Human Factors and Safety Management: The Role of the Regulator

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Flight Safety and Human Factors - ICAO
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Raising the flight level

“To remain successful, we must challenge the status quo, refine existing practices, adopt new best practices, focus on where we want to be in the next five years and what strategies we need to embrace to get there”

Art LaFlamme
Director General, Civil Aviation
Transport Canada
Two Fundamental Strategies

- Countermeasures to operational errors
  - human error does not cause accidents
- Risk and deviation management
  - “more of the same” will not be enough
Operational Behaviours

A balance *compromise*

safety  production
Training Behaviours

Going “by the book”

safety  production
Errors & Accidents\Incidents

**Causes and consequences** have no symmetry in their **magnitude**
Understanding Operational Errors

- error
- deviation
- amplification of the deviation
- system degradation/breakdown
Errors as They Relate to Safety

- Flaps: omitted
- Checklist: complete
- Warning: Planning deviation
- Normal operation: Amplification

Diagram: Flaps error, deviation, and amplification.
Errors as They Relate to Safety

Flaps omitted

Checklist omitted

No warning

Error Deviation Amplification Degradation/breakdown
The Data on Error We Collect

- Design & manufacture
- Management & supervision
- Training & maintenance
- Stakeholders
- Operational personnel
The Data on Error We Must Collect

- Design & manufacture
- Management & supervision
- Training & maintenance
- Stakeholders

Operational personnel
Line Operations Safety Audit (LOSA)
(500 segments, four large carriers)
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Segments with observed errors -- 74%

- Segments with 1 error: 24%
- Segments with 2 errors: 20%
- Segments with 3 errors: 10%
- Segments with 4 errors: 8%
- Segments with 5 or more errors: 12%

Average number of errors per flight -- 2.0
Automation-related errors -- 31%
<table>
<thead>
<tr>
<th>Outcome type</th>
<th>% of all errors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Without consequences</td>
<td>85%</td>
</tr>
<tr>
<td>Undesired state</td>
<td>12%</td>
</tr>
<tr>
<td>Additional error</td>
<td>3%</td>
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</tbody>
</table>
Why Monitor Normal Operations

- Operational personnel develop error management skills
- Understand these skills to support design, training, procedures
Why Monitor Normal Operations

The “big picture” of operational errors is poorly understood

- **We don’t need**
  - more accident/incident reports
  - more edicts/motivational posters

- **We need**
  - data on error(s) within the context of specific operational environments
The Problem: Our Culture

- Confidential reporting systems
- Severe protections to FOQA/QAR
- Presidential protection to ASAP
- Suspensions/revocations/sacking
- Remedial training
- Accident investigation
- Media (*CVR on NBC*)
- Criminal liability
- ICAO Safety Oversight Assessment
A Safety Culture?

What would happen if we remove regulation?

- Utopian ideals
- Hopes of safe and efficient individual and system behaviours

- A clear role for the Regulator
More of the Same will not Be Enough

improve the processes supporting human performance?

improve human performance?
Aviation cannot be entirely specified
● Aviation cannot be entirely specified
● Humans will inevitably make errors
- Aviation cannot be entirely specified
- Humans will inevitably make errors
- Normative prescription (music score)
• Aviation cannot be entirely specified
• Humans will inevitably make errors
• Normative prescription (music score)
• Real-time implementation of the score
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Deviations will take place
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● Real-time implementation of the score
● Deviations will take place
● *Danger*: loss of control of deviation management process rather than deviations themselves
Risk & Deviation Management

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- Humans will inevitably make errors
- Normative prescription (music score)
- Real-time implementation of the score
- Deviations will take place
- *Danger*: loss of control of deviation management process rather than deviations themselves
Risk & Deviation Management
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Rigid frame

Normative safety
Risk & Deviation Management

Rigid frame

Normative safety

Flexible links with dampers

Generative safety
The Regulator’s Contribution
The Regulator’s Contribution

• Think about the *spirit* rather than the *letter* of the law
The Regulator’s Contribution

- Think about the **spirit** rather than the **letter** of the law
- Foster a cultural shift
  - *what do people do after they commit errors*
  - *what should they do after they commit errors*
The Regulator’s Contribution

- Think about the *spirit* rather than the *letter* of the law
- Foster a cultural shift
  - *what do people do after they commit errors*
  - *what should they do after they commit errors*
- Stop the beatings (morale won’t improve)