NTSB National Transportation Safety Board

The Role of

Operators and Regulators

In Preventing Mishaps

Presentation to: Leadership

And Major Accident Risk Seminar

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Date: August 31, 2010

Truth of Conventional Wisdom?

- 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*
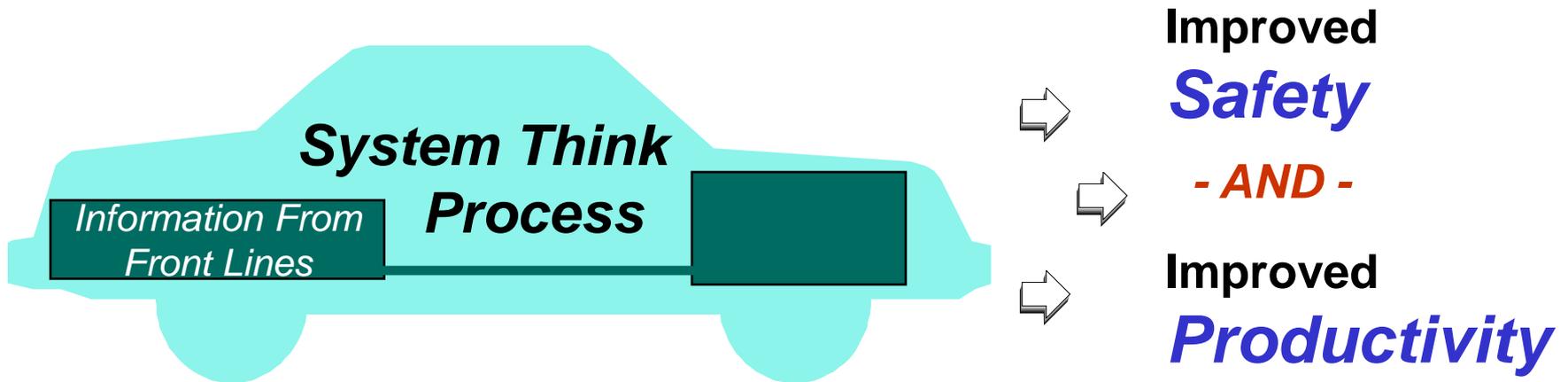
Outline

- **The Context**

- **Importance of "System Think"**

- **Importance of Better Information**

- **Safety Benefits**

- **Productivity Benefits**

- **The Role of Senior Management**

- **The Role of the Regulator**

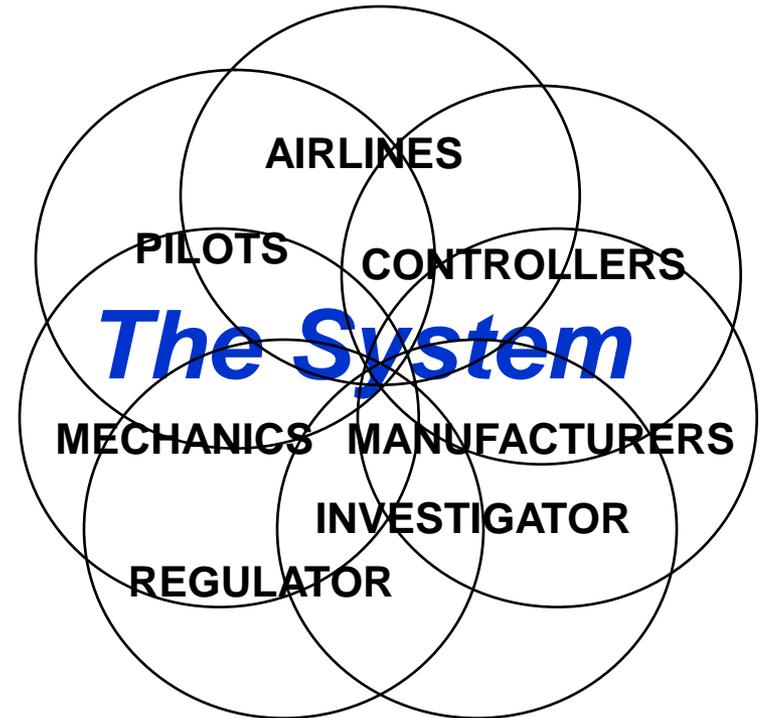# The Context: Increasing Complexity

- **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*

AIRLINES

PILOTS   **CONTROLLERS**

The System

MECHANICS   MANUFACTURERS

INVESTIGATOR

REGULATOR

Effects of Increasing Complexity:

More "Human Error" Because

- **System More Likely to be Error Prone**

- **Front-Line Workers More Likely to Encounter Unanticipated Situations**

- **Front-Line Workers More Likely to Encounter Situations in Which "By the Book" May Not Be Optimal**

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!

<u>Fix the Person or the System?</u>

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:

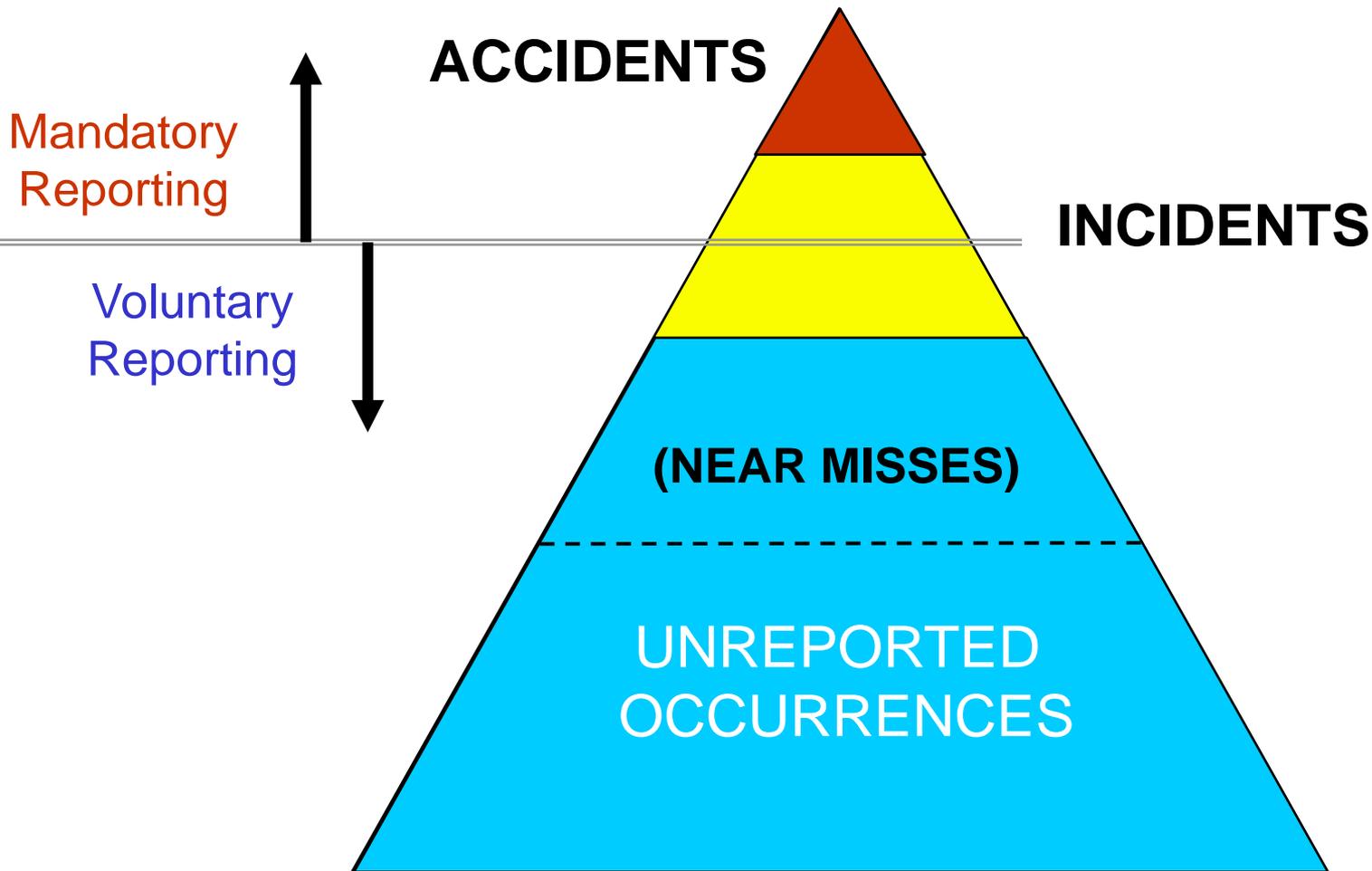### *Building a Safer Health System*

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

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

Current System Data Flow

Most Data Lost Forever

Currently Only a Minute Portion of Data is Collected and Analyzed
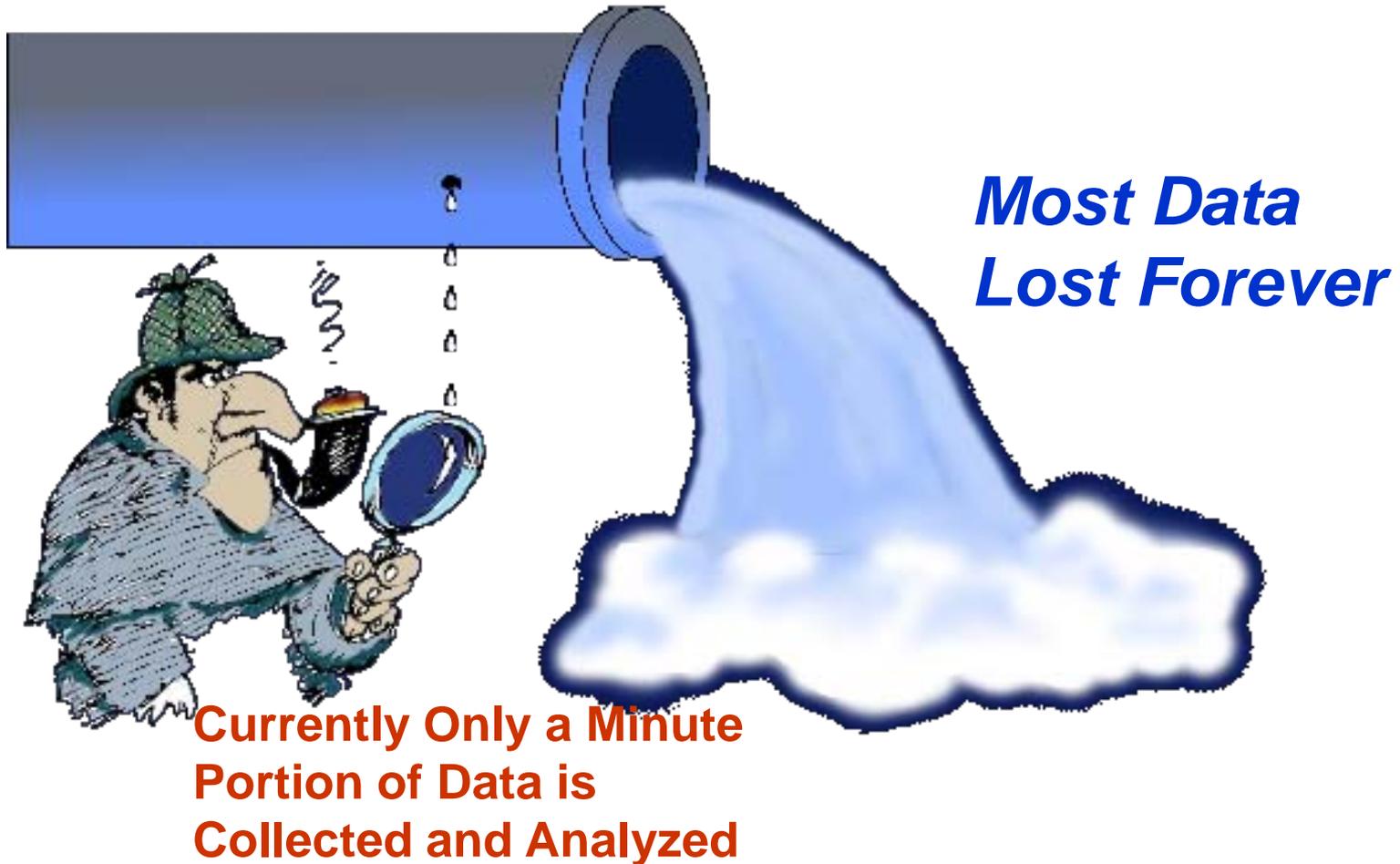
Heinrich Pyramid

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**

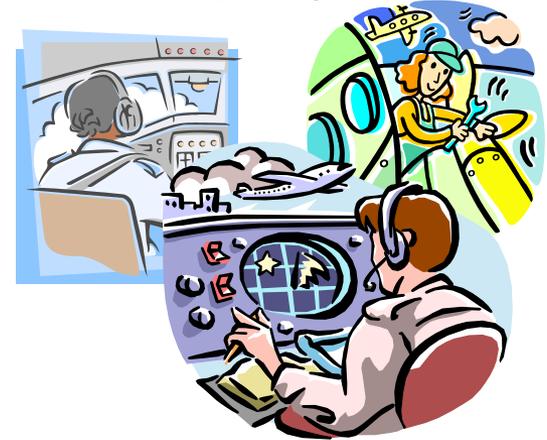- **Civil Litigation**

Typical "Cultural" Barrier

CEO

"Safety First"

Middle Management

"Production First"

Front-Line Employees

"Please the Boss First…
THEN Consider Safety?"

Next Challenge
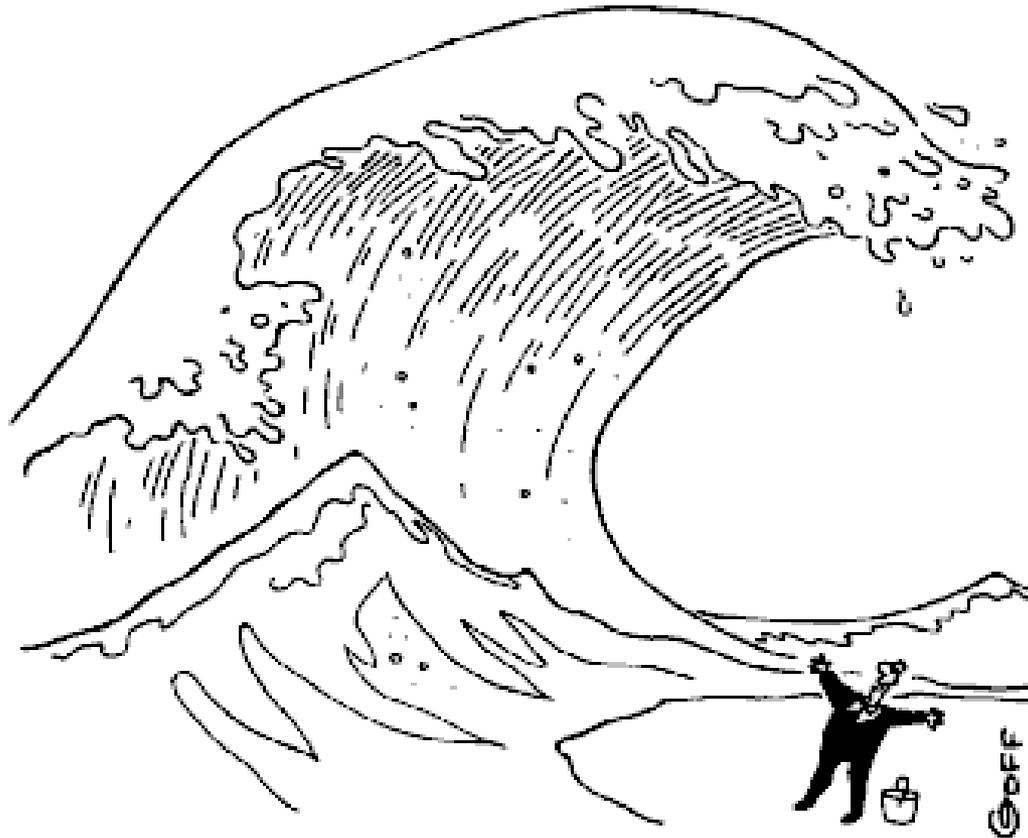
Legal/Cultural Issues

Improved Analytical Tools

As we begin to get over the first hurdle, we must start working on the next one . . .

Information Overload

© 1996 Ted Goff

"EUREKA! MORE INFORMATION!"

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

USEFUL

INFORMATION

Tools

Processes

Smart Decisions

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

Aviation Success Story

65% Decrease in U.S. Fatal Accident Rate,
1997 - 2007

largely because of
Proactive
***Safety Information Programs***

plus
System Think

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)**

AIRLINES

PILOTS   CONTROLLERS

The System

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INVESTIGATOR

REGULATOR
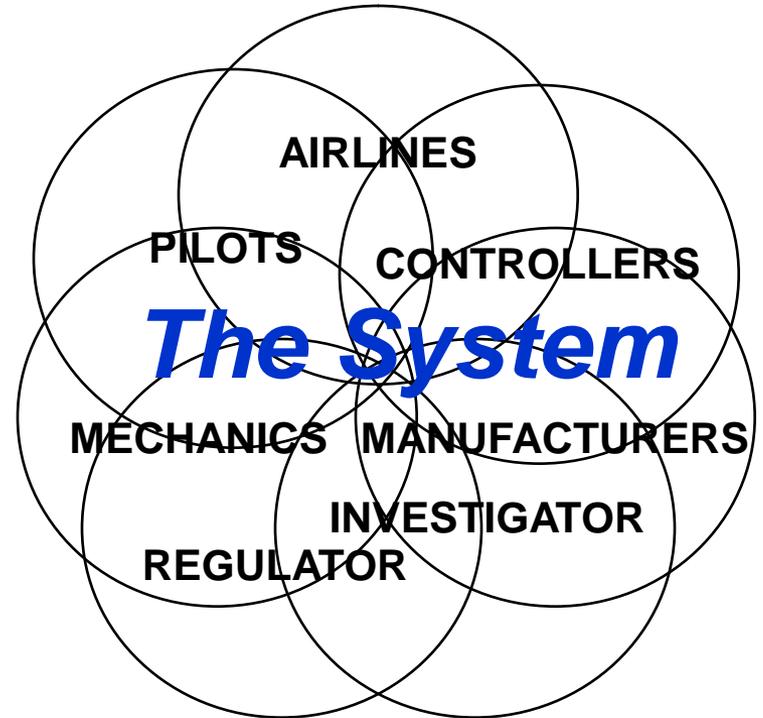
Major Benefit: $avings*

Significantly More
**Than Savings From
Mishaps Prevented**
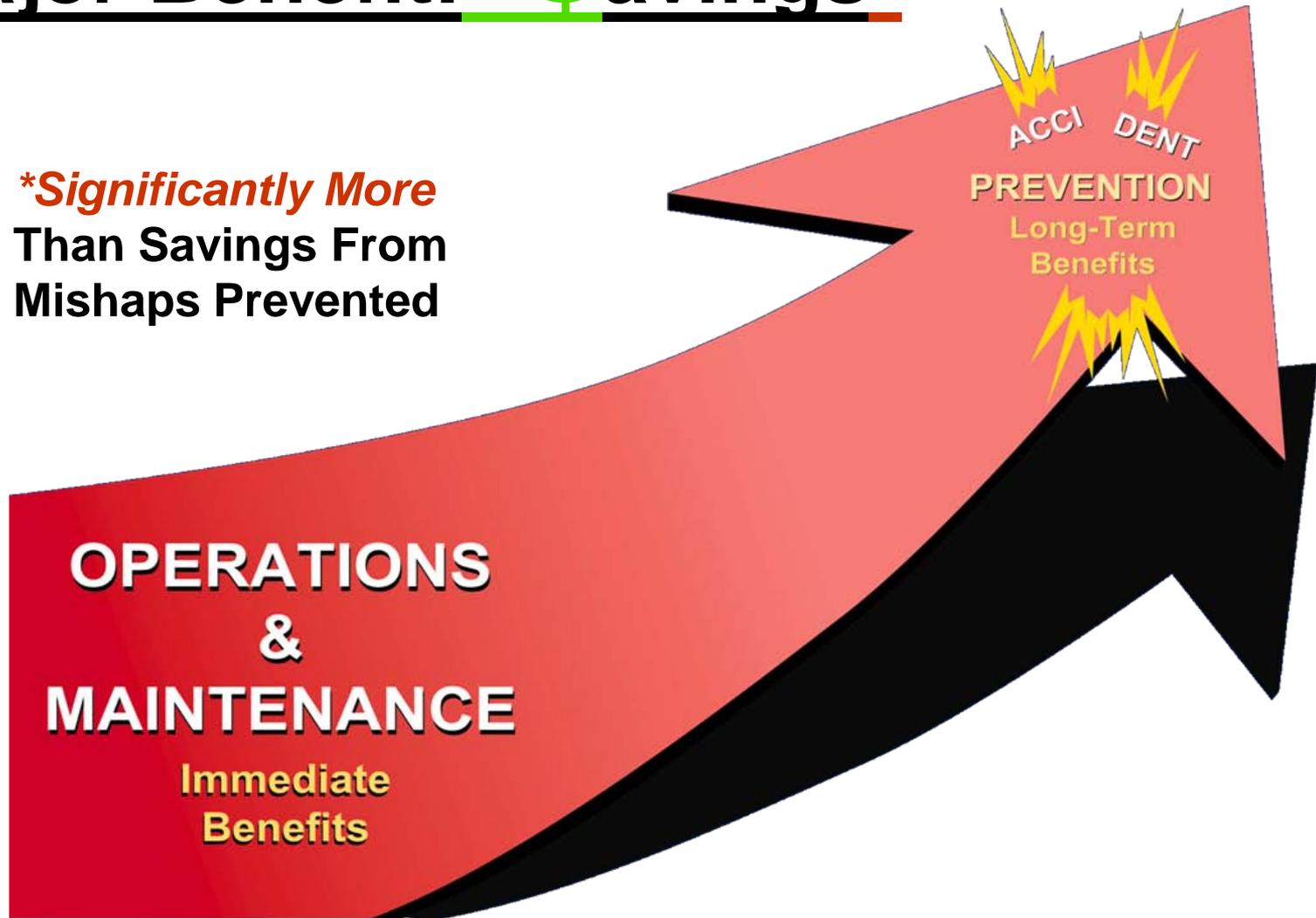
Not Only Improved Safety,
But Improved Productivity, Too

- **Ground Proximity Warning System**
  - *S: Reduced warning system complacency*
  - *P: Reduced unnecessary missed approaches, saved workload, time, and fuel*

- **Flap Overspeed**
  - *S: No more potentially compromised airplanes*
  - *P: Significantly reduced need to take airplanes off line for VERY EXPENSIVE (!!) disassembly, inspection, repair, and reassembly*

But Then . . .

Why Does

Improving Safety

Usually

Hurt The Bottom Line??

Costly Result$
Of Safety Improvements Poorly Done

Safety _Poorly_ Done

1. Punish/re-train workers

- 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 workers, also consider system issues

Costly Result$
Of Safety Poorly Done (con't)

Safety *Poorly* Done

Safety *Well* Done

2. Management decides remedies unilaterally

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

- 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
- Remedies less likely to address multiple problems
- Reluctance to develop/implement remedies due to past remedy failures

3. Remedies based upon instinct, gut feeling

Remedies based upon evidence (including info from front-line workers)

- Same costly results as No. 2, above

Costly Result$
Of Safety Poorly Done (con't)

Safety *Poorly* Done

Safety *Well* Done

4. Implementation is last step

Evaluation after implementation

- *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 Senior Management

- 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, Regulator(s), and Others

- Encourage and Facilitate Reporting

- Provide *Feedback*

- Provide Adequate *Resources*

- *Follow Through* With Action

How The Regulator Can Help

- **Emphasize Importance of System Issues in Addition to 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*

Thank You!!!

Questions?