

Human Performance Improvement and Feedback & Improvement



Red Rusty Ferric Acid Deposits on Vessel Flange (2RFO)



Cause Analysis Workshop

- **March 2007, LANL**
 - Representatives from several DOE sites
 - Provided information on various tools and processes
 - Variance among the various sites and contractors
 - Significant focus on tools
 - Reason, Taproot, Phoenix, MORT, Stream Analysis
- **Looking for a “*better*” approach**
 - Conducting Analysis
 - Developing corrective actions that stick



Cause Analysis Workshop Results

- Need a consistent process/approach
 - Conducting analysis
 - Extent of condition
 - Developing/Validating corrective actions
- The tools are useful if used “skillfully”
- Qualification and proficiency of analyst
- Recommendation to develop guidance document for the DOE community



Event Investigation & Cause Analysis



Red Rusty Boric Acid Deposits on Vessel Flange (12RFO)



Why –

Human Performance Approach?

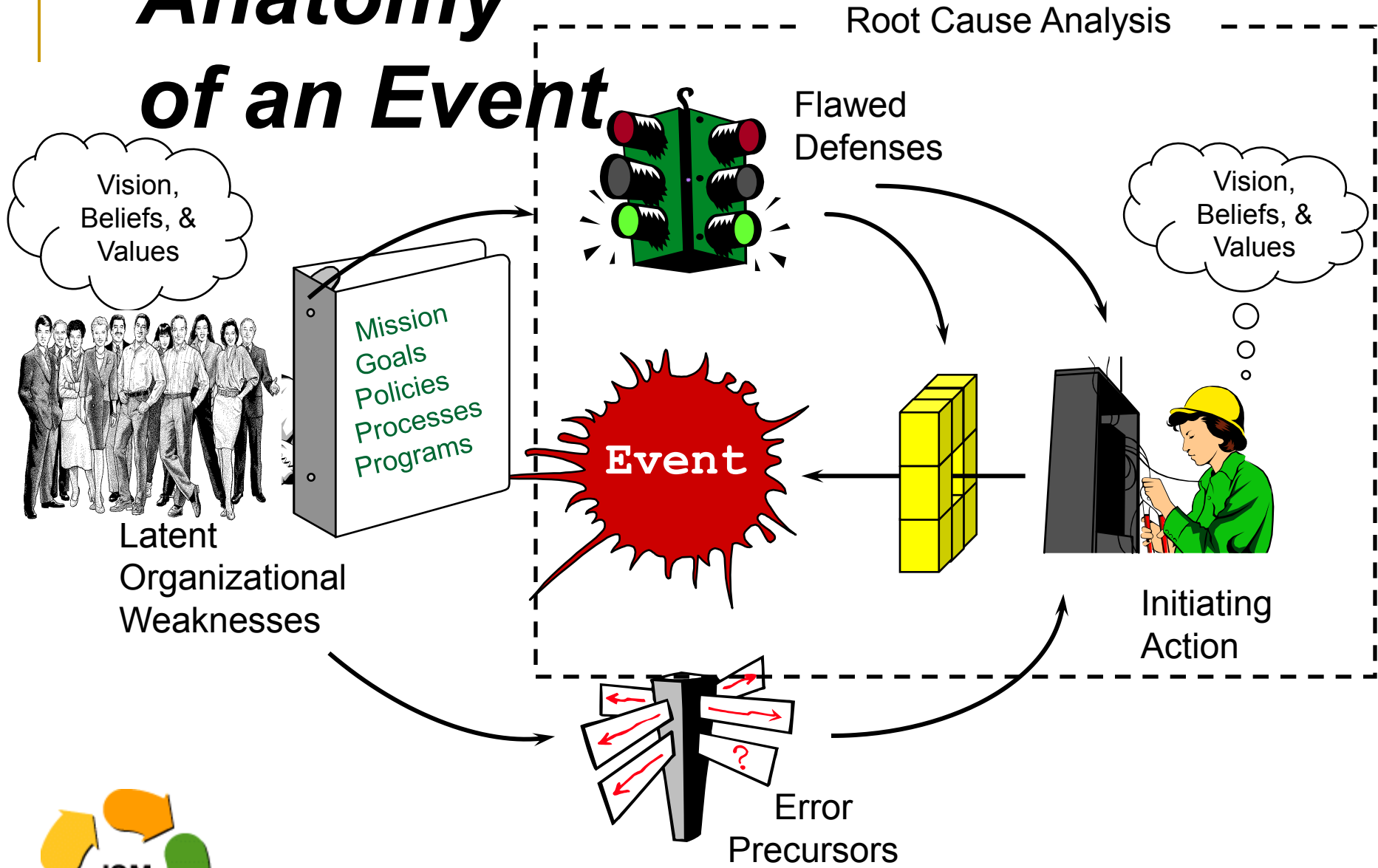
Human Errors

Occurrences



Anatomy

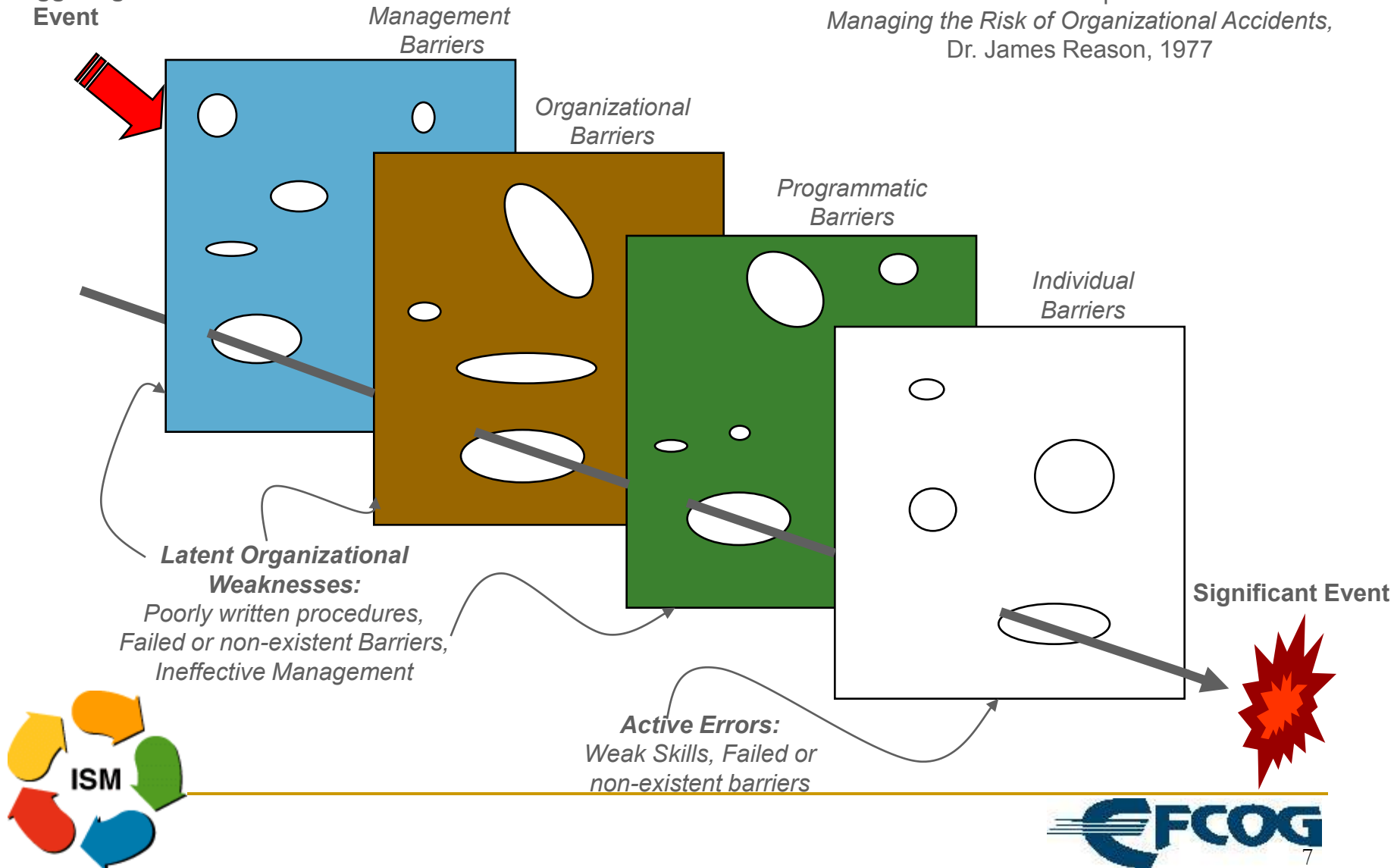
of an Event



Barrier Analysis

Triggering Event

“Defense in Depth Model”
Managing the Risk of Organizational Accidents,
Dr. James Reason, 1977



Principles of Human Performance

- **People are fallible, and even the best make mistakes.**
- Error-likely situations are predictable, manageable, and preventable.
- **Individual behavior is influenced by organizational processes and values.**
- People achieve high levels of performance based largely on the encouragement and reinforcement received from leaders, peers, and subordinates.
- An understanding of the reasons mistakes occur, and application of the lessons learned from past events can avoid future events.



“Traditional” Root Cause

- Tend to be focused on the individuals and specific processes that resulted in the event:
- Retrospective (in hindsight),
- Proximal (focus on people closest in time and space)
- Counterfactual and judgmental (identify what they could have or should have done – now that knowledge of the event shows the consequence of what they did).



Opposing Views

The Old View of Human Error

Human error is the cause of accidents.

To explain **failure**, you must seek **failure**.

You must find people's **inaccurate assessments**, **wrong decisions**, **bad** judgments.



The New View of Human Error

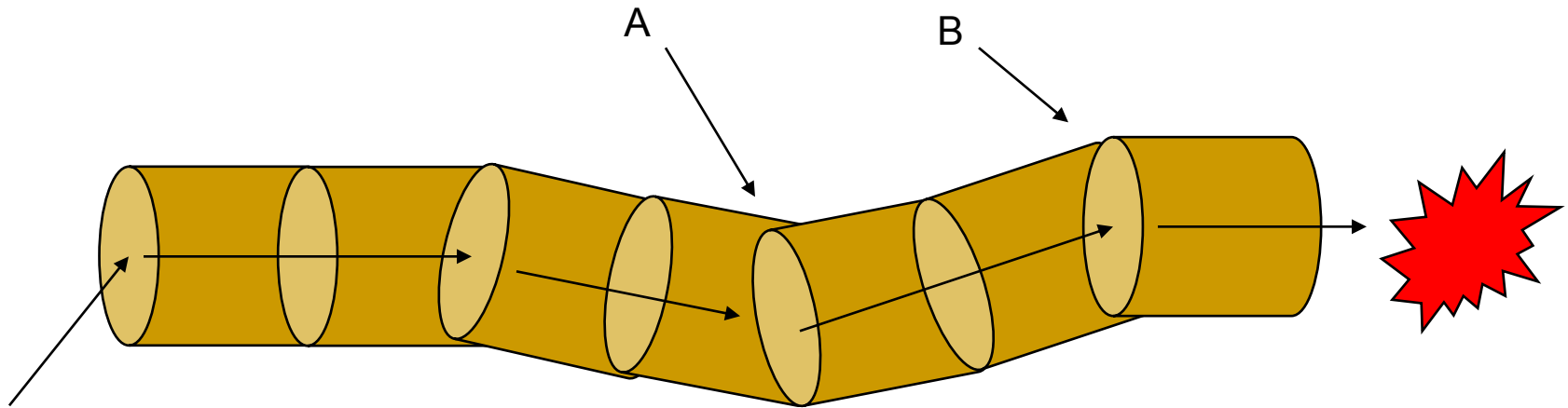
Human error is a ***symptom of trouble deeper*** inside a system.

To explain failure, do not try to find where people went wrong.

Instead, ***find how people's assessments and actions made sense at the time***, given the circumstances that surround them.

Root Cause – From Outside of the Event

If they had not done “A” or B”, then the event would have been prevented –



HPI – From Inside of the Event

Follow the process as it was implemented and look for error-likely situations that, if error-prevention tools were applied, the outcome of this, and other events, could be prevented – Why did the actions taken make sense to the people implementing them at that time?



“Two” Approaches

■ Standard Approach

- ❑ Review from the hindsight point of view judging each step in view of the final outcome.
- ❑ Investigate to find where personnel went wrong
- ❑ Evaluate the actions of the people against requirements
- ❑ Biased towards problems with people and how they implement procedures or how they were trained.

■ New Approach

- ❑ Review from the perspective of the people involved in the event/situation.
- ❑ Evaluate the organization as the event unfolds
- ❑ Evaluate the actions of the people involved from an error precursor/ELS
- ❑ Event is a symptom of a deeper trouble on the organization



Inside –vs- Outside

Outside	Attributes	Inside
X	Identify deltas between process expectations and actual event	X
X	Explore why the deltas occurred	X
X	Identify the causes to the deltas	X
X	Develop fixes (corrective actions) to break the cause and effect relationship (prevent recurrence).	X
X	Focuses on deficiencies that can be shown to have a cause and effect relationship to actual event	
	Identifies error-likely situations that can lead to future events	X
	Applies error-prevention tools to reduce likelihood of future errors or the consequence of the error	X



A “Different” Approach/Process

- Have participants tell their story one-on-one interviews
- Identify the key decision points in the sequence of events
- Rebuild the world as it looked to the participants at each decision point
 - What did the participant observe
 - What knowledge was used to deal with the situation
 - What did the participants expect was going to happen
 - What options did that participants think they had
 - How did the situation influence their decision
 - What does the participant believe caused the error
- Validate key decision points separate fact from opinion
- Reconstruct sequence of events
- Evaluate performance of the organization at key points of the sequence



Example differences

Outside Focus Results

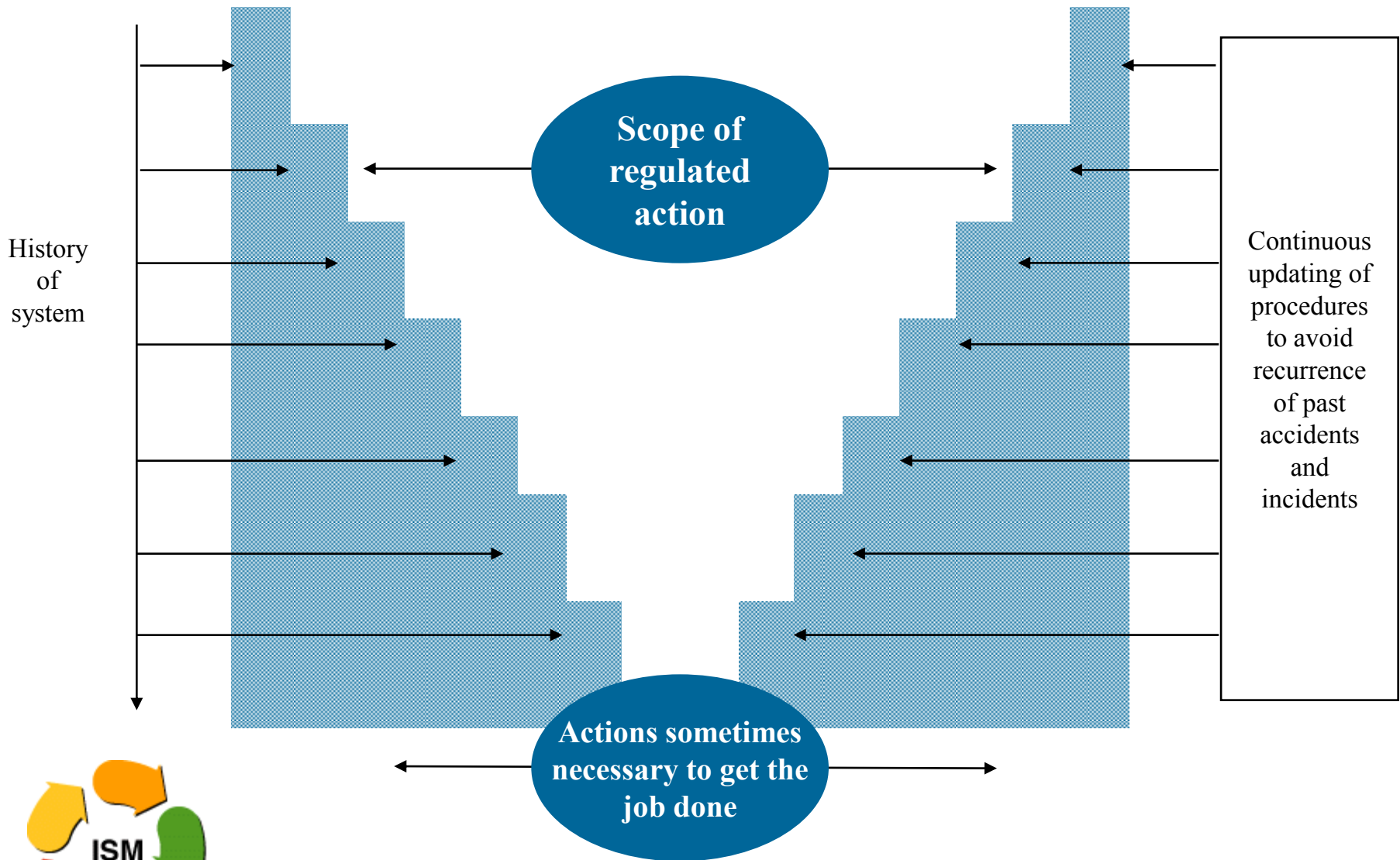
- No written process was in place to control removal activities.
- Construction Management needs to create and communicate clear expectations for pre-job briefings and walk downs .
- Work execution followed informal processes.

“New” Inside Focus Results

- Construction site work processes failed to ensure that work was performed safely and a quality product was produced.
- The process has involved supervision to the point that their ability to perform the role of a supervisor has been impacted.
- Processes failed to identify and communicate critical attributes.
- Technical expertise needed for relevant safety issues.
- No peer checks.



Corrective Action Paradox



Conclusions & Summary

- New way of thinking about problems and associated causes
- New strategy for approaching corrective action
- Recognition of the organization in operational problems
- The focus needs to align with operational needs:
 - Preventing the next operational event
- Recognizing that workers in the field must implement
- Reinforces the ISMS Core Functions

