SOP Compliance

F/O Chris Sharber
United Airlines
B777 Flight Instructor
Challenger Disaster

• What Happened?
Challenger Disaster
Challenger Disaster
Challenger Disaster

- Were they aware of the threat?
  - Boosters were reused
  - Evidence of damage on 14 of 24 previous missions
  - Engineers warned about potential for catastrophic loss
  - Particularly in cold temperatures....
Challenger Disaster

• Launch Day: 36°F
  – Coldest launch on record
  – 30°C Colder than any previous launch
Why did they launch?

Pressure?
Schedule?
Financial?
Political?
Public/Media?

Challenger Disaster

Official Finding:
GUILTY!
Why did they launch?
A different view...
They had gotten away with it the last 24 times...
Normalization of Deviance:

“The gradual process through which unacceptable practices or standards become acceptable. As the deviant behavior is repeated without catastrophic results, it becomes the social norm for the organization.”

“The Challenger Launch Decision”, Dr. Diane Vaughan

Challenger Disaster

SRB Designed Performance

- Actual flight performance deviates
- Analyze, modify

New Performance Standard

- Actual flight performance deviates
- Analyze, modify

New Performance Standard

- Actual flight performance deviates
- Analyze, modify
Normalization of Deviance:

Your definition of normal behavior is no longer based on the standard, but what you’ve become accustomed to.
Normalization of Deviance:

The shortcut gradually becomes the norm...
Question:

What does it feel like to be wrong?

“Being Wrong: Adventures in the Margin of Error”
by Kathryn Schulz
Normalization of Deviance
Challenger Disaster
Overview

- SOP Compliance and Normalization of Deviance
- What are the lessons for us?
- Where are we?
SOP Origins

- Where SOPs come from:
  - Manufacturers
  - NASA Ames / Academia
  - Company Goals/Standardization
  - “Born in Blood”
    - Past accidents/fatalities
  - Data Driven
    - FOQA / ASAP/ LOSA/ AQP
Why would there be incidents of non-compliance?

- Unintentional
- Intentional
Unintentional Non-Compliance

What is our exposure? How often does it happen?

Average

2.1

unintentional errors per flight*

*The LOSA Collaborative – from article in AeroSafety Magazine, Dec 2013
Unintentional Non-Compliance: Causes

– Lack of Knowledge (training or study)
– Simple Error (low SA, WM error, etc.)
– Reversion to old procedure
• Reversion to Old Procedure
• Reversion to Old Procedure

• Another industry trend...
• **Reversion Threat:**

  - When flying with crewmembers who don’t share your background:
    - Reversion poses a greater risk
    - You may be reverting to something they don’t understand at all
• Reversion to Old Procedure
  • Greatest occurrence is within first 30 days after a change is implemented
  • After that, continued non-compliance is morphing into Intentional Non-Compliance
Intentional Noncompliance

- Competing Priorities / Poor Procedure
- Short Cutting / Time saving
- Rationalization – “I got my reasons!”
- Perceived Lack of Consequences
  • “It just doesn’t matter...”
Is it an issue for the industry?
How often does INC happen (percentage of flights)?

1. Less than 20% of flights
2. 20%-40% of flights
3. 40%-60% of flights
4. More than 60% of flights

49% of flights had INC

*The LOSA Collaborative – from article in AeroSafety Magazine, Dec 2013*
LOSA Data: Intentional NC

Prevalent Examples*:

Missed Callouts
Sterile Cockpit violation
Checklist from memory
Failure to Monitor/Crosscheck Autoflight mode
PF makes own flight guidance changes
Taxi duties before clearing runway

*The LOSA Collaborative – from article in AeroSafety Magazine, Dec 2013
Does it really matter?
Behaviors

Which type of behavior poses the greatest threat to safety?

Compliant
Unintentional errors

Risky
Intentional act
Risk is believed justified or underestimated

Reckless
Intentional disregard of significant risk
SMS View: Behavior Risk

Severity

<table>
<thead>
<tr>
<th>Catastrophic</th>
<th>Severe</th>
<th>Significant</th>
<th>Minor</th>
<th>No Effect</th>
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</thead>
<tbody>
<tr>
<td>Frequent</td>
<td>Probable</td>
<td>Occasional</td>
<td>Seldom</td>
<td>Improbable</td>
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</tbody>
</table>

- **Reckless**
- **Risky**
- **Normalization of Deviance**
- **Compliant**
LOSA Data: Intentional NC Threat

- 0 INC = 2.1 Errors
- 1 INC = 3.9 Errors (~2x)
- 2 INC = 7.5 Errors (~3x)
- 2 or more INC = 3x

INC yields more than you asked for!

[The LOSA Collaborative]
Question:

What is the industry’s average stabilized approach rate?

What is your company’s stabilized approach rate?
Question:

What is the industry’s average go-around compliance rate? What about your company?
What is the industry’s average stabilized approach rate?

Stabilized Approaches: Industry Averages*

~96-97% Stable
~3-4% Unstable

*LOSA Collaborative and Airbus Studies
What is the industry’s go-around compliance rate?

Stabilized Approaches

- **Stable**
- **Unstable**

~1.5 - 3 % of unstable executed GA
~97- 98.5 % of unstable Landed

*LOSA Collaborative and Airbus Studies, ASIAS analysis*
# Unstabilized Approaches

<table>
<thead>
<tr>
<th>Average Major Carrier</th>
<th>Avg Per Day</th>
<th>Avg Per Year</th>
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</thead>
<tbody>
<tr>
<td>Total Flights</td>
<td>1800</td>
<td>657,000</td>
</tr>
<tr>
<td>Unstable Apchs (3%)</td>
<td>54</td>
<td>19,710</td>
</tr>
<tr>
<td>Go-Arounds (3%)</td>
<td>&lt;2</td>
<td>591</td>
</tr>
<tr>
<td>Landings from Unstable</td>
<td>52</td>
<td>19,119</td>
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### Unstabilized Approaches

<table>
<thead>
<tr>
<th></th>
<th>Best Average Major Carrier</th>
<th>Avg Per Day</th>
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<td>1800</td>
<td>657,000</td>
</tr>
<tr>
<td>Unstable Apchs (3%)</td>
<td>1.5%</td>
<td>27</td>
<td>9,855</td>
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<tr>
<td>Go-Arounds (3%)</td>
<td>&lt;1</td>
<td>296</td>
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<tr>
<td>Landings from Unstable</td>
<td>26</td>
<td>9,559</td>
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</table>
Regarding Go-Around Non-Compliance:

“What violating the rules has become so ingrained that airlines don’t enforce them and pilots don’t recognize when they are taking unnecessary risks.”

Rudy Quevedo, FSF Director of Global Programs
From a Bloomberg article dated 6 September 2013:

What does that sound like?
Normalization of Deviance!

NASA Shuttle SRBs: 24

Major Airline: 50 /Day

How long can we get away with this?
We’re not.
2011/2012 Aircraft Accidents by Phase of Flight [FSF Study]

FLP  PRF  ESD  TXO  TOF  RTO  ICL  ECL  CRZ  DST  APR  GOA  LND  TXI  AES  PSF  FLC  GDS

2011
2012
Aircraft Accidents by Phase: Consolidated

[FSF Study, 16 yrs accident data]

- Apch and Landing: 65%
- Everything Else: 35%
- Preventable with GA: 35%
**Aircraft Accidents by Phase: Consolidated**

[FSF Study, 16 yrs accident data]

- **Apch and Landing**: 15%
- **Everything Else**: 35%
- **Preventable with GA**: 50%

“**No other single decision can have such an impact on the industry accident rate**” [Curtis 2007]

“**The largest, lowest hanging piece of safety fruit.**” [FSF]
Why?

• Why is compliance so low?
• Go-Around Non-Compliance has been an issue for 15+ years
• Little to no change
• Little data to explain why
• Why has industry not been interested in this?
2011 Go-Around Decision Making Project

Capt Bill Curtis
FSF Project Co-Chair

Dr. J. Martin Smith PhD
President
Effective Go-Around Policy

Company management of policy

Accomplished by Flight Crews

Guidance trusted and believed in

Management
Execution of Policy

Pilot Decision Psychology

Objective conditions → Situational awareness → Risk assessment → Decision making

psychological
Execution of Policy

Pilot Decision Psychology

- Gut feeling for threats (Affective)
- Knowing the performance metrics (Functional)
- Relying on experience (Critical)
- Seeing the threats (Anticipatory)
- Knowing the limits (Task Empirical)
- Adjusting to threats (Compensatory)
- Keeping each other safe (Relational)
- Company support for safety (Environmental)
- Knowing the procedures (Hierarchical)
Overall Presage SA awareness scores

- Gut feel for threats
- Relying on experience
- Seeing the threats
- Knowing the limits
- Corporate support for safety
- Knowing performance metrics
- Adjusting to threats
- Keeping each other safe
- Knowing the procedures
Execution of Policy
Pilot Decision Psychology

Survey Results - Unstable Approach Pilots:
- Scored significantly lower on all SA 9 components
- Feel go-around criteria is unrealistic
- Communicate less in the flight deck
- Are less compliant in standard calls/checklists
- PM’s uncomfortable challenging other pilot
- Feel there is no disincentive for non-compliance, ie management is not concerned
Effective Go-Around Policy

Accomplished by Flight Crews

Company management of policy

GA guidance trusted and believed in

Guidance

Execution

Management
Guidance
Stabilized Approach Criteria/Targets

• Subjective?
• Too restrictive?
• Crews consider them relevant?
  • Perception: Non-compliant is not unsafe?
Effective Go-Around Policy

GA guidance trusted and believed in

Accomplished by Flight Crews

Company management of policy
A Survey found that:

- 87% of Stanford MBA students rated themselves above average
- 93% of students rated themselves in the top 50% for driving skill
- 70% of students rated themselves above average for leadership
- 85% put themselves above average for getting along with others
- 25% rated themselves in the top 1%
- 90% of Univ Nebraska faculty rated themselves above average teachers

Illusory Superiority

Management of GA Policy

- 68% of managers did not know the industry compliance rate.
- 55% did not know their companies rate of compliance.
- 88% estimated their company compliance rate was >10%.
- 69% were satisfied with their company’s GA compliance rate.
- 80% saw their GA policies as effective.

Management is disengaged and unaware of the risks.*

[*Presage Management Survey Results*]
Management of GA Policy

Management is disengaged and unaware of the risks:

• “One of the drivers to [pilot’s] bad decisions to not go around is management’s lack of awareness and emphasis...”

• “The biggest obstacle is management’s role – their engagement, and policy execution.”

• “We will not move forward in the industry till management takes this on. Management is in denial that they are part of the problem.”

[Phone interview with Dr. Martin Smith, Presage Group and Cap Bill Curtis, FSF]
Solutions?

Google:
Flight Safety Foundation: Go Around Decision Making Project
AeroSafety World Magazine 2013 Article Series

The Presage Group
Dr J. Martin Smith, CEO
presagegroup.com
Solutions?

Effective Go-Around Policy

Accomplished by Flight Crews

Guidance

Execution

Management

Company management of policy

GA guidance trusted and believed in
United Airlines Stabilized Approach Criteria

**Plan**
- Gear Down
- Airspeed ≤ 180 KIAS

**Report**
- Final Landing Configuration
- Landing Checklist complete
- A/S +15/- 5 of target
- On lateral profile
- On vertical profile, or correcting not to exceed:
  - +/- 300FPM (+/- 1°)
  - Sustained V/S < 1200

**Reject**
- PM will announce deviations in configuration, speed, or descent rate
- “Go-Around”
  - “Flaps”
  - “Airspeed”
  - “Descent Rate”

*Exceeding any parameter at these gates requires immediate corrective action.*
United Airlines Stabilized Approach Criteria

Features:
- Same criteria day/night and IMC/VMC
- Starts higher - 1500’
- Widens speed window +15/-5
- Allows variability from 1000’ – 500’
- Defined Hard limit
- Requires engagement of PM
United Airlines Stabilized Approach Criteria

FOQA Data Results:

- 4 consecutive year over year reduction in Unstabilized Approach rate
- Approx 22% improvement in 4 years
- Improvement in GA compliance rate
Solutions?

Effective Go-Around Policy

Accomplished by Flight Crews

Company management of policy

GA guidance trusted and believed in

Guidance  Execution  Management
What’s your GA compliance rate?

Survey shows that simply being aware of this one piece of data significantly improves Pilot/Management SA

- Management improves oversight
- Pilots make better decisions
Gut feel for threats
Relying on experience
Seeing the threats
Knowing the limits
Corporate support for safety
Knowing performance metrics
Adjusting to threats
Keeping each other safe
Knowing the procedures

Incremental SA benefit for knowing your companies GA compliance rate
Normalization of Deviance

We are here