Aviation Lesson Learned:

Better Collaboration Can Help Improve Safety and Productivity
The Contrast

- Conventional Wisdom:
  Improvements that reduce risk usually also reduce productivity

- Lesson Learned from Proactive Aviation Safety Programs:
  Risk can be reduced in a way that also results in immediate productivity improvements
Process Plus Fuel Creates a Win-Win

System Think Process

Information From Front Lines

Improved Safety

AND

Improved Productivity
Outline

- The Context
- Importance of “System Think”
- Importance of Better Information
- Safety Benefits
- Productivity Benefits
- Aviation Successes and Failures
- Roles of Leadership and Regulator
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
When Things Go Wrong

**How It Is Now . . .**

You are highly trained

and

If you did as trained, you would not make mistakes

so

You weren’t careful enough

so

You should be **PUNISHED!**

**How It Should Be . . .**

You are human

and

Humans make mistakes

so

Let’s *also* explore why the system allowed, or failed to accommodate, your mistake

and

Let’s **IMPROVE THE SYSTEM!**
Fix the Person or the System?

Is the **Person** Clumsy?

Or Is the Problem . . .

The **Step???**
Enhance Understanding of Person/System Interactions By:

- 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
Major Source of Information: Hands-On “Front-Line” Employees

“We Knew About That Problem”

(and we knew it might hurt someone sooner or later)
As we begin to get over the first hurdle, we must start working on the next one . . .
Information Overload

"EUREKA! MORE INFORMATION!"

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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

Analysts

Tools

Processes

Smart Decisions
- Identify issues
- PRIORITIZE!!!
- Develop solutions
- Evaluate interventions

USEFUL INFORMATION
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)?]
Major Paradigm Shift

– Old: The regulator identifies a problem, develops solutions
  • Industry skeptical of regulator’s understanding of the problem
  • Industry fights regulator’s solution and/or implements it begrudgingly

– New: Collaborative “System Think”
  • Industry involved in identifying problem
  • Industry “buy-in” re interventions because everyone had input, everyone’s interests considered
  • Prompt and willing implementation
  • Interventions evaluated . . . and tweaked as needed
  • Solutions probably more effective and efficient
  • Unintended consequences much less likely
Challenges of Collaboration

– Human nature: “I’m doing great . . . the problem is everyone else”

– Participants may have competing interests, e.g.,
  • Labor/management issues
  • May be potential co-defendants

– Regulator probably not welcome

– Not a democracy
  • Regulator must regulate

– Requires all to be willing, in their enlightened self-interest, to leave their “comfort zone” and think of the System
Applicability of Collaborative Approach:

• Entire Industry
• Company (Some or All)
• Type of Activity
• Facility
• Team
Manufacturer “System Think” Success

Aircraft Manufacturers are Increasingly Seeking Input, Throughout the Design Process, From

- Pilots  (User Friendly)
- Mechanics  (Maintenance Friendly)
- Air Traffic Services  (System Friendly)
Process Plus Fuel Can Produce An Amazing Win-Win

System Think
Process

Information From Front Lines

Improved Safety
AND
Improved Productivity

P.S. Collaboration also significantly reduces the likelihood of unintended consequences!
Not Only Improved Safety, But Improved Productivity, Too

• Ground Proximity Warning System
  – \textit{S}: Reduced warning system complacency
  – \textit{P}: Reduced unnecessary missed approaches, saved workload, time, and fuel

• Flap Overspeed
  – \textit{S}: No more potentially compromised airplanes
  – \textit{P}: Significantly reduced need to take airplanes off line for VERY EXPENSIVE (!!!) disassembly, inspection, repair, and reassembly
But Then . . .

Why Are We

So Jaded in The Belief That

*Improving Safety* 

*Will Probably* 

*Hurt The Bottom Line??*
## Costly Result$ Of Safety Improvements Poorly Done

<table>
<thead>
<tr>
<th>Safety Poorly Done</th>
<th>Safety Well Done</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Punish/re-train operator</td>
<td>Look beyond operator, also consider system issues</td>
</tr>
<tr>
<td>- Poor workforce morale</td>
<td></td>
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<tr>
<td>- Poor labor-management relations</td>
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<tr>
<td>- Labor reluctant to tell management what’s wrong</td>
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<tr>
<td>- Retraining/learning curve of new employee if “perpetrator” moved/fired</td>
<td></td>
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<tr>
<td>- Adverse impacts of equipment design ignored, problem may recur because manufacturers are not involved in improvement process</td>
<td></td>
</tr>
<tr>
<td>- Adverse impacts of procedures ignored, problem may recur because procedure originators (management and/or regulator) are not involved in improvement process</td>
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Costly Result$  
Of Safety Poorly Done (con’t)

Safety **Poorly** Done

2. Management decides remedies unilaterally
- *Problem may not be fixed*
- *Remedy may not be most effective, may generate other problems*
- *Remedy may not be most cost effective, may reduce productivity*
- *Reluctance to develop/implement remedies due to past remedy failures*
- *Remedies less likely to address multiple problems*

3. Remedies based upon instinct, gut feeling
- *Same costly results as No. 2, above*

Safety **Well** Done

Apply “System Think,” *with workers*, to identify and solve problems

Remedies based upon evidence (including info from front-line workers)
Costly Result$ Of Safety Poorly Done (con’t)

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<td>4. Implementation is last step</td>
<td>Evaluation after implementation</td>
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<tr>
<td>- No measure of how well remedy worked (until next mishap)</td>
<td></td>
</tr>
<tr>
<td>- No measure of unintended consequences (until something else goes wrong)</td>
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**Conclusion:** Is Safety Good Business?

- Safety implemented poorly can be very costly (and ineffective)
- Safety implemented well, in addition to improving safety more effectively, can also create benefits greater than the costs
The Role of Leadership

- Demonstrate Safety Commitment . . .
  *But Acknowledge That Mistakes Will Happen*
- Include “Us” (e.g., System) Issues,
  Not Just “You” (e.g., Training) Issues
- Make Safety a Middle Management Metric
  - Engage Labor Early
  - Include the System --
  Manufacturers, Operators, Regulator(s), and Others
- Encourage and Facilitate Reporting
  - Provide Feedback
- Provide Adequate Resources
  - Follow Through With Action
How The Regulator Can Help

- Emphasize the importance of System issues *in addition to* (not instead of) worker issues

- Encourage and participate in industry-wide “System Think”

- Facilitate collection and analysis of information
  - Clarify and announce *policies for protecting information and those who provide it*
  - Encourage other industry participants to do the same

- Recognize that *compliance* is very important, but the *mission is reducing systemic risk*
Thank You!!!

Questions?