Building a taxonomy for success among airplane pilots: How do we measure, categorize, and quantify resilient performance?

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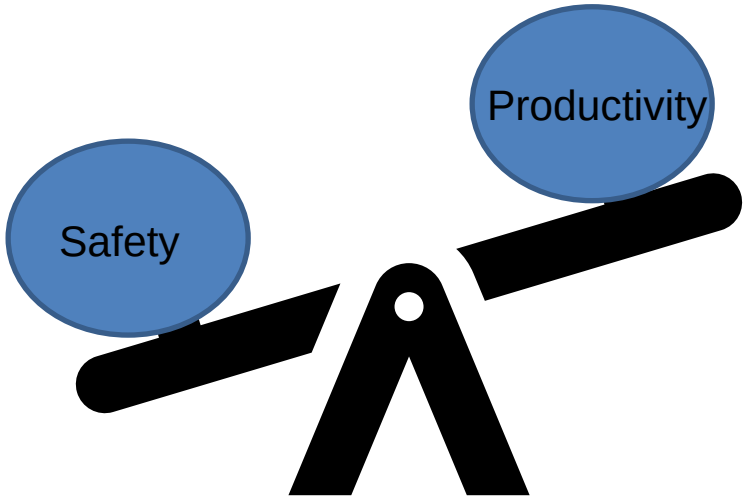
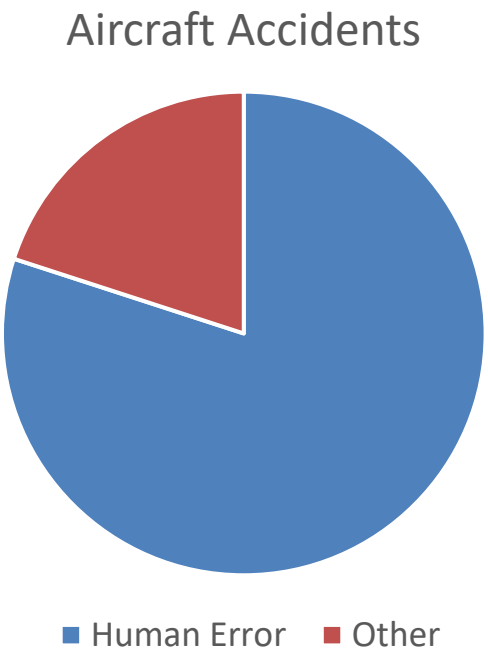
Dr. Kristy Kiernan, Dr. David Cross, Dr. Mark Scharf

EMBRY-RIDDLE
Aeronautical University
WORLDWIDE
COLLEGE OF AERONAUTICS

How we arrived here





…but aren't people doing things every day that help both safety and productivity?

Aren't people doing things every day that actually keep operations safe?

Aviation has robust ways to investigate errors, incidents, and accidents

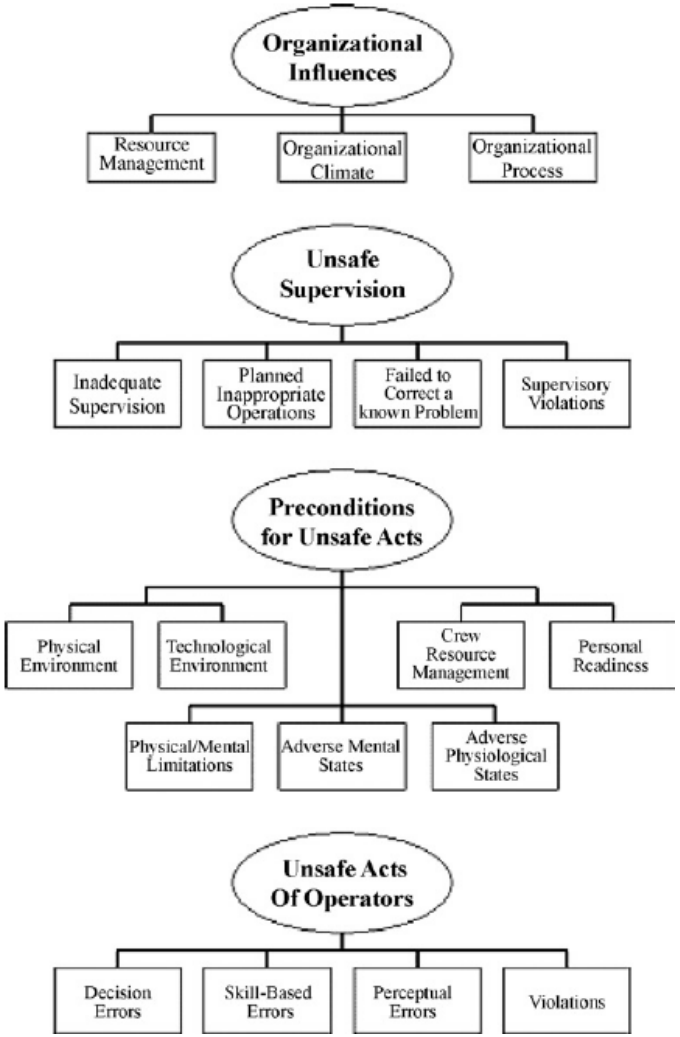
…but insufficient ways to study success

Sources of data for error:

- Aviation Safety Reporting System
- Aviation Safety Action Program
- Flight Operational Quality Assurance
- Incident Reporting
- Accident Investigation
- Line Operations Safety Assessments

Background

- Common language
  - Human Factors Analysis and Classification System
  - Threat and Error Management



Safety I

- Reduce the incidence of negative outcomes
  - How? Study negative outcomes

Safety II

- Increase the incidence of positive outcomes
  - How? Study positive outcomes

Paradigm Shift

- How do you study the absence of an accident?

Instead:

- How do you study the routine behaviors that contribute to system flexibility and resilience?

Challenges

- What sources of data are available to measure success?
- How do we extract that data?
- What data analysis methods provide the most rigor?
- How do we quantify positive behaviors?
- How do we classify positive human contributions –
  - Behaviors?
  - Attitudes?

Developing a taxonomy for success in commercial pilot behaviors

- Can commercial airline pilot behaviors be classified according to the four key attributes of resilient performance?
- Can a taxonomy of resilient performance be articulated from investigating airline pilot behaviors in routine operations?

Identifying and classifying resilient behavior among flight instructors

- What behaviors do CFIs display that contribute to system resilience?
- How do these behaviors group into a taxonomy?

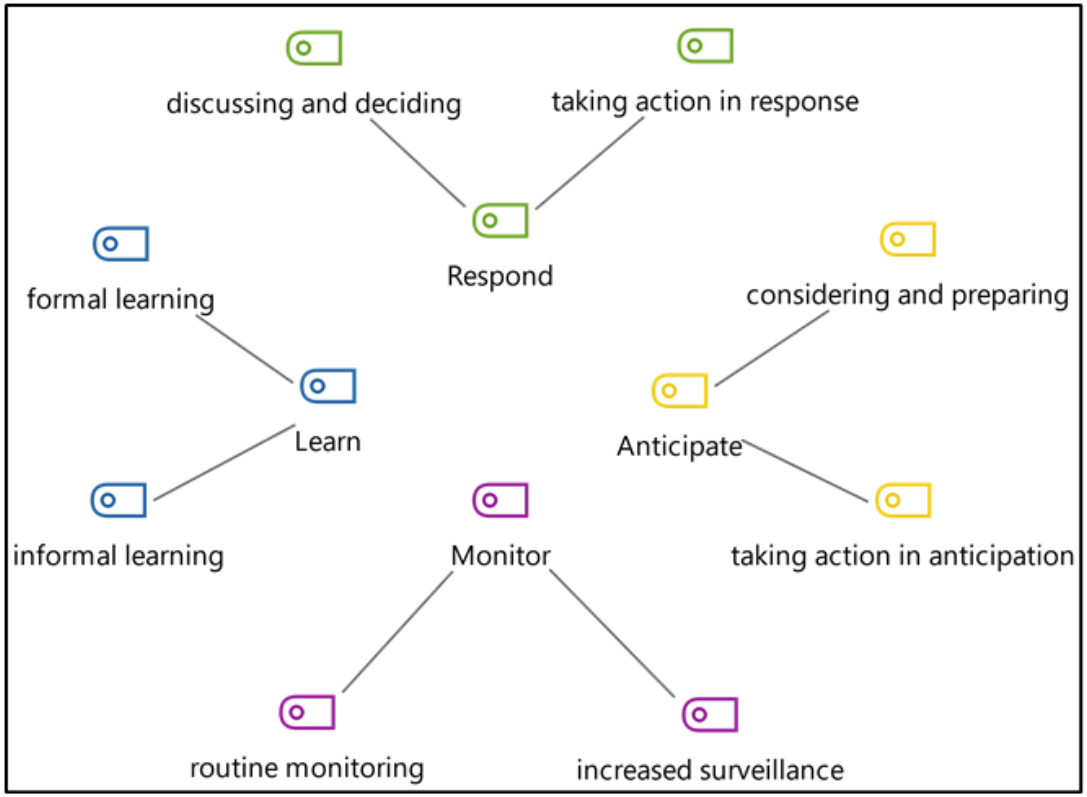
Research Questions

- But equally important, developing reliable, valid, repeatable, robust approach to data analysis.

Method

- Qualitative approach
- Semi-structured interviews with airline pilots (1) and Certificated Flight Instructors (2)
- Critical incident debrief approach of unexpected or unplanned event

Preliminary Model



Data analysis approach based on development of HFACS

1. Record, transcribe, and de-identify interviews
2. SMEs independently identify and isolate behaviors
3. Individuals sort into groups
4. Harmonize groups, informed by theory
5. Validate taxonomy with new individuals

Thanks to Dr. Scott Shappell for sharing information on development of HFACS

Sources of data: Existing

Report-based

- Aviation Safety Reporting System
- Aviation Safety Action Program
- Incident Reporting

Routine

- Line Operations Safety Audit
- Flight Operational Quality Assurance

Sources of data: Generated

Report-based

- Operational Learning Review

Routine

- Interviews based on critical incident approach
- Cockpit voice recordings
- GoPro LOSA

Sources of data: Existing

Report-based: Text mining

- Aviation Safety Reporting System
- Aviation Safety Action Program
- Incident Reporting

Routine:

- Line Operations Safety Audit: Expert observer classification
- Flight Operational Quality Assurance: Return from exceedance

Sources of data: Generated

Report-based

- Operational Learning Review

Routine Text mining, expert classification, correlation of LOSA style and FOQA data

- Interviews based on critical incident approach
- Cockpit voice recordings
- GoPro LOSA

Where we go from here

- Explore sources of data
- Explore ways to analyze that data
- Collaborate and share with others