Should reporting programmes talk to each other?

Mike O’Leary
Introduction

- Three flight operations safety programmes—ASR, FDR (FOQA) and HFR
- Compare and contrast ASR and HFR incident reporting programmes
- Focus on the ‘go-around’ manoeuvre to show how the two programmes can offer distinct but complementary aspects of safety problems.
What’s a Go-around?

◊ A manoeuvre in which a pilot aborts an intended landing on final approach
◊ Costs money, causes delays, frightens passengers
◊ Mostly related to traffic density and weather
◊ Also caused by pilot misjudgement
  ◊ Low frequency of G/As means low level of practice at the manoeuvre
  ◊ In BA a possible training issue
The Issue

★ Three programmes that don’t talk to each other
★ For certain types of events FDR has different threshold criteria from ASR, e.g., alt busts
★ ASR and HFR generally deal with same incidents but Flight Operations have no access to HFRs
★ Makes it difficult to evaluate the extent and cause of a problem
★ - and makes it difficult to solve the problem.

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FDR – Flight Data Recording

- 1000’s of data channels sampled / recorded
- Data concerns technical and flight parameters
- Excellent feedback on engineering systems performance and status
- Flight path monitored continuously for abnormal / unusual flight status
- All data is anonymous – no crew names recorded
- Excellent feedback on crew training and standards
- BUT – dialogue with ASR / HFR is impossible.

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ASR - Air Safety Reporting

- Mandatory open reporting and data collection
- Clear reporting criteria, State MOR
- Ability to portray safety trends
- Identify hazards and assess risk
- BA’s fundamental safety metric
- 8500 reports per annum
- Feedback to the reporter, community & CAA.

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HFR - Human Factors Reporting

- Confidential reporting and data storage
- Reporting is voluntary
- Identifies ‘issues’
- Causal analysis
- No risk assessment
- Feedback to the reporter & community.

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ASR versus HFR

**ASR**
- is mandatory
- is public
- asks What?
- analyses incidents

**HFR**
- is voluntary
- is confidential
- Why? & How?
- analyses situations

Outcome vs. Process

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ASR Analysis

- Categorical
- BASIS References / Keywords / Descriptors
  - What? Where?
  - How much? When?

- Focuses on negative outcomes
- Analysis is Numeric / Comparative / Risk
- Benefit: timeline of safety status

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HFR Analysis

- Explanatory Human ‘Factors’  
  - not technical ‘Keywords’

- Factors describe **Crew Behaviour and the Influences** on crew behaviour

- Analysis focuses on **Positive** as well **Negative** safety behaviour and influences

- Graphically maps the chains of **cause and effect** within an event

- Establishes common failure modes and recovery / prevention activities.

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Factor Categories

Crew behaviour

- What & How?
- CRM Teamskills
- Errors & Violations
- Handling Skills

Behavioural influences

- Why?
- Environment
- Organisation
- Person

Note: Most factors can be applied in a Positive as well as a Negative sense

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Simple Incident Model

Cause  →  Ops Problem  →  Consequences
Human factors analysis of a Go-around
Go-arounds: ASR Analysis

- Allows numeric comparisons of G/A frequency
  - Across locations / ATC facilities
  - Across time
  - Across a/c fleets
- Risk assessment – action prioritisation
- Little or no account of avoidance or recovery strategies
- Analysis gives a negative picture but no indication of problems with G/A

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**BASIS References:**
Go-arounds in the first six months of 1997 and 2002

<table>
<thead>
<tr>
<th>Jan – Jun 1997</th>
<th>G/As = 440</th>
<th>Jan – Jun 2002</th>
<th>G/As = 403</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. WEATHER</td>
<td>152</td>
<td>2. WEATHER</td>
<td>114</td>
</tr>
<tr>
<td>2. AERDRM/LANDING SITE</td>
<td>132</td>
<td>3. ATC</td>
<td>77</td>
</tr>
<tr>
<td>3. ATC</td>
<td>81</td>
<td>4. PILOT HNDLG/AIMNSHP</td>
<td>73</td>
</tr>
<tr>
<td>4. PILOT HNDLG/AIRMNSHP</td>
<td>53</td>
<td>5. FLIGHT CONTROLS</td>
<td>22</td>
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<tr>
<td>5. GPWS</td>
<td>34</td>
<td>6. GPWS</td>
<td>20</td>
</tr>
<tr>
<td>6. FLIGHT CONTROLS</td>
<td>19</td>
<td>7. LANDING GEAR</td>
<td>11</td>
</tr>
<tr>
<td>7. AUTOFLIGHT</td>
<td>14</td>
<td>8. CABIN EQUIPMENT</td>
<td>4</td>
</tr>
<tr>
<td>8. LANDING GEAR</td>
<td>8</td>
<td>9. NAV EQUIPMENT</td>
<td>2</td>
</tr>
<tr>
<td>9. CABIN EQUIPMENT</td>
<td>4</td>
<td>10. FUEL</td>
<td>1</td>
</tr>
<tr>
<td>10. AIRPROX</td>
<td>1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

BASIS References are not necessarily causal – just associated.
Go-arounds: HFR Analysis

- HFR data gives a more balanced picture
- Account of avoidance or recovery strategies
- Focus on causal analysis allows development of effective training programmes
- No risk assessment
- No useful numeric comparisons of G/A frequency (location, time, fleets etc.)
HFR study details

- April to early June 2002. A total of 132 HFR questionnaires were sent out covering 66 go-arounds
- Fifty-four replies were received representing a return rate of just over 40%.
- Much higher rate than normal
- 54 replies concerned 45 go-arounds
Number of Negative Factors / Incident
Before Go-Around

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Number of Negative Factors / Incident After Go-Around

Number of Negative Factors / Incident

Incidents with 'N' Negative Factors

Incidents with 'N' Negative Factors

N = 0 1 2 3 4 5 6 7 8

Number of Negative Factors / Incident
Negative human factors applied to the pre and post go-around phases

<table>
<thead>
<tr>
<th>Pre Go-around</th>
<th>N=</th>
<th>Post Go-around</th>
<th>N=</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. ATC Services</td>
<td>28</td>
<td>1. Cross-Checking</td>
<td>11</td>
</tr>
<tr>
<td>2. Other Aircraft</td>
<td>23</td>
<td>2. Ops Stress</td>
<td>11</td>
</tr>
<tr>
<td>3. Met Conditions</td>
<td>13</td>
<td>3. ATC Service</td>
<td>8</td>
</tr>
<tr>
<td>7. Crew Comms</td>
<td>5</td>
<td>7. Prep/Plan</td>
<td>6</td>
</tr>
<tr>
<td>8. Mode Awareness</td>
<td>5</td>
<td>8. Currency</td>
<td>4</td>
</tr>
<tr>
<td>10. Error</td>
<td>4</td>
<td>10. Training</td>
<td>3</td>
</tr>
</tbody>
</table>

Total Factors: 134
Total incidents: 45

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Positive human factors applied to the pre and post go-around phases

<table>
<thead>
<tr>
<th>Pre Go-around</th>
<th>N=</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Prep / Planning</td>
<td>25</td>
</tr>
<tr>
<td>2. ATC Services</td>
<td>18</td>
</tr>
<tr>
<td>3. Environment Awareness</td>
<td>15</td>
</tr>
<tr>
<td>4. Crew Comms</td>
<td>12</td>
</tr>
<tr>
<td>5. Mode Awareness</td>
<td>10</td>
</tr>
<tr>
<td>6. Handling-Manual</td>
<td>8</td>
</tr>
<tr>
<td>7. Currency</td>
<td>5</td>
</tr>
<tr>
<td>8. Handling-Auto</td>
<td>5</td>
</tr>
<tr>
<td>9. SOPs</td>
<td>5</td>
</tr>
<tr>
<td>10. Workload Management</td>
<td>4</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Post Go-around</th>
<th>N=</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Handling-Auto</td>
<td>4</td>
</tr>
<tr>
<td>2. Handling-Manual</td>
<td>4</td>
</tr>
<tr>
<td>3. Crew Comms</td>
<td>3</td>
</tr>
<tr>
<td>4. Assertiveness</td>
<td>2</td>
</tr>
<tr>
<td>5. Role Conformity</td>
<td>2</td>
</tr>
<tr>
<td>6. System Handling</td>
<td>1</td>
</tr>
</tbody>
</table>

Total Factors: 118
Total incidents: 38

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‘Preparation & Planning’ vs. Go-around Outcome

<table>
<thead>
<tr>
<th>OUTCOME</th>
<th>PREPARATION &amp; PLANNING</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Positive</td>
</tr>
<tr>
<td>Positive</td>
<td>32</td>
</tr>
<tr>
<td>Negative</td>
<td>18</td>
</tr>
<tr>
<td>Not Assessed</td>
<td>4</td>
</tr>
</tbody>
</table>
Conclusions

- ASR and HFR can work together effectively
- ASR provides a broad authoritative overview
- HFR offers valuable detail and can surprise
  - 3% reported difficulty with G/A in ASR
  - ~60% indicated some difficulty in HFR
- Jim Reason was right
  - The more ways you have of looking at a problem, the better the view.