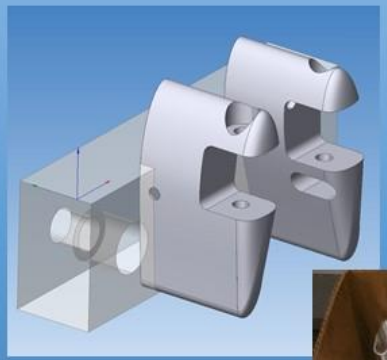
# Lessons Learned
# and
# Murphy's Corollary

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## Science and Engineering





## Art and Craftsmanship



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# Production Test Flying – Normal Procedure





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# Test Flown Gliders In The Landing Area



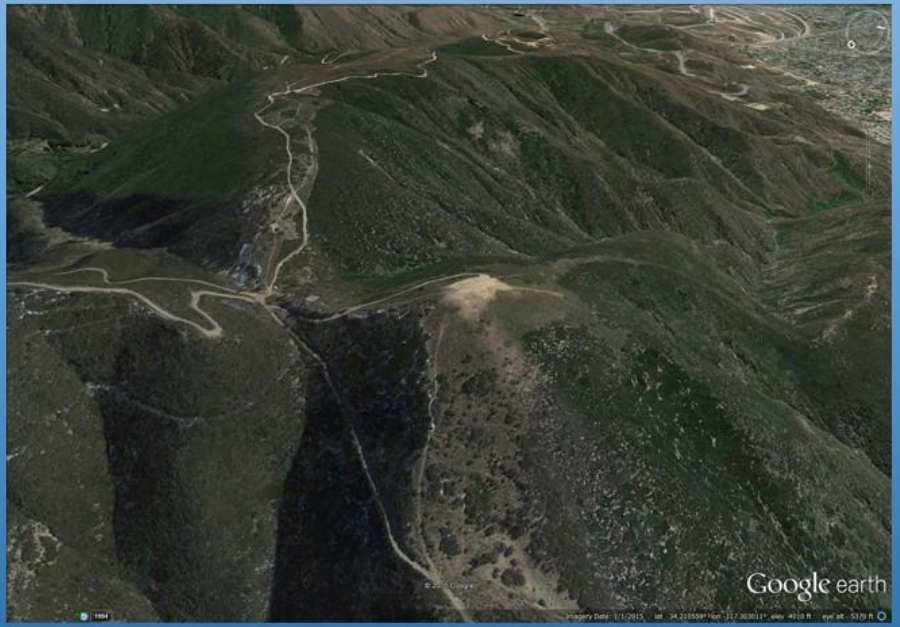
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# Production Test Flying – Top Landing

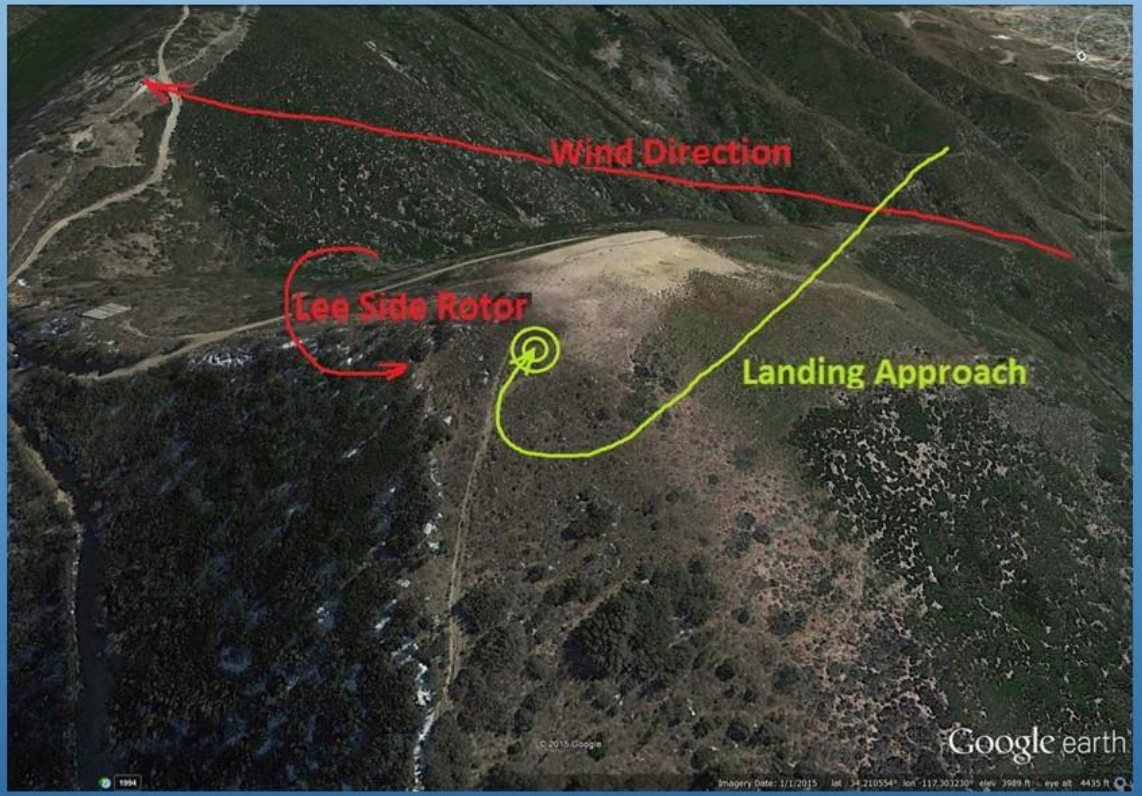


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# Marshall Peak, San Bernardino



# Marshall Peak Top Landing Approach

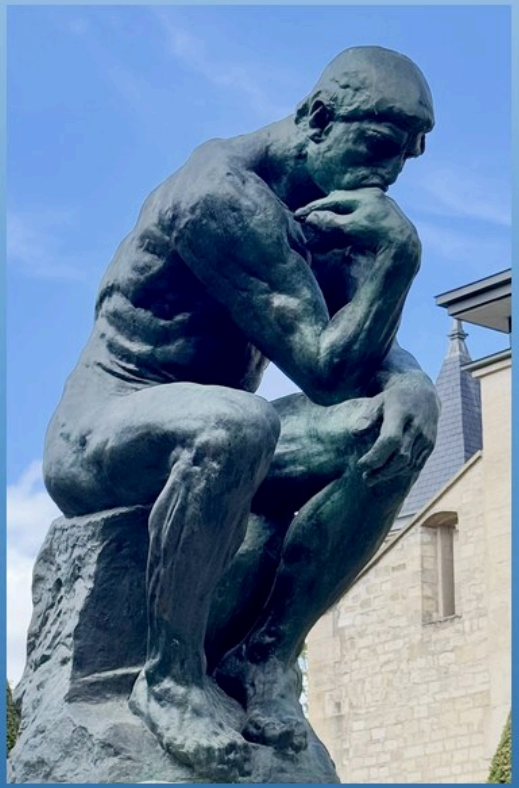












# Quality of decisions determines safety

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**The go decision requires a very high degree of confidence in a positive outcome.**

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# Feedback Loop




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# Feedback Loop With Lowered Evaluative Criteria




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# Murphy's Law:

Anything that can go wrong, will go wrong.

# Murphy's Corollary

Anything that did not go wrong could not have gone wrong.

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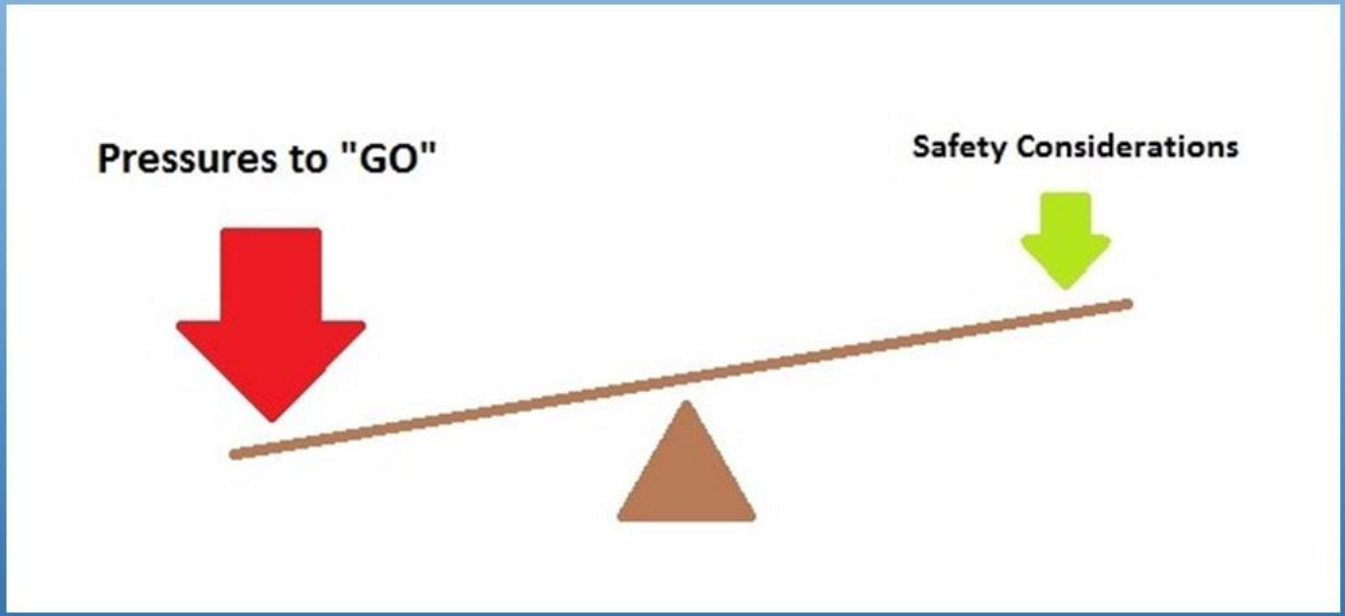
$$.99^{18} = .83$$

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$$1 - .83 = .17 = 1/6$$

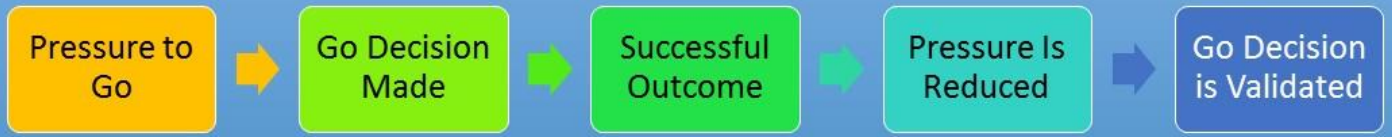
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# Pressure To Make The Go Decision



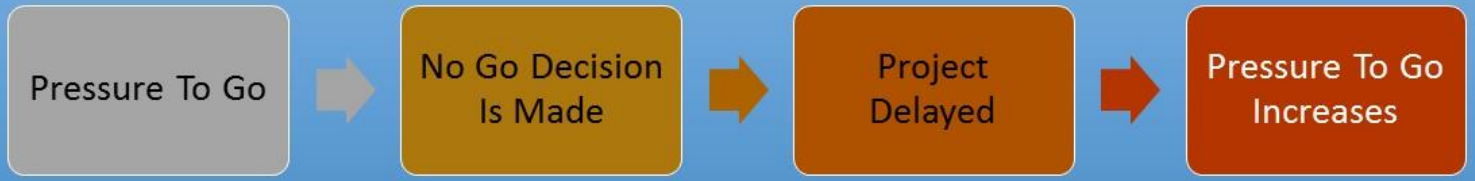

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# Go Decision Reduces Pressure




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# No Go Decision Increases Pressure




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# 1. Apollo 1



# 2. Space Shuttle Challenger



# 3. Space Shuttle Columbia



1. Apollo 1 - 1967

2. Space Shuttle Challenger - 1986

3. Space Shuttle Columbia - 2003

# The Challenge

- Deceptive Mathematics Of Probability
- Self-Deceptive Psychology Of Evaluating Our Own Decisions
- Inevitable Pressure To Make The “Go” Decision

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# Continual Awareness

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# Expand The Scope Of Lessons Learned

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# Questions?

# About these slides

Slides by Michael W. Meier, shown at the Society of Experimental Test Pilots Symposium, Anaheim, 2015

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