Enhancing Runway Safety: A predictive approach through LOSA

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Runway Incursions – A growing concern

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- Global increase in runway incursions.
Runway Incursions – A growing concern

- Runway Incursion at Tokyo Haneda Airport (Jan 2’ 2024).
- Global increase in runway incursions.
- Large number of close call events in the U.S.

Airline Close Calls Happen Far More Often Than Previously Known

Airline Incidents Show a System Under Growing Stress

FAA Identifies 19 Serious Near Miss Incidents In 2023: The Most In 7 Years
Runway Incursions

Too infrequent to get a true picture of risk.
Alignment of Safety Data Training Data Taxonomies

Reactive
- E.g., Analysis Accident - Incidents
- Incident Analysis + Reports

Reactive/Proactive
- E.g., Analysis Of event including UASs
- Flight Data Analysis (FDA)
- Mandatory Occurrence reporting

Proactive/Predictive
- E.g., Analysis Of Normal Work
- Line Oriented Safety Audits (LOSA)
- Voluntary Safety reporting
Threat and Error Management Chain

Anticipate/Recognize and Mitigate

Detect/Correct

Recognize/Recover

Threat

Error

Undesired Aircraft State

END STATE

The Competencies are the individual and Team Counter Measures
Why do we need a LOSA Program

Anticipate or Recognize/Mitigate

- Threat
- Error

Detect/Correct

Proactive / Predictive Approach

- Pilot Competence

Recognize/Recover

Reactive Approach

- Pilot Competence

End State
TEM Analysis of Runway and Taxiway Incursions

**Threat**
- Multiple/Parallel Runways
- Faded Markings/Signage
- Confusing Markings/Taxiways
- Challenging Clearances
- Controller Error
- Fatigue
- Expectation BIAS

**Error**

**Airport**
- Checks for gross Errors
- Monitors the Environment
- Plans and prioritize task
- Manages Distractions
- Active listening
- Intervention

**ATC**
- Situational Awareness
- Workload Management

**Internal Threat**
- Expectation BIAS
- Fatigue
TEM Analysis of Runway and Taxiway Incursions

- Threats
  - Internal Threat – Fatigue BIAS
  - Other
  - ATC

Error

Pilot Competencies

Airport

Mismanaged Threats (Competencies)

- Situational Awareness
  - Checks for gross errors
  - Monitors the environment

- Workload Management
  - Plans and prioritize tasks
  - Manages distractions

- Communication
  - Active listening
  - Intervention

- 50%
- 20%
- 15%
- 15%

20%
TEM Analysis of Runway and Taxiway Incursions

Threat → Error → Airport

Root Cause of Errors (Competency)

• Active listening
• Checks for gross errors
• Monitors the environment
• Plans and prioritize task
• Manages Distractions

Pilot Competencies

Communication
Situational Awareness
Workload Management

Taxi Errors

Airport

• Active listening
• Checks for gross errors
• Monitors the environment
• Plans and prioritize task
• Manages Distractions
Summary of Runway and Taxiway Incursion TEM analysis

Threat & Errors

Errors, Undesired Aircraft State & End State

Pilot Competencies

Runway Incursion

Taxiway Incursion

Airport

ATC

Fatigue/BIAS

Situational Awareness

Workload Management

Communication
Determining Predictive Precursors to Runway Safety – LOSA data (Taxiway Errors)

- **Error Prevalence during taxi** – 66% of flights had 3 or more Errors during Taxi
  - Omitted ‘clear left /right’ call
  - Fast taxi speed
  - Nonessential duties performed
  - Checklist Errors
  - Wrong system settings

**Root Cause**
- Checklist Errors: 20%

**Workload Management**
- Distraction Management
- Rushing
- Prioritizing tasks
Determining Predictive Precursors to Runway Safety – LOSA data (Understanding ATC Threat Management)

Of all Threats during Taxi were ATC related threats.

Predictive Data driver: The Management of ATC threats

- Workload Management
- Communication

40% 60% 20%
Determining Predictive Precursors to Runway Safety – LOSA data (Understanding Crew Workload Management on Ground)

Top Threats On Ground (Prevalence)

- ATC – 53%
- Airport – 47%
- Airline Ops Pressure – 52%

In Pre-Departure

- Airline Ops Pressure

Positive Management

- Workload Management used the most
- Workload Management used the most

Flight crew reliance on Workload management
Determining Predictive Precursors to Runway Safety – LOSA data (Understanding Crew Workload Management on Ground)

Top Threats On Ground
- ATC – 53%
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- Airline Ops Pressure – 52%

In Pre-Departure
- Airline Ops Pressure

Positive Management
- 66%
- 76%

Are we putting the flights crew’s operational resilience to the test?
Determining Predictive Precursors to Runway Safety – LOSA data (Understanding Crew Workload Management on Ground)

Top Threats On Ground
- ATC – 53%
- Airport – 47%
- Airline Ops Pressure – 52%

In Pre-Departure
- Airline Ops Pressure

Predictive Data driver: A measure of Airline OPS Pressure on Ground

Workload Management used the most

Positive Management
- 66%
- 76%
Determining Predictive Precursors to Runway Safety – LOSA data
(How are crew dealing with Airport threats?)

37% Of all Threats during Taxi were Airport related threats.

Positive Management
When Anticipated

Determining Predictive Precursors to Runway Safety – LOSA data (How are crew dealing with Airport threats?)

Of all Threats during Taxi were Airport related threats.

Management

Positive Management

When Anticipated

Alignment of Safety and Training Data Taxonomies

Safety Taxonomy
- Threat & Errors
- Undesired Aircraft State & End State
- Pilot & Instructor Competencies

Training Taxonomy
- Training Topic
- Reduction of Safety Margins
- Pilot & Instructor Competencies
Alignment of Safety and Training Data Taxonomies

**Safety Taxonomy**

**Threat & Errors**
- Scenarios involving operational pressures, ATC pressure during Taxi.

**Workload Management:**
- Plans, prioritizes, and schedules appropriate tasks effectively.
- Manages and recovers from interruptions, distractions, variations and failures.

**Training Taxonomy**

**Scenarios involving operational pressures, ATC pressure during Taxi.**

**Workload Management:**
- Plans, prioritizes, and schedules appropriate tasks effectively.
- Manages and recovers from interruptions, distractions, variations and failures.
Conclusion

- Are we Data rich but information poor? – Invest in Learning from ‘normal work’.
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• Make the effort to align safety and taxonomies – TEM + CBTA is an easy solution!
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• Are we Data rich but information poor? – Invest in Learning from ‘normal work’.
• Make the effort to align safety and taxonomies – TEM + CBTA is an easy solution!
• Use Predictive Data as ‘Strength of Knowledge’.
• Risk assess Proactive and Predictive data. Risk management must evolve from a reactive to a proactive data-driven approach – Use Proactive/Predictive data in Risk Assessment.
Conclusion

- Are we Data rich but information poor? – Invest in Learning from ‘normal work’.
- Make the effort to align safety and taxonomies – TEM + CBTA is an easy solution!
- Use Predictive Data as ‘Strength of Knowledge’.
- Risk assess Proactive and Predictive data. Risk management must evolve from a reactive to a proactive data-driven approach – Use Proactive/Predictive data in Risk Assessment.
- Enhance industry collaboration
Thank You