

// Tim Hughes says ADS-B makes available to all, the sort of situational awareness that the FLARM warning system has provided to glider pilots for years.



ADS-B – FROM SCEPTIC TO CONVERT



Tim Hughes, a recreational aviator for 36 years, wasn't sold on ADS-B at first. Then he thought through the safety benefits.

At first, I was unconvinced by the requirement for ADS-B to be mandated. It's less economic than viable alternatives, but the safety case puts it all in a different light.

ADS-B Out does just one thing. It broadcasts your position, altitude, velocity, aircraft ID, and some other essential facts. Nothing more. The benefits of ADS-B depend entirely on what someone else does with that data.

From a safety perspective, ADS-B data is used in three main ways by:

- air traffic control
- other pilots
- search and rescue.

Air traffic control

It might have been nice, in some parallel universe, if a new aviation technology arose to fill an unmet need, and delivered that benefit so well that it was simply adopted by all because of its value. It would make the buying decision easy and need no mandate.

In practice in New Zealand, ADS-B has arrived primarily because the ATC radar network was near end of life, and something had to be done. It made no sense to refresh the surveillance system with old technology.

So, here we are.

If you want to use transponder-mandatory controlled airspace you'll have to have a suitable transponder, hence the ADS-B mandate. In this case (in my opinion) ADS-B is a 'dis-benefit'. You need additional capital to get the same service you had before.

The expense is somewhat offset. Airways avoided a great deal of cost because an ADS-B receiver network is much cheaper than radar. The government has given back much of that saving as a subsidy to aircraft owners who equip with ADS-B in the world's most generous grant scheme of its kind.

Commercial operators may be able to absorb the remaining cost. With half the New Zealand fleet involved in low-cost non-revenue operations, however, sport and recreational aviators who make light use of controlled airspace have to decide if the benefits are worth it.

For me, the next two safety cases make all the difference.

Search and rescue

Far and away, the most frequent need is to find aircraft in an emergency. ADS-B is a backup method in addition to emergency locator beacons.

Airways has extended the surveillance system coverage well outside controlled airspace as part of the ADS-B system upgrade, so you're more likely to be tracked – but not deep in the mountains.

ADS-B can also be picked up by the Aireon satellites, however, and Aireon provides a free-of-charge emergency aircraft location service. One call, and RCCNZ can have the last known location of a missing aircraft. Search and rescue may as well start there – it's likely they won't have to look very far.

Other pilots

For VFR operations, see and avoid works reasonably well. There are very, very few airborne collisions. Yet, as VFR aviators, most of us at some point have been 'jumped' to some degree, surprised by nearby aircraft we would have preferred to have noticed sooner.

It's no surprise then, that most pilot commentators have focussed on the advantage of ADS-B In. It's the one truly new feature enabled by ADS-B, and one of a VFR pilot's greatest-felt needs.

I've been a recreational aviator for 36 years, and recently started gliding. I've never felt as safe in an aeroplane as when flying a glider – there's so much less to go wrong! Gliders, however, tend to concentrate in areas of lift, where collision avoidance is front of mind.

For gliding, the parallel universe exists. For 15 years, gliders have used 'FLARM', a short-range collision warning system designed for GA. It was quickly taken up en masse, without a mandate, because the improved situational awareness was so worthwhile.

ADS-B makes that feature available to all. There's just no question that an air situation display showing aircraft equipped with ADS-B in your area is a great tool to supplement your visual scan and radio watch.

It works for IFR traffic too. Once every few years something happens to air traffic control, and it's temporarily disrupted. During these outages, airborne IFR flights use TIBA procedures (traffic information broadcasts by aircraft) to self-organise continued flight to safe landings.

The system is accepted and proven, but how much better would it be to also have an air situation display in the cockpit showing all relevant aircraft on a map?

Business value

The safety benefits are great, but my top pick for the value of ADS-B is actually commercial.

ADS-B has democratised access to air traffic surveillance data; think Flightradar24 and the like. My day job as a data scientist and operations researcher has made me aware of the millions in value that the data can unlock.

For airports, airlines, and organisations supporting air transport, there are solid opportunities to improve many things: on-time and environmental performance, capacity, asset utilisation, flexible scheduling in the ramp-up after COVID-19, logistics, fleet tracking, and more. To identify what you're missing, you'll need good data science.

But first, it will help if the aircraft in your world have ADS-B. ➡

Tim Hughes spent 20 years working for Airways in air traffic management software engineering, data science, and strategic research. He has since worked as a research consultant to the air traffic management industry.

// APPLICATIONS FOR THE ADS-B GRANT

To the end of July, there have been 650 applications for the ADS-B grant. In total, \$880,000 has been paid out in nearly 300 grants. Check out how to apply, on the back cover of this *Vector*.

