Safety Management

Systems, Risk, Performance, and Regulatory Strategies

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Safety

“Safety is the state in which the risk of harm to persons or property is reduced to, and maintained at or below, an acceptable level through a continuing process of hazard identification and risk management”

ICAO Doc 9859
“Safety is the state in which the **risk of harm** to persons or property is reduced to, and maintained at or below, an **acceptable level** through a continuing process of **hazard identification** and **risk management**”

*Operationally defined…*

“Safety” is **How well risk is managed**
Balancing the Priorities: Finding the “Hard Limits”

Safety

Mission

Money

Decision Making
Evolving Nature of Causality

pax fatalities rate / 100 million pax miles

PHASE 1: eliminating common causes

PHASE 2: random/multiple causes

PHASE 3: system failure or further improvement

Source: ICAO
So where do we go from here?

For every complex question there’s a solution that’s clear, simple…

…and wrong.

H. L. Mencken
Compliance and Risk Management

- Illegal
- Unsafe
- Common Cause
- Unique Cause

Compliance

Effective Regulation

Risk Management

SMS
Control Strategies

• Regulatory Action (Required)
• Formal Voluntary Programs
• Collaborative (Defined Voluntary)
• Promotion, Education, and Awareness
Regulatory Strategies

- **Prescriptive ("Compliance-Based")**
  - Typical for Common Cause Risks

- **Performance-Based**
  - More flexible for Diverse Populations

- **Risk Based**
  - Focused on Risk Control

- **Process Based (Blended Approach)**
  - Prescribed Processes
  - Flexible implementation and specific performance
All **Safety** Rules should be “Risk Based”

- **Legislative/Regulatory charters** directed toward safety – reducing risk
- **Defining the Risk**
- **Compliance**
  - “If”: *Simple* compliance ("letter of the law")
  - “How”: *Effective* compliance (managing the risk)
- **Certification, licensing, approval processes must stress effective means of compliance**
All Rules are Prescriptive

- Rules, “prescribe” acceptable behaviors
- **Objective** ("black and white")
- Address “common cause,” technical issues
- Relevance to population narrowly defined
- Lack of fit problems
- **Limited flexibility**
- Assumption of “effective compliance”
All Rules are Performance Based

- All rules have expectations for outcomes
- “Performance based” rules can be more flexible to variables in population
- Depend on defining performance standards
- Ultimate outcomes (accidents) are reactive
- Immediate outcomes dependent on assumptions of causality
- Measures and oversight strategy must not be overlooked
Safety Performance Measures: Challenges

Everything that counts can’t [always] be counted…

…everything that can be counted doesn’t [necessarily] count.

Albert Einstein
Measurement Considerations

• Performance of all types of approaches should be measured and assessed:
  – Defining performance
  – Validity of measures
  – Reliability of data
  – Qualitative and quantitative data
  – Classification systems
  – Trending
Traits of a Healthy Culture: High Reliability Organizations (HROs)

• Preoccupation with failure (track small failures)
• Reluctance to (over)simplify
• Sensitivity to operations
• Commitment to resilience (ability to recover)
• Deference to expertise

Weick & Sutcliffe
“Carelessness and overconfidence are more dangerous than deliberately accepted risk”
Wilbur Wright, 1901

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Wilbur Wright gliding, 1901
Photographs: Library of Congress