Beyond Data: Making Life-Saving Decisions Through Knowledge

Tuesday, November 1st | 1:00 p.m. – 2:00 p.m.

PRESENTED BY:
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Polaris Aero
Colonel William Ocker

- The father of instrument flight
- He was the first person to assert pilots should not trust their senses
- Conducted numerous experiments
- Concluded problem was with pilots’ inner ear, not instruments
Questions We Need to Answer

• Why do we take risks?
• What is data?
• How do we use it?
• Influence or Justify?
• Assumptions?
Personal Example
Louisiana National Guard Example
Montrose, Colorado Example
Montrose Takeaways

• Numerous warning signs were ignored
• Lack of experience in icing conditions
• Experience ≠ Knowledgable
• Compliant ≠ Safe
SWA Example
SWA Takeaways

- Pilots were not aware of company’s guidance
- Three other SWA crews also landed in the same conditions
- Osmosis is not effective
Summary of Accidents

- Pilots did not have the best data and information
- 80% of all accidents are a result of human error
- We focus too much on accidents and often ignore the root causes (until it's too late)
US Navy Study

• Contributing factors to low cost/no injury events…
• were the same contributing factors to high cost/personal injury events
• We don’t need to wait for a bad outcome to learn our lesson

Source: Boeing Maintenance Error Decision Aid (MEDA) User Guide
Lessons Learned

• Derived from accident reports
• Eventually gets incorporated into our rules and regulations
• Over time, this information can be overwhelming
• We are responsible for knowing everything! (FAR 91.103)
Forgetting Curve

- Demonstrated empirically in the 1970s
- Information we retain decreases over time
- 1 day: we retain less than 50% of what we learned
- 30 days: we retain less than 25%
Information Quantity vs. Decision Quality

- We can graph the relationship
- More data and information is not always better
- Not enough data - leads to oversimplification
- Too much data - leads to information overload
What is Risk?

- Risk = probability x severity
- There is very little we can do to change severity
- We need to focus on decreasing the probability of a bad outcome
- We decrease uncertainty by increasing our knowledge
- Therefore, knowledge is the key to reducing risk
Data vs. Information vs. Knowledge

- They are not the same thing!
- Data is the raw material
- Information provides context
- Knowledge provides perspective
- Knowledge facilitates action
- Action is the KEY to mitigating risk
Risk Matrix

- Graphically depicts risk
- Qualitative or Quantitative?
- No standard definitions
- Does it increase knowledge or facilitate action?
Hazard Scoring Systems

- Uses numbers to depict risk
- Qualitative or Quantitative?
- Does it increase knowledge or facilitate action?
- Hidden dangers in using numbers
Hidden Dangers of Hazard Scoring Systems

- Awareness Paradox
- Trending Trap
- Do we use the numbers in influence our decisions, or to justify a decision that we already made?
Empirical Illusion

- We assume numbers are always QUANTITATIVE, but they can also be used QUALITATIVELY
- We often confuse the terms numerical and quantitative
- Numerical - relating to, or expressed as, a number
- Quantitative - relating to, or measured by a quantity
Measurement Systems

• Nominal - use numbers as *labels*
• Ordinal - use numbers to *rank order* things (one is more than another, but we don’t know by how much)
• Interval - numbers are used to define units (but no true zero point)
• Ratio - true zero point, and defined units. All math functions are allowed
WARNING

- A hazard scoring system is an ORDINAL measurement system, *not* a RATIO measurement system
- There are no fundamental “risk” units; therefore, we cannot add hazards together
What is the solution?

- We need to establish CONTEXT
- Context creates a framework; helps us FOCUS
- Flight planning context example
- SMS context example
Why do we take risks?

“People take risks because, most of the time, they don’t know the risks they are taking. It’s not because they make a rational calculation of the risks.”

- Professor Daniel Kahneman
  2002 Nobel Prize Winner
What do we need to do?

• We need to replace uncertainty with knowledge (because knowledge facilitates action)
• We need to share our knowledge with other people (so they don’t make the same mistakes)
The Troop Who Rides One In

“We should all bear one thing in mind when we talk about a troop who rode one in.

He called upon the sum of all his knowledge and judgement. He believed in it so strongly that he knowingly bet his life on it.

That he was mistaken in his judgement is a tragedy...not stupidity. Every supervisor and contemporary who ever spoke to him had an opportunity to influence his judgement.

...so, a little bit of all of us goes in with every troop we lose.”

Author Unknown
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