



## DRONES

# MAKING A CASE FOR SAFETY

By Andre P. Meredith

**S**afety is a word everyone in aviation is familiar with, but one which is also often misunderstood. It is one of those things we all know is important but is often ignored – especially when operational pressures pile up. A quick reflection on past aviation accidents should be a sobering reminder of this fact.

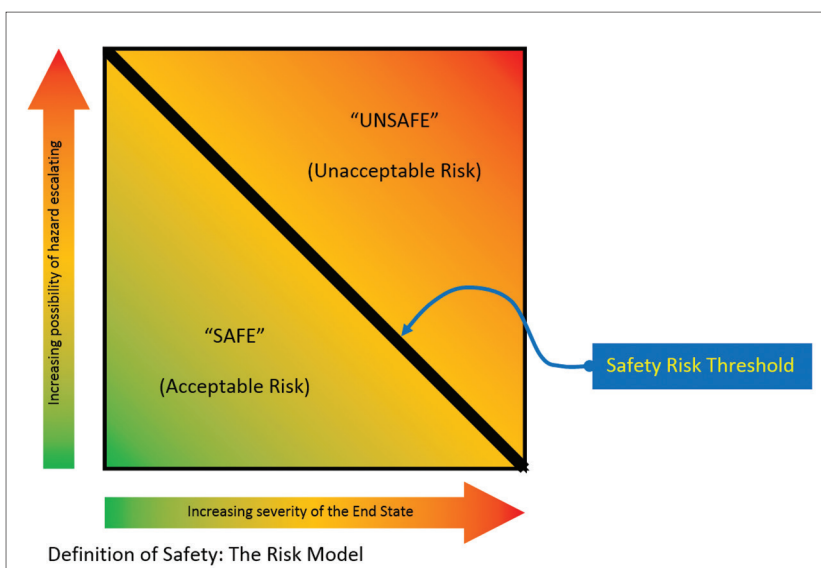
Regardless, it should come as no surprise that the concept of safety applies to commercial drone operations, too - including operations with 'small drones', in other words those weighing in the order of 20 to 25 kg or less. These drones are aircraft in their own right, no matter how small - they do fly and they occupy a segment of the National Airspace volume. They also have the potential to operate over unsuspecting or uncontrollable persons, over private or government property, close to national roads or aerodromes - and so forth. Such activities position drones where they have a potential to inflict damage or cause severe injuries, depending on circumstances. This should instinctively lead drone operators to err on the side of caution, but to what extent? To

what lengths should operators of small commercial drones go to ensure that their operations are carried out safely?

Before trying to answer this burning question, we should take a quick look at the often-misunderstood and slightly abstract term safety. According to Aerospace Recommended Practice (ARP) 4754A – “Guidelines for the Development of Civil Aircraft and Systems”, safety is defined as the state in which risk is lower than the boundary risk, the boundary risk being the upper limit of acceptable risk. Even this is a bit of a mouthful, but what should be evident from this definition (and many others like it) is that all situations will at all times harbor an element of risk. Risk will always be there, which means no system or situation can be regarded as 100% safe. The level of safety is an attribute of the amount of risk prevalent, but as long as the remaining or prevalent risk is below the “safety risk threshold”, things should be OK.

The model to the left alludes to safety risks per se, not other forms of risk, which could include financial risks, programmed risks, contractual risks and so on.

What can be deduced from the above is that safety risks needs to be managed







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in all situations to ensure that an adequate or acceptable level of safety is maintained. This is true within all spheres of aviation, and runs through the total Life Cycle of an Aviation System - in other words, safety risk management runs from the concept phase right through to system end-of-life. What is important for drone operators is that safety risk management should be an integral part of commercial activities. This is the primary goal of drone regulations.

So what should commercial drone operators do to ensure that operational safety risks have been reduced to acceptable levels? The simplest answer is probably 'adhere to the drone regulations', but we all know how easy this is, right? Regulations, as important as they are, can be difficult to interpret. An easier way to accomplish this is to follow good practice and develop a Commercial Drone Safety Case for your drone operations. If your Safety Case is comprehensive, robust and water-tight, all requirements as set out in the regulations should be complied with automatically.

In essence, a Safety Case is a body of evidence that presents a coherent argument that all credible risks associated with the operation of an air system have been addressed. In real terms the Safety Case documents all operational hazards and shows how these hazards will be controlled so that they do not escalate into undesirable safety risks or accidents.

The term 'Safety Case' is well-understood in military aviation circles, as well as in other forms of industry, including automotive, oil and gas and mining. It is less understood in commercial aviation sectors, but the intent is encapsulated within the aviation Safety Management System (SMS) model, which is required for all commercial aviation ventures.

In terms of drone operations, safety risk management is usually accomplished through adherence to operational procedures, personnel competence, appropriate licensing, hardware integrity, good planning and situational awareness during operations. To help drone operators come to terms with what is required, a simplistic Safety Case Checklist has been developed outlining the most pertinent safety-related matters requiring attention. To put it simply: if you have managed to put an honest tick in each box in the Checklist, you should be good to go as far as safety is concerned. The underlying set of documents (the 'body of evidence') generated through this process will form your drone operations Safety Case; the Safety Case could also be used when applying to the regulator for licensing, certification or other approvals.

One matter to keep in mind is that the Safety Case should be revisited and updated regularly to ensure that your actual operational intent matches your safety model. A self-audit process should be applied to verify that all safety risks remain 'in check' and the Safety Case (like any good SMS) should never be considered complete, until the system under scrutiny is withdrawn or the commercial venture ceases to exist.

The devil is in the detail of course, but the Checklist should guide drone operators to identify omissions and put measures in place to eliminate any undesirable safety risks - before taking to the skies.

An example of a Drone Safety Case Checklist is available at [www.dronesafetyhandbook.com](http://www.dronesafetyhandbook.com). The Checklist can be adapted as required. In addition, a host of templates representing a large portion of the "underlying documentation" referred to in the Checklist are also provided here and may be used as required.

Operators of commercial drones should not regard safety as an over-an-above and should remember that they are aviators - and as aviators, they have a responsibility towards safeguarding of the public against incidents resulting from their commercial ventures. It would be prudent for all commercial drone operators to do a self-assessment of their safety model to determine if there are any glaring undesirable safety risks unaccounted for - and then do all possible to resolve such issues. Utilisation of a Safety Case model is a great way to accomplish the aforementioned, which, if done properly, will yield a safer drone operating organisation, all towards the promotion of safer commercial drone operations. ➔



### WHO IS ANDRE P. MEREDITH?

Andre Meredith matriculated in 1989 and, following attestation in the South African Air Force, completed his Bachelor of Mechanical Engineering degree at the University of Stellenbosch in 1994. He then embarked on a long and diversified career in the SAAF which included aspects of design engineering, engineering management, project engineering, system engineering and finally certification of military air systems.

It was during his tenure as Chief System Engineer that he became interested in UAVs, and embarked on a process which eventually culminated in the completion of a Master of Science in Engineering degree at the University of Stellenbosch with research into the feasibility of utilising large UAS for long range maritime search and rescue.

During his tenure as Chief Certification Officer he provided oversight and guidance to Defence Industry on safety, regulation and testing of various military UAS. This included the Type Certification of the Dynamics Seeker 400 UAS, which at the time was only the second Type Certified UAS in the world. He also wrote the policy for the regulation of military UAS operations in the South African Department of Defence, and served as the military UAS advisor on the Aerospace, Maritime and Defence Industries Association of South Africa (AMD) UAV Forum.

In addition to his military duties he also spent some time as an Air Certification Consultant to operators of commercial UAVs, enabling them to apply for technical clearance certificates. It was during this time where the need for structured safety guidance to commercial and recreational UAV operators was identified, which led to the development and publication of his first book entitled "The Drone Safety Handbook".

Operators of Commercial and Recreational "drones" need to understand the importance of safety and also need to understand the potential risks to third parties - and how to identify, eliminate or at least manage these risks. Andre has opted to share his certification and technical risk management experience accumulated over the course of more than ten years, towards the eradication of unsafe drone operations and the improvement of safety towards the general public.