INTRODUCTION OF RAMP-LOSA AT KLM GROUND SERVICES

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CONTENTS

• Background
• Adaptation of standard ramp LOSA
• Results
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• Conclusion
BACKGROUND
KLM GROUND SERVICES EXECUTES AIRCRAFT TURN-AROUND AT SCHIPHOL

- Baggage Services
- Pushback and Towing
- Catering and Onboard Supply
- Cleaning
- Aircraft refueling
- Water and toilet services
LINE OBSERVATION SAFETY AUDITS ARE SUCCESSFUL IN THE COCKPIT

• Developed by the University of Texas Human Factors Project
• Applied by Cathay Pacific, Delta, United Airlines, etc.
• Effective in identifying areas to target to improve safety, e.g.
  • Checklist errors: 70% reduction after identification by LOSA
  • Unstable approaches: 60% reduction
LOSA ATTACKS THE (UNDER-REPRESENTED) FOOT OF THE ICEBERG

Relative occurrences KLM-GS

Substantial
High
Medium
Small

Approximate numbers
THE ICAO TEM MODEL UNJUSTLY EMPHASIZES THREATS

- Threats are shown as a precursor to errors
- Identification of threats is susceptible to hindsight bias
- Threats are desirable to “justify” errors
- < 10% of cockpit errors follow a threat (Klinect, Wilhelm et al. 1999)
- Even less linkage expected on platform

(ICAO 2002)
DELTA HAS MODIFIED THE TEM MODEL
ADAPTATION OF STANDARD LOSA
MODIFICATIONS TO ERROR CODES

- FAA: 201
- Eliminated: 201
- Added: 117
- KLM-GS: 140
- Eliminated: 140
- March: 117
- Added: 140
- Januari: 140

Number of codes
# Rephrased or New Error Codes

<table>
<thead>
<tr>
<th>KLM Ramp LOSA</th>
<th>FAA Ramp LOSA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aircraft left without following long term parking procedures</td>
<td>Not in LOSA</td>
</tr>
<tr>
<td>Equipment restraint area not clear of GSE before arrival</td>
<td>Not in LOSA</td>
</tr>
<tr>
<td>Cones not placed</td>
<td>E/C 11. Wing tip markers not placed</td>
</tr>
<tr>
<td>Drain mast used by personal in pantry</td>
<td>Not in LOSA</td>
</tr>
<tr>
<td>Loose luggage on loading equipment while driving</td>
<td>Not in LOSA</td>
</tr>
<tr>
<td>Fuel monitored from within the cabin</td>
<td>Not in LOSA</td>
</tr>
<tr>
<td>Chocks removed before connecting towing equipment</td>
<td>Not in LOSA</td>
</tr>
</tbody>
</table>
IMPLEMENTATION

Observers
• Required resources to observe 5% of all turn-arounds
  • 2.6 fte for intercontinental
  • For Europe tbd
  • Based on 4 turn-arounds per observer per day
• Observers recruited from operational staff including those with temporary physical limitations

Training
• One day classroom
• Three supervised audits
• Calibration videos tbd
• Prerequisite: procedural knowledge up to standard

Data entry
• Current tool is MS Access
• Custom ramp-LOSA tool envisaged
• Tablet?
ADHERENCE TO LOSA GUIDELINES

- peer to peer observations
- anonymity
- confidential and non-punitive data collection
- voluntary participation
- trusted and calibrated observers
- union cooperation
- systematic observations
- secure data collection repository
- data verification roundtables
- feedback to workers.
- targets for enhancement
RESULTS
RESULTS 2012 - 2013

Number of observations

Errors per observation

Q1  Q2  Q3  Q4  Q1
2012 - 2013

Q1  Q2  Q3  Q4  Q1
2012 - 2013

na
TOP 10 ERROR CODES

- Beltloader safety rails improperly used
- Inappropriate speed when driving (ULD transporter)
- FOD on equipment (Beltloader)
- FOD on equipment (ULD transporter)
- FOD check inadequate or omitted
- Drain mast used by personal in pantry
- Driving under wing or fuselage (Tug)
- Inappropriate speed when driving (Tug)
- GPU not positioned in designated area
- ERA not clear of GSE
EFFECT OF TIME PRESSURE

**ARRIVAL RAMP WORKERS**

<table>
<thead>
<tr>
<th>Status</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>In time</td>
<td>20%</td>
</tr>
<tr>
<td>Too late</td>
<td>30%</td>
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</table>

**DEPARTURE VERSUS ARRIVAL**

<table>
<thead>
<tr>
<th>Status</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arrival</td>
<td>25%</td>
</tr>
<tr>
<td>Departure</td>
<td>35%</td>
</tr>
</tbody>
</table>
EFFECT OF FATIGUE

11:30-12:00

Rest of the day
EFFECT OF BAD WEATHER

**FOD check not performed**
- Dry: 50%
- Wet: 70%

**Fuel process not monitored properly**
- Dry: 5%
- Wet: 20%
RELATION BETWEEN ERROR FREQUENCY AND DAMAGES
NEXT STEPS
LOSA HAS CLOSED THE FEEDBACK LOOP AND IDENTIFIED PRELIMINARY RISKS

(Leveson 2011)
WHAT TO IMPROVE? (1/2)

Potential Management Control Flaws

• Control input or external information wrong or missing
• Process model inconsistent, incomplete or incorrect
• Incorrect or no feedback, measurement inaccuracy, delay
• Inadequate control algorithm
• Inappropriate, ineffective, delayed or missing control action
• Conflicting control action

Platform execution

• Process failures, changes over time
• Unidentified or out-of-range disturbances

(Leveson 2011)
WHAT TO IMPROVE? (2/2)

Generic management tasks

- Set goals and direction
- Establish work processes and standards
- Staff, schedule and train
- Manage facility & equipment
- Allocate resources
- Monitor, evaluate performance

(Helferich 2013)
Control Structure for Radiation Oncology at UCSD

Chief of Radiation Oncologists

Chief of Medical Physicists

Dosimetrist

Medical Physicists Team

Radiation Oncology Team

Simulation RTTs

Radiation Therapist Team

Dose Planning

Software (dosimetry, treatment plan, LINAC Control, scheduling, patient EMR)

Images, Physical Exam, Patient Experience

LINAC

Radiation Dose

Patient

(Helferich 2013)
INTRODUCING TIME – DEPENDENCY: EXAMPLE OF SD MODEL FOR NASA
MAP KLM–GS AGAINST “MODEL OF SOCIO-TECHNICAL SAFETY CONTROL”

- Preliminary Risk Analysis
- 1. Model Control Structure
- 2. Map requirements to responsibilities
- 3. Risk analysis due to control flaws
- 4. Categorize risks (long term, short term)
- 5. Dynamic analysis using System Dynamics
- 6. Recommendations

(Leveson 2011)
CONCLUSIONS
CONCLUSION

- Standard ramp LOSA methodology shows some weaknesses:
  - questionable threat and error management framework
  - elaborate forms
  - inflexible software
- Standard error codes are necessarily generic, need customization
- Ramp LOSA useful to quantify safety performance at the bottom of the iceberg
- Improvements require interventions at the supervisor level
- We expect effective interventions to be identified through a systems approach to identify control flaws
- Part of an integrated research program at the Amsterdam Univ. of AS.
THANK YOU FOR YOUR ATTENTION

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