Reducing Risk
While
Improving
Productivity:

Key Lessons Learned
The Contrast

- Conventional Wisdom:

Improvements that reduce risk usually
also reduce productivity

- Lesson Learned from Proactive Aviation Safety Information 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
- Role of Leadership
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”)

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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
Current System Data Flow

Currently Only a Minute Portion of Data is Collected and Analyzed

Most Data Lost Forever
Heinrich Pyramid

- Mandatory Reporting
- Voluntary Reporting

ACCIDENTS

(INCIDENTS)

(NEAR MISSES)

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

“We Knew About That Problem”

(and we knew it might hurt someone sooner or later)
Legal Concerns That Discourage Collection, Analysis, and Sharing

- Public Disclosure
- Job Sanctions and/or Enforcement
- Criminal Sanctions
- Civil Litigation
Typical “Cultural” Barrier

CEO

“Safety First”

Middle Management

“Production First”

Front-Line Employees

“Please the Boss First... THEN Consider Safety?”

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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

Tools and Processes

Analysts

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

From Data to Information

October 28, 2011 METRO
Aviation Success Story

65% Decrease in Fatal Accident Rate, 1997 - 2007

largely because of
System Think

towered 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
- 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)
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 indentifying problem
  - Industry “buy-in” re solution because everyone had input, everyone’s interests considered
  - Prompt and willing implementation
  - Solution probably more effective and efficient
  - Unintended consequences much less likely
Challenges of Collaboration

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

- Not a democracy
  - Regulator must regulate

- Regulator probably not welcome

- Labor/Management issues between some participants

- Participants are potential co-defendants
A 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
Major Benefit: $Savings*

*Significantly More Than Savings From Mishaps Prevented

OPERATIONS & MAINTENANCE
Immediate Benefits

PREVENTION
Long-Term Benefits

ACCI DENT
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

Safety Poorly Done

1. Punish/re-train operator
   - Poor workforce morale
   - Poor labor-management relations
   - Labor reluctant to tell management what’s wrong
   - Retraining/learning curve of new employee if “perpetrator” moved/fired
   - Adverse impacts of equipment design ignored, problem may recur because manufacturers are not involved in improvement process
   - Adverse impacts of procedures ignored, problem may recur because procedure originators (management and/or regulator) are not involved in improvement process

Safety Well Done

Look beyond operator, also consider system issues
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

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

Remedies based upon evidence (including info from front-line workers)
4. Implementation is last step

- No measure of how well remedy worked (until next mishap)
- No measure of unintended consequences (until something else goes wrong)

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
Thank You!!!

Questions?