, mortars and man portable air defence systems (MANPADS)** are of particular concern.



Non-state actors with access to MANPADs are spread throughout the world. Courtesy: US Dept of State.

Recent events at **ORBI/Baghdad Airport** serve as a good example, where multiple rockets were found stashed on nearby rooftops overlooking the airport.

Civil Unrest

In the past eighteen months, we've seen countries around the world suddenly erupt into periods of civil unrest. While beyond the realm of airspace warnings and Notams, the effects on **crew safety on the ground** can be dramatic.

While strikes and peaceful demonstrations can cause little more than inconvenience on the airport commute, it is when things get violent that the danger emerges.

Two examples spring to mind this year where the security situation on the ground changed rapidly and without warning.

The first is Myanmar where in February a **military coup** saw nationwide protests. Clashes with military police eventually turned violent with mass civilian casualties in the capital, Yangon. Disruptions continue there to this day.

The second is South Africa last month where a political and legal dispute led to **widespread rioting and looting** and became the worst violence that South Africa had experienced in many years.



Violent clashes between protestors and military resulted in mass casualties in Myanmar earlier this year.

Given the abundance of uncertainty that seems to characterise the modern world, it seems naive to believe that civil unrest is going anywhere in a hurry. Recent events have shown that even away from airports, aviation professionals continue to be at risk.

Cyber Threats

While the aviation industry has developed a strong track record of security practices from physical threats, it has struggled to keep pace with digital ones.

Studies have revealed some alarming numbers. EASA for instance have reported an average of **one thousand reported cyber on attacks on airports every single month**, while systems at airports in Israel fend off up to three million attempted breaches *per day*.

Unlike other industries, aviation is particularly vulnerable to cyber-attacks because the consequences can be so catastrophic. Successful attacks could literally cost lives.

Only two things are needed to open the doors to a cyber attack: **a vulnerability and a pathway**. We're heavily reliant on countless connected systems that have to operate in real-time and with super-high reliability. Many of them are safety-critical, and they have to be protected.

Have a ponder for a moment about just how far that rabbit hole can go. Here's a few suggestions just to get you started: Primary radar, secondary radar, EFBs, ADS-B, GNSS, Datalink, ACARs, even Fly-By-Wire. Heavy, heavy hitters in the safety game. This is before we even go down the road of the pilotless aircraft.



Safety critical systems such as CPDLC could potentially be targeted by cyber criminals.

As technology continues to improve our efficiency and make our jobs easier, it is also opening gateways for those with malicious intent. Aircraft are becoming smarter and more connected, but arguably also more vulnerable to attack.

The challenge in years to come will be **how to protect these critical systems**, or at least limit the impact when they are attacked.

Human Trafficking

The unlawful act of transporting people around the world in order to benefit from their labour or exploit them in other ways continues to be a global phenomenon. Particularly when they are suffering from economic hardship.

Recent studies have shown that as many as **700,000 people become the subjects of human trafficking every year**, with reports from over **127 countries worldwide**. It is aviation that is often the vehicle for this malicious trade. These unfortunate people are often travelling with forged or stolen documents, and may be under duress from the people they are travelling with.

It's an ongoing problem. ICAO itself is directly involved in efforts to address it through better training and an understanding of where in the world the worst hotspots are. However it is likely to remain a threat to aviation security for many years to come.

Threats to aviation security aren't new, but our reaction to them needs to be.

Moving forward our response to security in the industry must continue to evolve to meet the threat, regardless of what other industry pressures we find ourselves under. Undeniably, our safety and that of our passengers will depend on it.

Any Single Pilots Out There?

OPSGROUP Team

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The big talking point of the moment – Airbus and Cathay Pacific's project to have **only one pilot in the cockpit during cruise**.

So let's take a look at what this might mean for **safety, operations** and **pilots** worldwide.

The headlines are misleading

Cathay and Airbus have **not** designed a new A350 which no longer needs pilots operating it. There is **no** mega computer AI robot involved which is stealing our job.

The plan is to simply allow **one pilot to go and rest during “quiet cruise” phases**, while another pilot remains in the cockpit vigilantly monitoring (and probably with toothpicks propping their eyes open). This will allow them to potentially reduce the number of crew required on long haul flights, and while it means a change to procedures it is not really, as many are reporting, a leap towards pilotless flight decks.

Maybe just a small step

So, what are the considerations here that people are talking about?

GermanWings

The GermanWings accident resulted in a rule that there must be two persons in the cockpit at anytime. So if a pilot needed a bathroom break, a cabin crew member was required to come in. This was fairly contentious at the time because, as many pointed out, **what is a cabin crew member going to do** if a "situation" arises?

This **rule was eventually revoked**, in part because EASA and other authorities brought in new regulations relating to pilot psychometric testing. However, with only one pilot in the flight deck, this does raise various safety concerns - from events similar to the GermanWings accident, to the question of pilot incapacitation or even, what do they do if they need the loo?

What about the AF447 accident?

AF447 was, in part, **attributed to the experience levels of the two crew in the flight deck** - both First Officers while the Captain was out sleeping.

Using cruise relief pilots is not a new thing though, and in order to operate with a single pilot, that pilot will presumably need to meet a minimum experience level. Additionally, the Captain will maintain the decision as to when they leave the flight deck in their First Officer's hands.

The lonesome pilot can also recall their colleague to the flight deck should a situation require it. So the question really comes down to whether a situation is likely to arise where, by **having only a single pilot the result is more critical or catastrophic** than if two had been present and therein lies the problem - because years of aviation safety studies have shown time again that there is a reason we operate with two crew.

Safety in numbers

Modern aircraft, and the A350 in particular, have **many levels of safety and redundancy** to support the crew. They can automatically fly TCAS maneuvers. They can carry out an emergency descent at the push of a button. In addition, Airbus are working to demonstrate that their aircraft and systems are robust enough to basically not really fail. They are also designing them to be able to **autonomously handle any situation without pilot input for 15 minutes**.

This will be a big deal. It will mean, should something fail, *and* the single pilot be incapacitated, that there is time for the second pilot to wake up and make it to the flight deck to solve the situation. However, **recent aviation accidents involving malfunctioning systems** (designed to minimize pilot workload), and ongoing concerns about automation complacency highlight the potential downside of such advancements.

Can ETOPS can teach us something?

The A350 was certified for 370 minutes ETOPS. That's a long time. It is over 6 hours. 6 hours on one engine potentially. So what leads to this?

ETOPS is given to the operator, not the aircraft, and it is based on the operator's ability to demonstrate necessary airworthiness, maintenance and ops requirements. **It is really a statistical thing.** If an operator hasn't had an engine issue in a really long time then they are probably going to be able to get a better ETOPS approval.

So what does this have to do with only one pilot in the flight deck?

Well, it boils down to the same thing - statistics and procedures:

- How often does something go wrong in the cruise (which requires two pilots to handle it)?
- What procedures will be in place for ensuring safety and redundancy levels are maintained?

The answer to Question 1 might be “hardly ever”, but aviation safety improvements are built on the fairly simply idea that **if there is a risk, find a way to mitigate it.**

Even if that risk is minute, if it can be removed it should be. This is why astronauts have their appendix out before heading into space. This is why we have redundant systems onboard, or each pilot eats a different meal. Statistics might suggest an event occurring which a single pilot cannot deal with and which then results in a fatal accident or hull loss is tinier than a hair on a fleas back...

But if a risk exists that can be mitigated simply by retaining two pilots in the cockpit, then two pilots should remain.

A Disco onboard

They gave the A380 a bar and showers, now the plan is to have Discos...

DISCO actually stands for Disruptive Cockpit (I am not sure that sounds any better). This is the Airbus project looking at enhanced cockpit design to enable single-pilot operations on new aircraft.

The DISCO concept is looking to place core technologies into the flight deck in a ‘multi modal’ way. Things like pilot monitoring systems which track eye movement, voice recognition for commands, improved ground collision avoidance systems, new navigation sensors.

And of course pilot health monitoring systems.

An integral safety aspect of this concept lies in the monitoring of the sole pilot, and the availability of a system to detect if they become incapacitated, and to alert the remaining crew member.

It is only happening in 2025

The plan is to implement this in 2025. That is **3 and a bit years of procedure writing, regulation making, testing and trialling** before it is put into action, and there are a fair few obstacles that stand between now and that day :

- Regulators will be looking at their procedures with a fine tooth comb
- The pilot will probably need monitoring, particularly to ensure incapacitation does not occur (or if it does, the other pilot can quick-foot it back)
- There will need to be pilot training in place
- Airbus need to hit that 15 minutes of safe autonomy.
 - And these systems will also need to deal with situations where ‘Black and White’ failures do not occur. When you consider the multiple, varied and often “illogical” failures which can arise from a lightning strike, a bomb onboard, or multiple computer failures this does not look as simple as Airbus might say
- The approvals for this do not just sit with the Hong Kong authorities. Any state that the airline might overfly with only one pilot in the driving seat is going to have to be convinced as well
- Passengers will need convincing...

And they still need to answer the question of the toilet. We all want a little more information on how that 'specially designed unisex toilet' to be used 'in coordination with ATC' will work.

If this happens, they won't need pilots anymore

This is a contentious one to raise right now. Say 'single pilot' or 'autonomous systems' and a lot of pilots break out in a sweat, seeing themselves replaced by AI computers. But aviation has always been very innovative and those in it have always had to adapt to new technologies. Take a glance back to the 1980s and flight engineers were still a relatively common site in flight.

Ignoring the rather decimating impact of Covid though, **aviation was growing, and it was growing fast.**

Chances are it will again.

There are around 200,000 active pilots and forecasts suggested upwards of 500,000 would have to be trained over the next two decades to meet forecast growth demands. Even if every (long haul) flight deck sees the number of crew in it halved, it is still probably safe to say none of the current or new generation of pilots will be out of work anytime soon.

But we still are not convinced

There are unresolved questions here. **The main one being "Why?"**

You see, there is already this rather marvelous thing in an airplane - it can watch the pilot, it can monitor aircraft systems, and it can take over no matter what the failure or the complexity of that failure might be...

It is called "the other pilot".

There is a good reason why aircraft are multi-crew machines. So why are Airbus and Cathay Pacific investing millions into developing systems which can do this?

It isn't for safety...

This is being driven, not by manufacturers looking to increase safety, but by **an operator looking to reduce costs**. And for many, that appears an unwise and arguably unethical reason. Even if the statistical impact on safety is a 0.0001% decrease, that is still an unacceptable decrease when it is made for business reasons. There are also a great many places within an airline or operation where costs can be cut, and when cuts are made these should never occur at the price of safety, even if that price does seem negligible.

The main photo is of a pair of VietJet co-pilots who got married - because we think that's nice, but also because we liked the play on 'single pilot' in the flight deck idea. Congrats to them both for their lovely day!