Sample Implementation of An Industry-Wide Safety Management System

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SMS In The Pipeline Industry

- Oil pipeline release, Marshall, MI (2010)
- NTSB investigated, issued several recommendations including one to the American Petroleum Institute to develop Safety Management System (SMS)(2012)
- API published Recommended Practice (RP) 1173 as model SMS (2015)
- Widely adopted by many pipeline operators

Elements of SMS – RP 1173

- What is SMS
  - A process for transforming safety into a way of doing business rather than merely checking a box
- Ten elements per RP 1173
  - Leadership and management commitment
  - Stakeholder engagement
  - Risk management
  - Operational controls
  - Incident investigation, evaluation, and lessons learned
  - Safety assurance
  - Management review and continuous improvement
  - Emergency preparedness and response
  - Competence, awareness, and training
  - Documentation and record keeping

Varying Descriptions

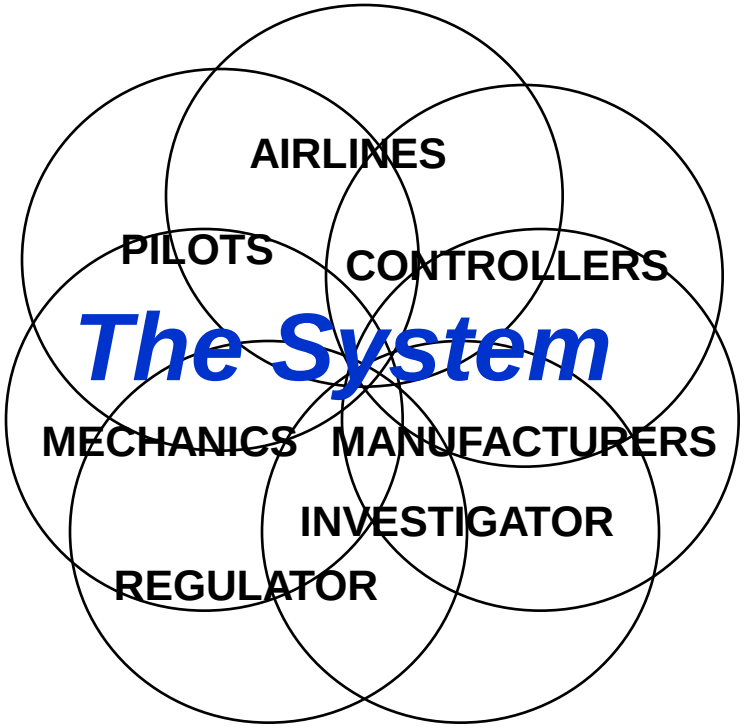
- Many descriptions in different contexts, e.g., Federal Aviation Administration (FAA) describes the four characteristics as safety policy, safety risk management, safety assurance, and safety promotion
- Foundational similarity: The best way to improve the safety of a complex system is collaboration among the system's participants, rather than more regulations or a bigger stick for the regulator
- How to implement SMS
  - Program is very comprehensive
  - Implementation is challenging
  - Probably many ways to implement, commercial airline industry demonstrated one way

Aviation Implementation of SMS: Commercial Aviation Safety Team

- Declining fatal accident rate stopped declining, early 1990's
- Volume predicted to double in 15-20 years
- Industry concerned that twice as many fatal accidents would scare the flying public
- Implemented CAST, voluntary industry-wide collaborative program that has not been replicated in any other industry before or since
- Collaboration includes airlines, manufacturers, airports, pilots, air traffic controllers, and the regulator (FAA)
- Note: The effect of CAST was to implement SMS without any specific reference to SMS

Complex System of Subsystems

- 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*



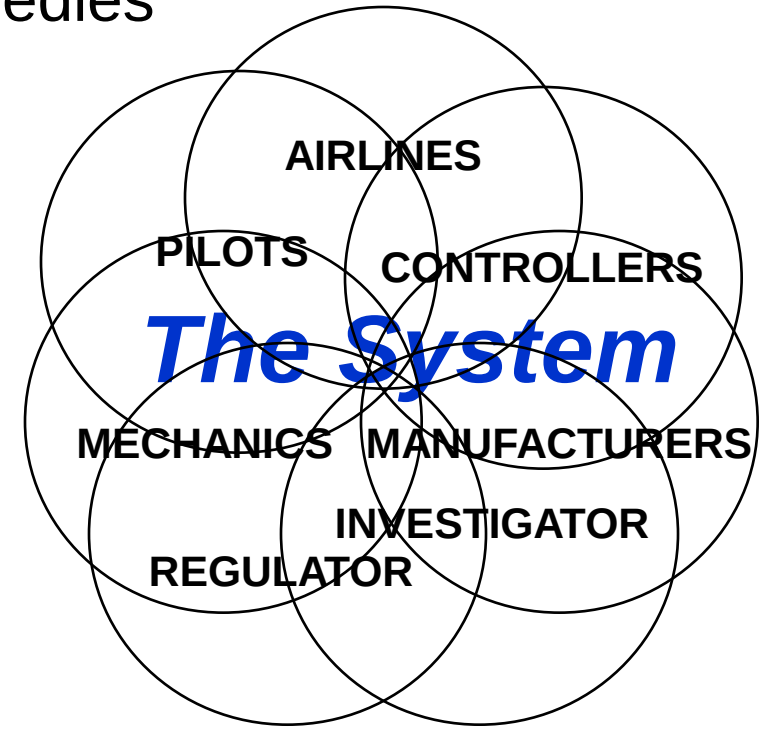
The Solution: System Think

Understanding how a change in one subsystem of a complex system may affect other subsystems within that system

System Think via Collaboration

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
- Airports
- Labor
  - *Pilots*
  - *Mechanics*
  - *Air traffic controllers*
- Regulator(s)



Objectives:

Make the System

(a) Less error prone

and

(b) More error tolerant

New Paradigm

How It Is Now . . .	*How It Should Be . . .*
You are highly trained	You are human
and	*and*
If you did as trained, you would not make mistakes	Humans make mistakes
so	*so*
You weren't careful enough	Let's *also* explore why the system allowed, or failed to accommodate, your mistake
so	*and*
You should be PUNISHED!	Let's IMPROVE THE SYSTEM!

From Data to Useful 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

USEFUL

INFORMATION

Smart Decisions

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

Commercial Aviation Success Story

83% decrease in fatal accident rate,

1998 - 2007

largely because of

System Think

fueled by

proactive safety information programs

P.S. In 1998, commercial aviation was already considered *VERY SAFE and unlikely to improve much*!!

Moral of the Story

Anyone who is

involved in the *problem*

should be

involved in the *solution*

Major Paradigm Shift

- Old: The regulator identifies a problem, develops solutions
  - Industry skeptical of regulator's understanding of the problem
  - Industry fights regulator's proposed solution and/or implements it begrudgingly
- New: Collaborative "System Think"
  - Industry involved in identifying problem
  - Industry "buy-in" re solutions because everyone had input, everyone's interests and concerns considered
  - Prompt and willing implementation
  - Interventions evaluated . . . *and tweaked as needed*
  - Solutions probably more effective and efficient, *improved productivity enhances sustainability*
  - Unintended consequences much less likely
  - Safety level well above "floor of regulatory compliance," hence *no new regulations generated*

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

TRUST

Applicability of Collaborative Approach

- Improved collaboration can help improve *process* safety in any industry that is engaged in activities that create the potential for an uncontained release of large quantities of energy and/or pollutants (typically low-frequency high-consequence events)
- Improved collaboration can also help improve *workplace* safety (commonly referred to as slips, trips, and falls) in all industries in which workers can be injured

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 related to safety 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*

Conclusions

- *SMS helps transform safety into a way of doing business rather than checking a box*
- *SMS has many elements and is challenging to implement and sustain*
- *The airline industry has shown that collaboration can be a way to implement SMS*
- *By focusing on safety, collaboration produces a much higher level of safety than can be attained by focusing on compliance*
- *Collaboration can help ensure that safety improvement programs also improve productivity, which makes the safety programs more sustainable*

Thank You

Questions?

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