NTSB National Transportation Safety Board

Runway Incursions:

A Suggested New Process

Presentation to: AAAE Runway Safety Summit

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NTSB Basics

- Independent agency, investigate transportation accidents
- Determine probable cause(s) and make recommendations to prevent recurrences
- Single focus is safety
- Primary product: Safety recommendations
  - Acceptance rate > 80%

Runway Safety

For commercial aircraft, 1995-2008:

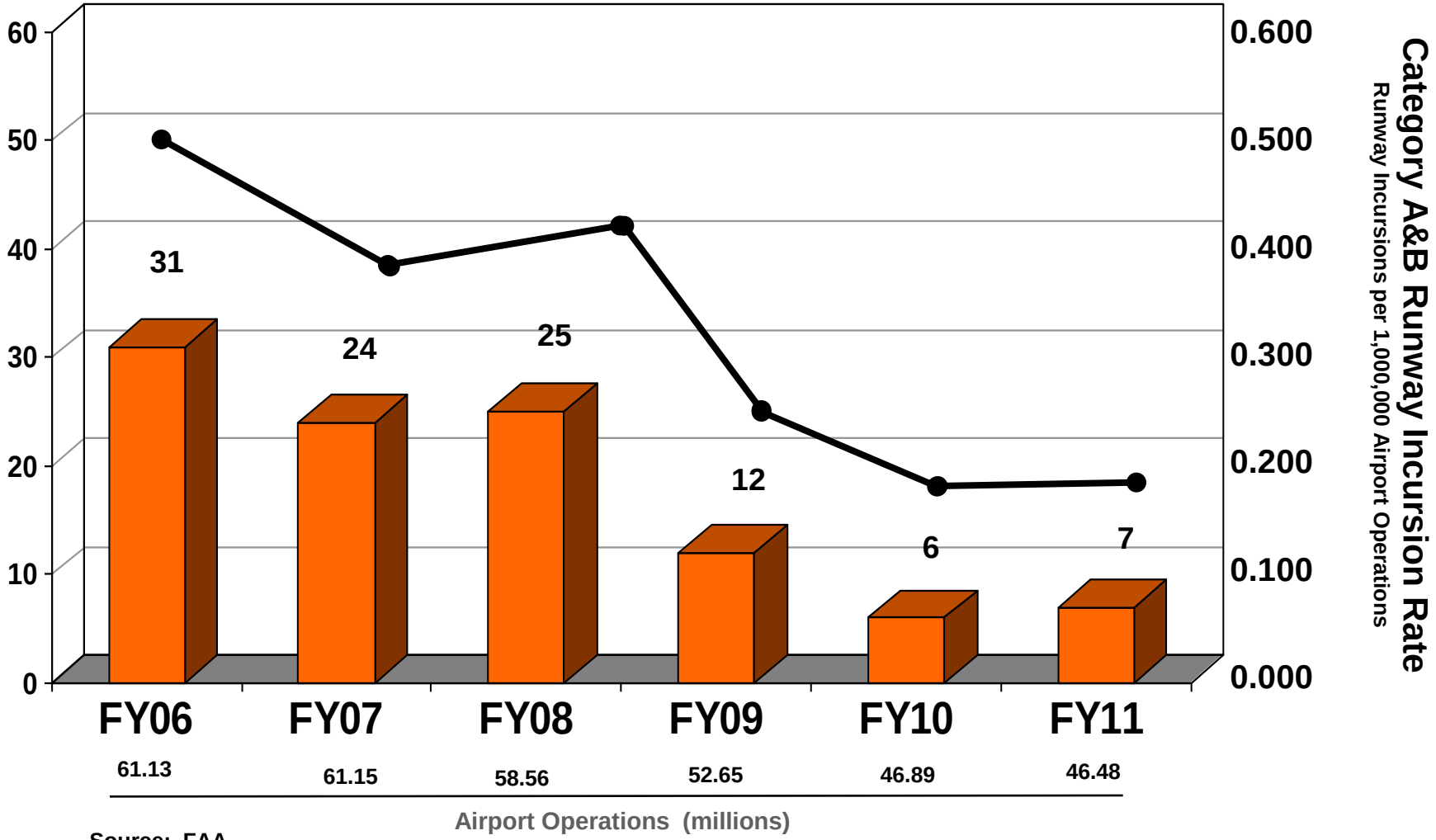
- **Of 1429 accidents involving major or substantial damage , 431 (30%) were runway related**
- **Those 431 runway related accidents included**
  - **417 excursions**
  - **10 incursions, and**
  - **4 confusions**
- **41 of those 431 accidents (10%) were fatal**
- **34 of those 41 fatal accidents (83%) were excursions**

Concerns re Runway Incursions

- **Historic**
  - **Worst accident in aviation history (Tenerife: 583 fatalities)**
- **Low probability but high consequence**
  - **Airliner to airliner**
- **Demand v. Capacity**
  - **More airplanes**

    but
  - **No new airports (and very few new runways)**
- **More complex personnel interactions**
  - **Pilots and controllers**

Category A&B Runway Incursions



Source: FAA

NTSB Recommendations

- Immediate collision/incursion warning in the cockpit
- Specific clearance for each runway crossing
- Cockpit moving map displays to alert re wrong runway
- [More robust reporting]

Current Process

- ATC identifies type of problem
- Handling of problem depends largely on ATC's identification of who made the last "mistake"
- If ATC says ATC made last mistake: referred to ATC for further action
- If ATC says pilot made last mistake: referred to FAA Flight Standards

Suggested Process

- Process should not depend upon who made last mistake
- Bring all involved parties (pilots, controllers, vehicle drivers) together, find out what happened
- No enforcement action (absent criminal, intentional wrongdoing)
- Ascertain totality of circumstances

Why A New* Process?

- Purpose of current process is to determine whom to discipline/punish
- Need a process to help determine how to reduce incursions

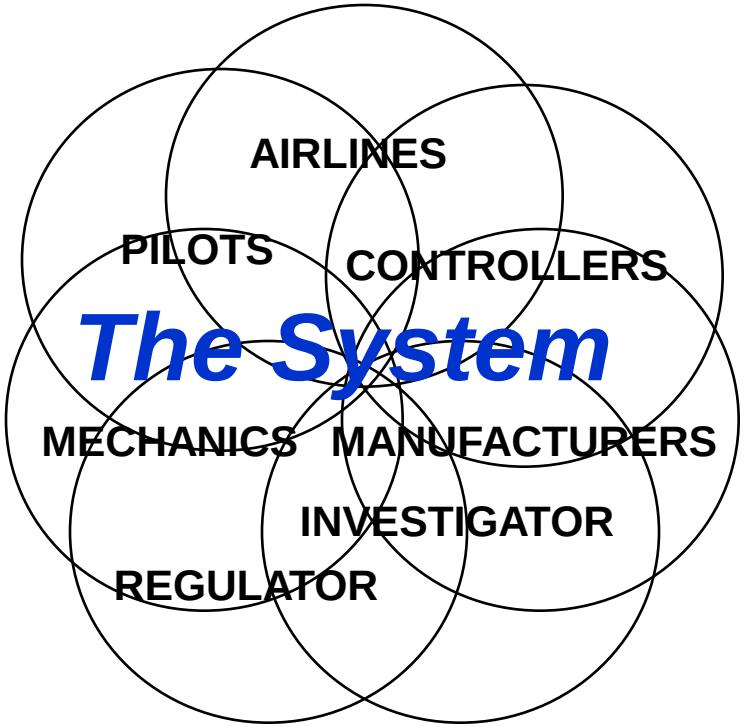
* The process is actually not new . . . the FAA used it, very successfully, in the early 1990's re altitude busts

Examples of the Need

- **Tenerife, 1977**
  - **(abnormal ops; small airport; fog; language difficulties)**
- **Detroit, 1990**
  - **(fog; airport geometry)**
- **Los Angeles, 1991**
  - **(conspicuity at night, from tower and from behind)**
- **St. Louis, 1994**
  - **(FBO ramp leads directly onto runway)**
- **Providence, 1999**
  - **(success story: refusal to take off)**

The Context: Increasing Complexity

- **More System *Interdependencies***
  - – Large, complex, interactive system
  - – Often tightly coupled
  - – Hi-tech components
  - – Continuous innovation
  - – Ongoing evolution
- **Safety Issues Are More Likely to Involve *Interactions Between Parts of the System***



Effects of Increasing Complexity:

More "Human Error" Because

- System More Likely to be Error Prone
- Operators More Likely to Encounter Unanticipated Situations
- Operators More Likely to Encounter Situations in Which "By the Book" May Not Be Optimal ("workarounds")

The Result:

Front-Line Staff Who Are

- Highly Trained
- Competent
- Experienced,
- Trying to Do the Right Thing, and
- Proud of Doing It Well

. . . Yet They Still Commit

Inadvertent
Human Errors

Fix the Person or the System?

Is the Person *Clumsy?*

Or Is the Problem . . .

The *Step???*

Enhance Understanding of <u>Person/System Interactions By:</u>

- Collecting,
- Analyzing, and
- Sharing

Information

Objectives:

Make the System

(a) Less Error Prone

and

(b) More Error Tolerant

The Health Care Industry

To Err Is Human:

Building a Safer Health System

"The focus must shift from blaming individuals for past errors to a focus on preventing future errors by designing safety into the system."

Institute of Medicine, Committee on Quality of Health Care in America, 1999

From Data to Information

Tools and processes to convert large quantities of data into useful information

Data Sources

Info from front line staff and other sources

DATA

USEFUL INFORMATION

Analysts

Tools

Processes

Smart Decisions

- **Identify issues**
- ***PRIORITIZE!!!***
- **Develop solutions**
- **Evaluate interventions**

Aviation Success Story

65% Decrease **in Fatal Accident Rate,**

1997 - 2007

largely because of

System Think

fueled by

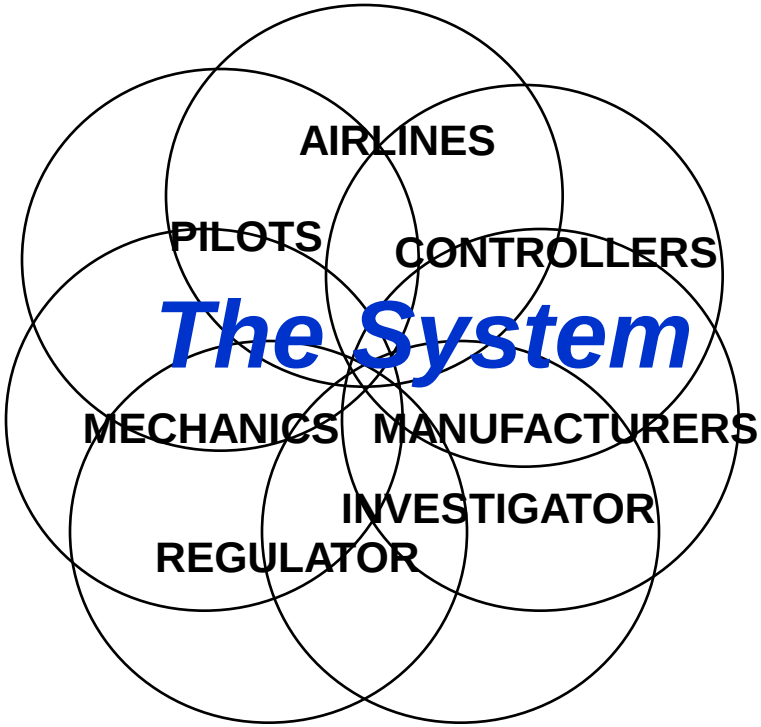
Proactive Safety

Information Programs

P.S. Aviation was already considered *VERY SAFE* in 1997!!

Aviation "System Think" Success

- **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)?]**



Applicability of "System" Success:

- **Entire Industry**
- **Company (Some or All)**
- **Type of Activity**
- **Facility/Airport**
- **Team**

Failure: Inadequate "System Think"

- **1995 – Cali, Colombia**
- **Risk Factors**
  - ***Night***
  - ***Airport in Deep Valley***
  - ***No Ground Radar***
  - ***Airborne Terrain Alerting***
    Limited to "Look-Down"
  - ***Last Minute Change in Approach***
    - ***More rapid descent (throttles idle, spoilers)***
    - ***Hurried reprogramming***
- **Navigation Radio Ambiguity**
- **Spoilers Do Not Retract With Power**

Recommended Remedies Include:

- **Operational**
  - ***Caution Re Last Minute Changes to the Approach***
- **Aircraft/Avionics**
  - **Enhanced Ground Proximity Warning System**
  - **Spoilers That Retract With Max Power**
  - **Require Confirmation of Non-Obvious Changes**
  - **Unused or Passed Waypoints Remain In View**
- **Infrastructure**
  - **Three-Letter Navigational Radio Identifiers**
  - **Ground-Based Radar**
  - **Improved Reporting of, and Acting Upon, Safety Issues**

Note: All but one of these eight remedies address system issues

Conclusions

- Need process for improvement, not punishment, re incursions

- Need to treat airport as a system by considering all airport issues:
  - Incursions
  - Excursions
  - Confusions

Thank You!!!

Questions?