

# Overzealous Criminalization: Adverse Effects on Safety?

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Presentation to Eurocontrol

October 27, 2020



# The Problem

- Most accidents involve inadvertent error by good people trying to do the right thing under sometimes difficult circumstances
- Most criminal statutes require specific intent to harm, inadvertent error is not enough
- Nonetheless, post-accident public outcry and political response: ***PUNISH!***



# The Challenge

- Intentional wrongdoing *should* be punished
- Issue: Does criminalization help prevent *inadvertent error*?
- Difference of objectives:
  - Purpose of criminalization is *punishment* for intentional wrongdoing
  - Purpose of safety investigation is finding out why mishaps occur and *preventing them from happening again*



# Potential Undesirable Results of Overzealous Criminalization

- Actual or threatened criminalization:
  - Discourages participation in proactive information programs
  - Hinders safety accident investigations and efforts to prevent recurrences
  - Eliminates investigation transparency
  - Reduces the likelihood of addressing *system* issues
  - Is often a lose-lose because criminal proceedings cause all of the above problems even though they are often “unsuccessful” due to lack of requisite intent

# Strasbourg, France

- Risk factors

- Night, mountainous terrain
- No ground radar
- No ground-based glideslope guidance
- No airborne terrain alerting equipment

- Sophisticated autopilot

- Autopilot mode ambiguity



# Human Factors Challenge

- “3.2” in the window, *with* a decimal, means descend at a 3.2 degree angle (about *700 fpm* at 140 knots)
- “32” in the window, *without* a decimal, means descend at *3200 fpm*
- Clue re potential problem: Quick changes in autopilot mode suggest mode selection error
- Flight data recorder readout program could have helped safety experts address this problem proactively, before a crash

# Criminal Charges: Acquittal

- Manslaughter charges brought against representatives from the air navigation service provider, the airline, and the French BEA (aviation safety agency)
- Compensation ordered, but all six defendants acquitted of criminal charges

# Example: Concorde, 2000

## – Chain of Events: Takeoff from Paris CDG

- Tire shredded after rolling over piece of metal from previous (Continental Airlines) airplane
- Tire fragments punctured fuel tank
- Plane caught fire, crashed, fatal to all 109 in airplane, 4 on ground
- Involuntary manslaughter charges brought against Continental Airlines, two Continental mechanics



# Outcome

- French appeals court cleared Continental Airlines of criminal charges
- Court also dropped charges against the two Continental mechanics
- Issue: Requisite intent by mechanics?

# Criminal Prosecution Does Not Address System Issues

- Robustness of connection for part that fell off?
- Mechanics fatigued, distracted, impaired?
- Training of mechanics adequate?
- Work environment suitable?
- Necessary tools available?
- Parts inventory adequate?
- Adequacy of airport FOD procedures?
- Other?

# Another Example: GOL, 2007

## – Chain of Events, Flight from Brazil to New York

- Embraer eastbound, FL370 (per international convention)
- Route turned westbound at waypoint
- Go to even thousand (FL 380 or 360) per international convention?
- Pilots tried to contact controllers, unsuccessful, remained at FL370



# GOL (con't)

## – Chain of Events

- For unknown reasons, Embraer transponder was on “Standby” for about an hour prior to the collision, hence
  - Embraer was invisible to ATC
  - It was also invisible to Traffic Collision Avoidance System (TCAS) in eastbound airliner at FL370
- Airplanes collided, airliner crashed, fatal to all 154 on board, damaged Embraer landed safely at nearby airport

# Outcome

- Two Embraer pilots, four air traffic controllers charged with “exposing an aircraft to danger”
- Embraer pilots sentenced to 4 years, 4 months in prison, commuted to community service to be served in the US
- One controller sentenced to a prison term of up to 3 years, 4 months, eligible to do community service in Brazil
- Possible theory: Pilot’s foot on footrest accidentally hit transponder “Standby” button, no obvious indication that transponder was not transmitting
- Requisite intent by pilots or controllers?

# System Issues Addressed?

- Adequacy of ATC surveillance equipment and processes?
- Adequacy of warning to ATC re “disappeared” airplane?
- Adequacy of ATC communications capability?
- Adequacy of ATC staffing?
- Design of transponder controls?
- Adequacy of warning to pilots re transponder not transmitting?
- Other?

# Initially Unclear if Criminal? TWA 800

- Explosion of center-fuselage fuel tank, fatal to all 230 on board
- Immediate speculation re missile
- FBI or NTSB in charge?
  - FBI in charge: No public disclosure of evidence, criminal investigation comes first
  - NTSB in charge: Daily public disclosure of evidence
- Difficult to determine validity of missile theory until pieces recovered and assembled
- NTSB probable cause: Explosion, due to internal spark of unknown origin, of nearly empty fuel tank that was already heated near flash point



# Result: FBI/NTSB MOU

- Presumption that accident was caused by inadvertent error rather than criminal wrongdoing, so NTSB will lead investigation unless clearly criminal (e.g., 9/11)
- If NTSB investigation uncovers criminal activity, NTSB will ask FBI to lead, then NTSB will provide technical assistance as requested

# Effect on Criminalization of Two Major Human Factors Challenges?

## – Ongoing

- Pilots encountering problem that they have never seen before, even in training
  - Turkish Airlines, Amsterdam (2009)
  - Rio to Paris (2009)
  - Asiana, San Francisco (2013)
  - 737MAX (2018-9)
  - Exception: Landing in the Hudson River (2009)
  - Exception: Hydraulic failure, Sioux City, IA (1989)
- Exacerbated by automation becoming more complex and more reliable

## – Future

- Expecting highly trained, highly skilled pilots to become mere monitors as automation becomes increasingly capable

# Conclusions

- Few would argue against criminalization of intentional wrongdoing
- Overzealous criminalization, however, may adversely affect safety improvement efforts
- Successful in the U.S.: Primacy of safety investigation, criminal enforcement only evidence of intent to harm
- Needed: Model Policy, developed collaboratively – but not in the heat of battle – by all who are involved in the process, regarding best ways to address important and sometimes competing interests

# Thank You!!



## Questions?

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