Process Safety Issues: Applicability to Workplace Safety?

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Outline

- NTSB Basics
- Some Process Safety Issues
  - Fatigue
  - Distraction from PEDs
  - Increasing automation
- NTSB Recommendations
- Transferable to Workplace Safety?

NTSB 101

- Independent federal agency, investigate transportation mishaps, all modes
- Determine probable cause(s) and make recommendations to prevent recurrences
- Primary product: Safety recommendations
  - Favorable response > 80%
- *SINGLE FOCUS IS SAFETY*
- Independence
  - Political: Findings and recommendations based upon evidence rather than politics
  - Functional: No “dog in the fight”

Some Process Safety Issues

- Fatigue
- Distraction from Personal Electronic Devices
- Increasing automation

Fatigue: Problem in All Modes of Transportation

- Fundamental disconnect: Commercial transportation is 24/7, humans are not
- Sleep science is well developed; what about fatigue science?
  - Diet? Weight? Exercise? Drinking? Smoking? Age? Stress? Other?

Fatigue (con't)

- Shift changes?
- In aviation, effects of crossing time zones rapidly?
- In life-threatening situations, temporary mitigating effects of adrenaline rush?

Measuring Fatigue?

- Difficult to measure
  - When arriving at work
  - While underway
  - Post-accident
- Self-diagnosis is not reliable

Last But Not Least

- Cannot control what employees do while off duty
- Cranbury, NJ: Truck driver fell asleep, crashed into slowed traffic, chain collision involving 6 vehicles, resulting in 1 fatality
  - Driver had been awake 28 straight hours prior to the accident, but
  - Driver was in compliance with rest and duty time rules
- Challenge: How to ensure employees arrive ready and remain ready for the duration?

Newly Emerging Threat: Obstructive Sleep Apnea

- Americans are gaining weight
- Strong association of OSA with BMI
  - At least 50% likely to have OSA if BMI > 40
  - Other indicators, e.g., neck circumference
- Often undiagnosed

NTSB Recommendation

- Comprehensive fatigue management program based upon best fatigue science

- Not just for employees, but include
  - Employer
  - Dispatcher
  - Driver's family

Personal Electronic Devices

- Fatal accidents in every mode
- 23 times more likely to have motor vehicle accident while texting
- General conception re ability to multi-task
  - Surveys show almost everyone knows that texting while driving is dangerous, but
  - A very large percentage still does it

Worst PED Accident Yet

- Chatsworth, CA
  - Commuter train engineer passed red signal while texting
  - Collided with oncoming freight train, 25 fatalities, including engineer
  - Previously warned not to text while operating train
  - Texting teenage railroad geek to drive train

NTSB Recommendation

- Ban all cellphone use while driving, even hands-free
- 46 states and DC ban texting while driving, 14 states and DC ban use of hand-held cellphone while driving
- No state bans hands-free cellphone use while driving
- Railroad engineers, commercial (bus and truck) drivers prohibited from texting or using hand-held cellphone

Increasing Automation

– When it *malfunctions:*

- Increasing complexity increases likelihood that operators will not completely understand the system
- Increasing reliability increases likelihood that operators have never seen a given malfunction before, even in training

– When it's working *properly:*

- Undermine professionalism?

Malfunction Examples

– Amsterdam, Holland (2009)

– Rio to Paris (2009)

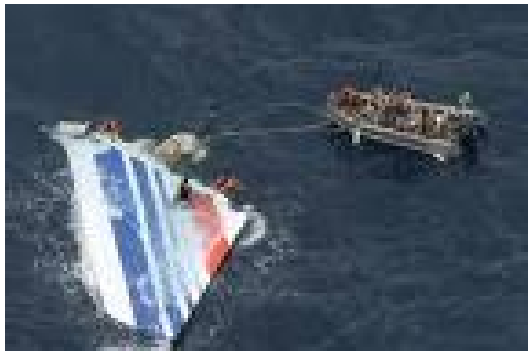
– San Francisco (2013)

Amsterdam, Holland

- The Conditions
  - Malfunctioning left radar altimeter
  - Pilots selected right side autopilot
  - Aircraft vectored above glideslope
  - Autothrust commanded throttles to idle
  - Unknown to pilots, right autopilot using left radar altimeter
  - Pilot unsuccessfully attempted go-around

- Queries:
  - Should autopilot default to same side altimeter?
  - More clarity re source of information? Ability to select?

Rio to Paris



- The Conditions
  - Cruise, autopilot engaged
  - Night, in clouds, turbulence, coffin corner
  - Ice blocked pitot tubes
  - Autopilot and autothrust inoperative without airspeed
  - Alpha protections disabled
  - Pilots' responses inappropriate
- Queries:
  - Pilot training re loss of airspeed information in cruise?
  - Importance of CRM – pilot knowing other pilot's actions?
  - Pilot training re manual flight at cruise altitude?

Asiana, San Francisco

- The conditions
  - Clear weather, negligible wind
  - 11,000 foot runway
  - Experienced pilots
  - Glide slope inoperative
  - Could not use autopilot to land
  - Crashed short of runway

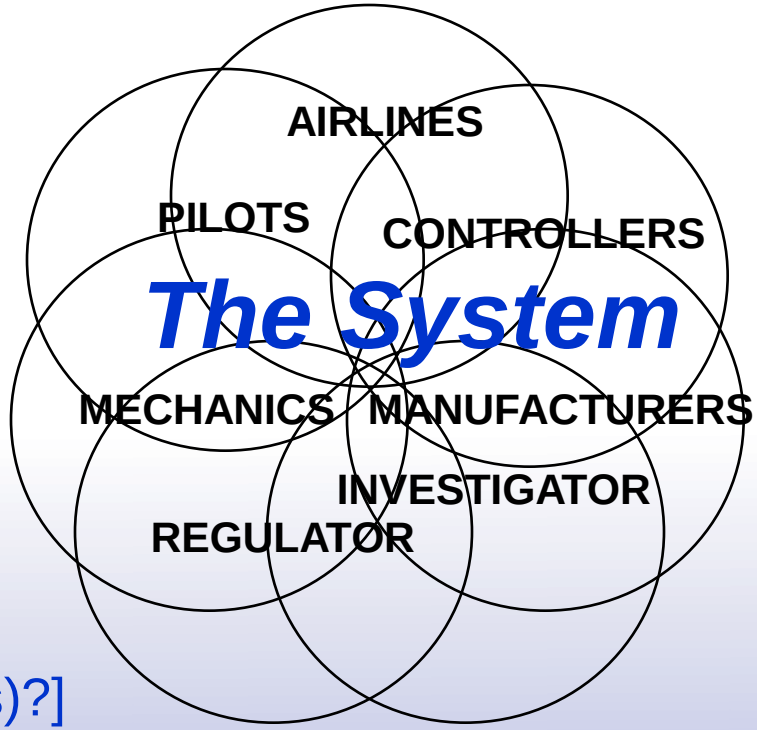
- Query:
  - Opportunities for manual flying?

Automation Working Properly: Undercutting Professionalism?

- Washington Metro: Automation
  - Starts the train out of the station
  - Observes speed limits, avoids collisions
  - Stops the train in the next station
  - Opens the doors
- Operator
  - Closes the doors
- Issues
  - Work for pay, rather than for job well done?
  - Job satisfaction/professionalism?

Comprehensive Solution

- Engage *All* Participants In Identifying Problems and Developing and Evaluating Remedies
- Airlines
- Manufacturers
  - With the systemwide effort
  - With their own end users
- Air Traffic Organizations
- Labor
  - Pilots
  - Mechanics
  - Air traffic controllers
- Regulator(s) [Query: Investigator(s)?]



Aviation Success Story

- *83% decrease* in fatal accident rate, 1998 – 2007, largely because of *collaboration*
- Icing on the cake: The process also
  - Improved productivity,
  - Minimized unintended consequences; but
  - Created *no new regulations*
- Collaboration can also help reduce effects of fatigue, eliminate PED distraction, and address automation issues

Success Transferable to Workplace Safety?

- Suggest beta test: Start with fatigue, PED use, automation, or any other troublesome area
  - Nagging problem for many years
  - Many interventions have been tried, not successful
  - Longevity suggests that problems are systemic, not just people
  - Collaboration as effort to address the system problems
  - Less employee defensiveness because process focused on trend rather than single event, purpose is improvement rather than blame
- Select collaborative corrective action group, all who have a “dog in the fight”
  - Manufacturers? Operators? Regulators? Others?

The Power of Collaboration

Everyone who is involved in the *problem* should be involved in developing the *solution*

Sample Areas as Threats to Workplace Safety?

- Fatigue: Most significant workplace safety threat, and collaboration probably most effective, in situations involving employees operating alone
- Use of PEDs: Also most likely threat, and collaboration most effective, where employees are operating alone
- Automation: Collaboration potentially beneficial throughout

Conclusions

- Fatigue, PED use, and automation are systemic process safety issues in aviation that can benefit from collaborative process improvement
- Workplace safety in general can benefit from the same collaboration successes that commercial aviation has used to benefit process safety

Thank You

Questions?