Flight Test *Safety* Fact

Published for the Flight Test Safety Committee

In This Issue

Take a fast flight through a small sample of Flight Test *Safety* **News** and accident reports **March Turbo Talk** is just one letter away from going supersonic in his review of the No Vote – for the first time ever, the Chairman assigns homework to readers of *FTSF* **OpEd**: AI brings more uncertainty, but applying statistical rigor is still not exhausting and will never inappropriate. Finally, as always, tell your friends about **our Podcast.**

Sundry Observations from recent Flight Test News

Time and space will not allow us to address every piece of relevant news reported since the last issue, but I want to at least point out a couple of important developments.

The US Air Force achieved a "first in the development of Kubernetes." The astute observer will note, in particular, that they took the specialized software to a top speed of approximately 67,761 mph.* More at the link: https://www.wpafb.af.mil/News/Article-Display/Article/2475374/586th-flts-accomplishes-air-force-first-in-development-of-kubernetes/.

USAF photo

In Flight Test accident reporting, I'd be remiss if we didn't at least link to these: Ikrut MC-21-300 skids off Runway during Rejected Takeoff Test

UK Air Accidents Investigation Branch publishes Alauda Airspeeder Mk II "flying car" accident report – the UAV climbed to 8,000 ft and entered controlled airspace during a loss of control incident because the "kill switch" failed.

Uncertainty about Statistics in AI Flight Test

"Statistical relevance was considered to the maximum extent possible during test design. However, due to the limited scope of the test...rigorous statistical methods are inappropriate. The test execution period and limited prior performance data were strong influences in the design of the test." I sighed loudly when I read it, when I came across it in the Executive Summary section of an AI + Flight Test plan.

The added complexity of new technologies, the difficulty of parsing what we mean by Artificial Intelligence (AI), and, finally, the nuanced delineation between this and "autonomy" are challenges that each and every flight test professional faces almost daily. This dilemma puts us at risk of losing mastery of the fundamentals. Our ability to understand probability and statistics is one such fundamental. Furthermore, **there will never be any test for which rigorous statistical methods are inappropriate.**

Suppose, for example, that I have a brown paper bag in my hand, and I don't tell you anything about what's in it. When I pull the first item out of the bag—let's say it is an ordinary red dice, the kind you would see in a casino—you will know, with certainty and all the statistical rigor in the world, that a red dice is a member of the population.

Before the "test" began, you knew very little about the contents of the brown paper bag. In contrast, I think we can all agree that we know much more about the outcome of any test before it begins. In both cases, with only a single outcome, we have a lot of information, and we can (even though we forgot how) use statistical rigor to quantify it. I'm convinced that "statistical rigor" often shows up in disguise.

If I gave you a fair quarter, and you flip it, what are the chances that it comes up heads? The answer to this question is simply elementary, yet none of us would deny that the answer is statistically rigorous. The pedantic engineer would argue that the domain of this discussion is not statistics, insisting that it is, in fact, probability, but I think we all know that the two disciplines are like two sides of the same coin. As I said, I'm convinced that "statistical rigor" often shows up in disguise, and it's precisely because we are so familiar with its appearance that we fail to recognize it as statistical rigor. I want to convince you of the need for and ease of statistical rigor in limited space, so I urge you to read the attached white paper for a more thorough treatment with no confidence intervals or normal distributions at all—you will not be exhausted.

Just as we bring the vocabulary of the warfighter to the technical rigor of aeronautical engineering and apply our knowledge of aeronautics to meeting the needs of the warfighter, we can do the same with statistics—this is the classical role of "test professional." We can speak a language not reserved for dusty textbooks, but instead we can communicate about uncertainty with the technical precision we use to execute flight test. Ultimately, let us be decidedly unashamed that we have found useful ways to make statistical rigor less exhausting.

Mark Jones Jr.

Turbo Talk – Chairman's Corner *Art "Turbo" Tomassetti*

As some of you may have seen, we had to cancel our North American Flight Test Safety Workshop this year, planned for early May. While we are hoping for an improving trend and decreasing restrictions due to COVID-19, we would not have been able to provide the event we wanted, and travel restrictions for many organizations would have impacted attendance. Having said all that, we are looking into what we can do for a virtual event at approximately the same time. Please stay tuned for more details as we sort out our options.

In the Feb podcast I talked about the No Vote. If you haven't had a chance to listen, I recommend it—I think the concept of the No Vote is an important one for any high-risk operations. If you are not familiar, consider this simple explanation: The No Vote is what happens when someone sees something that doesn't look, feel, or seem right or safe, they say something to stop or pause the activity. When I first presented on the No Vote back in 2008, I said I thought there were three distinct criteria to establish an environment where the No Vote could be used:

1. People *trained* to know when to use the "no-vote"
2. People *empowered* to use the "no-vote"
3. Leaders that understand how to say yes to the "no-vote"

In the podcast I hit on a catchy phrase of SEE IT, SAY IT, OKAY IT, which is similar to the criteria above but would make a much better T-shirt or bumper sticker. (Of course, T-shirts and bumper stickers are old school so maybe I should figure out a meme.) I think most organizations, or at least the ones I have worked in, do a reasonable job with the first two criteria. That third one however is challenging, because saying yes to the No Vote usually means something is going to get delayed, and leaders are the ones who typically deal with the ramifications of those delays. It would be so much easier if we had tools that showed us the future, and we could easily show the bad thing that could occur if we don't use the No Vote. We probably could even put a value on it for a cost-benefit analysis. But that tool has yet to be developed, and most attempts with time travel result in generation of undesirable alternative timelines. So we are left with something that could happen if we don't use the No Vote and no way to put a true likelihood on that. Worse yet, imagine the situation that "doesn't feel right" and we aren't even sure what the bad thing that could happen would be.

So, all of these factors and a few others are the things that make SEE IT, SAY IT, OKAY IT hard to put into practice. In that presentation back in 2008 I actually put together a quick reference guide for the No Vote. That guide included things for preparing individuals to use the No Vote (SEE IT), setting the environment that supports it (SAY IT), and actions for leaders (OKAY IT). It seemed pretty straightforward and simple to me at the time: Just follow the guide and you will have an environment that supports use of the No Vote. No crystal ball required—no dangerous reality altering time travel, just the ability to recognize something wrong and stop something bad before it happens. Simple.

Right about now you are wondering, "Where is this quick reference guide? Surely, Turbo will include it or at least provide a link." Nope. I know the internet sleuths out there will take time out of solving cold cases or locating El Dorado to go find it, and that's okay, but what if the rest of you sat down with a piece of paper, in a group (live or virtual), and tried to come up with some things that you think would support or improve use of the No Vote. I will even get you started: Print or save the attached 8.5x11 note-page and fill in what you come up with. In the next issue of FTSF I will show you what I had, and we can compare.

Turbo ***Art Tomassetti***

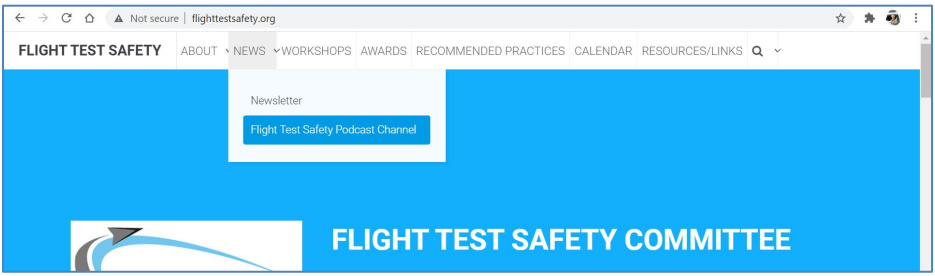
FTSC issues new Guidelines for Tony LeVier Award

In 2019, we published this newsletter's first call for nominations for the Tony LeVier Flight Test Safety Award. The times have changed and the criteria for selection of an award winner have also changed. The new nomination form is attached to this newsletter.

The Flight Test Safety Committee is soliciting nominations for the award, and the deadline to submit a nomination is **30 March 2021.** Here is a link to more information about and history of the award: http://www.flighttestsafety.org/awards/35-awards/information/54-tony-levier-flight-test-safety-award.

Recommend our Podcast

The January podcast was part two, the sequel to the December podcast, in which you may have heard Kristopher "WigB" Rorberg and a panel of USAF AI test professionals. In February, Turbo tried out some new production bells and whistles, as he described the No Vote. In both cases, I'll say it again: **Recommend this podcast to a friend or colleague.** Sometimes it helps if you pick a specific episode that you think he or she will like, and send a link to the podcast from your mobile phone.



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News FOOTNOTE: **This is an estimate, since the flight path may not have in the same direction as Earth.*