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Safety Culture Workshop

G. Kenneth Koves, Ph.D.

Safety Messages

- Exits
- Refreshments
- Restrooms



Background

- Who am I?
 - Georgia Tech
 - From INPO / power reactors
- Who are you? What do you expect or why are you here?
- Systems Thinking from The Fifth Discipline Fieldbook (Peter Senge)
- Safety culture 101



Objectives

- Develop deeper knowledge in the area of safety culture
 - Understanding of the construct
 - Current developments in the power reactor industry
 - Introduce a different way of thinking about cause and effect
 - Develop skills in identifying SC and organizational weaknesses
- Better identify safety culture deficiencies



Agenda (from one perspective)

- Systems Thinking
- Define Safety Culture (SC)
- Measuring SC
- Changing SC
- Models and Exercises
- Case Study
- Real Examples
- (Breaks)



Agenda (from another perspective)

- If you want to teach people a new way of thinking, don't bother trying to teach them. Instead, give them a tool, the use of which will lead to new ways of thinking.
 - (Buckminster Fuller)





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Systems Thinking

What is Systems Thinking?

- A holistic approach to organization functioning with an emphasis on understanding the relationships between elements of the system
- The process of understanding how things influence one another within a whole. In organizations, systems consist of people, structures, and processes that work together to make an organization healthy or unhealthy.



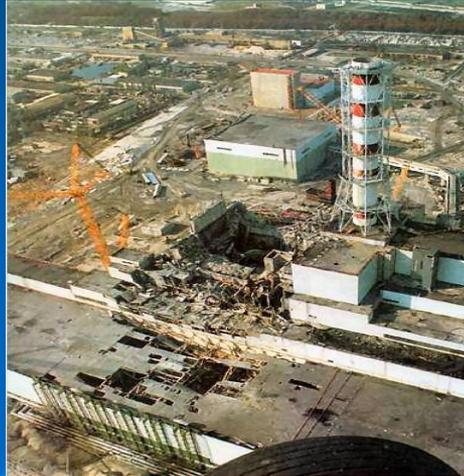
– http://en.wikipedia.org/wiki/Systems_thinking

What is Systems Thinking?

- An approach to problem solving, by viewing "problems" as parts of an overall system
- Systems thinking is not one thing but a set of habits or practices within a framework that is based on the belief that the component parts of a system can best be understood in the context of relationships with each other and with other systems, rather than in isolation.
- Systems thinking focuses on cyclical rather than linear cause and effect.



In Our Lifetime



MSNBC TV



INPO

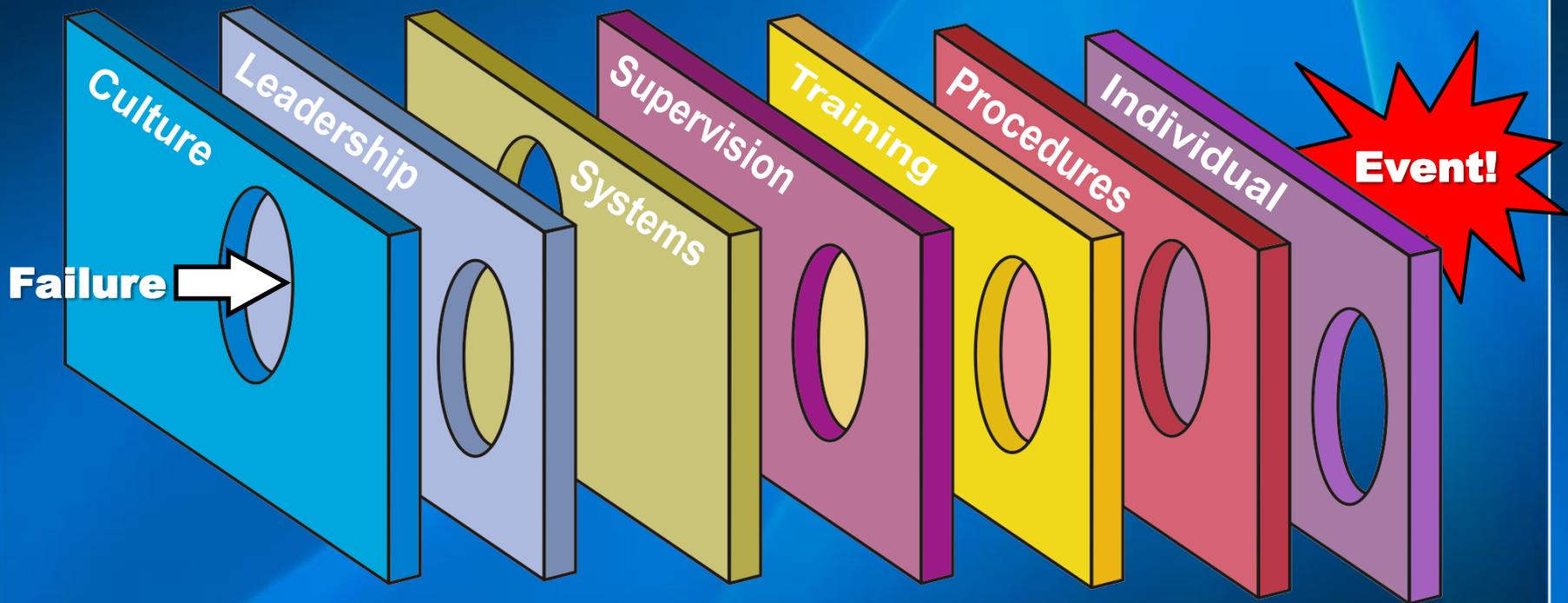
What Barriers Failed?

- TMI
- Chernobyl
- Challenger
- Columbia
- Katrina Response

- There was no 'one thing' that allowed these catastrophes



Barriers to Prevent Events



James Reason

Why Do Some Events Return Repeatedly?

- “We fail because we try to address symptoms, not systems.”
 - Dr. Megan Neyer
 - Firefly video



What is a System?

- A perceived whole whose elements 'hang together' because they continually affect each other over time and operate toward a common purpose
 - Senge et. al.



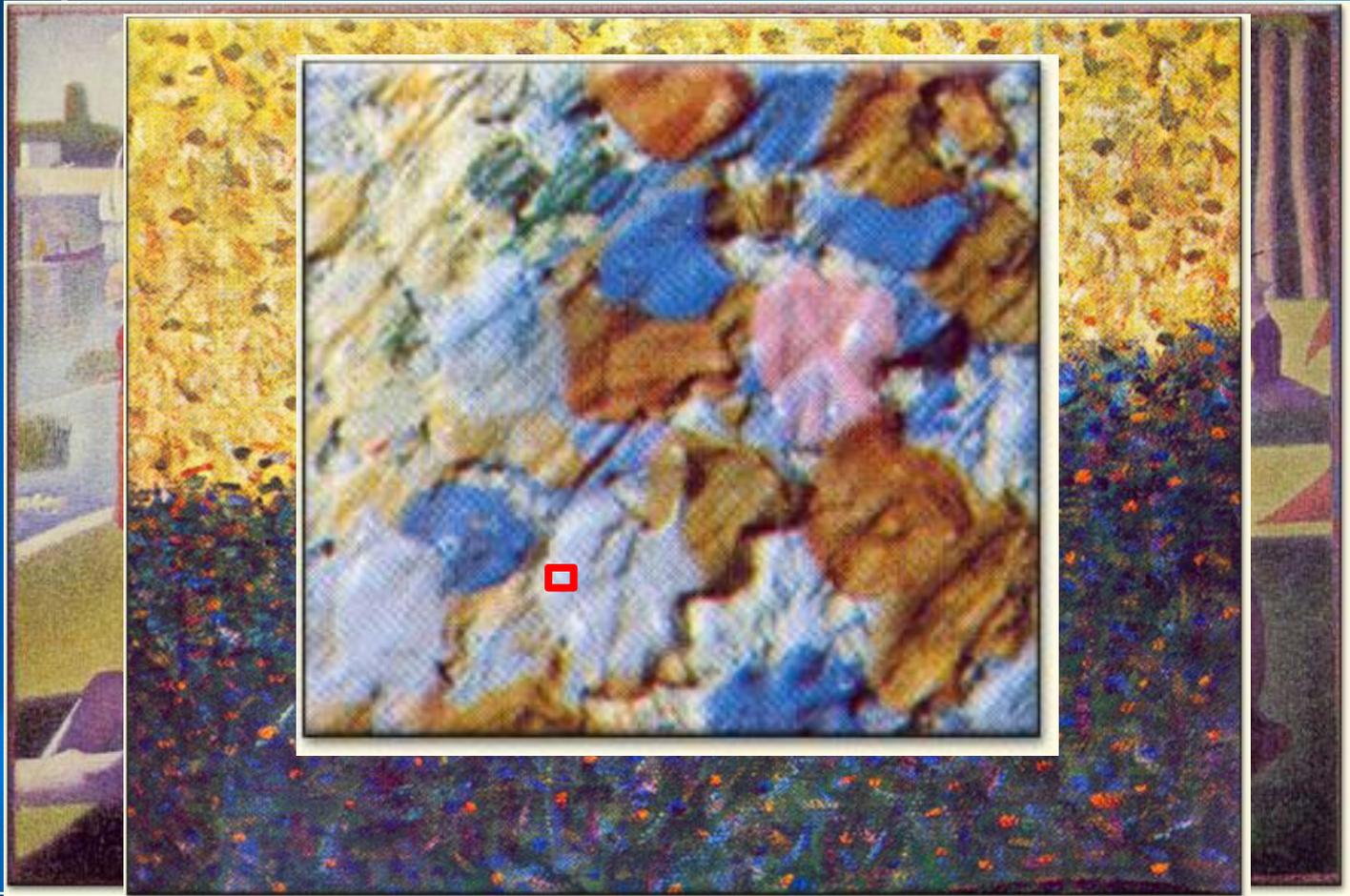
What is Systems Thinking?

- A way of thinking about, and a language for describing and understanding, the forces and interrelationships that shape the behavior of systems.
 - (Senge, Kleiner, Roberts, Ross, & Smith, 1994)



Do You Understand This Picture?

Sunday Aft. on the Island of La Grande Jatte - Seurat



A Different Way of Thinking

- Holistic vs. Atomistic
- 'Dig into it' vs. 'Step back from it'
- "Peripheral vision": the ability to pay attention to the world as if through a wide-angle, not a telephoto lens...
 - (David McCamus, CEO Xerox Canada)
- Shifting from seeing things as events, to seeing them as non-linear processes



Causal Analysis

- Usually assumes linear causation



- Systems thinking assumes interconnectedness and loops



Examples of Causal Loops

- Fixes That Backfire
- Accidental Adversaries
- Dissipation Loop



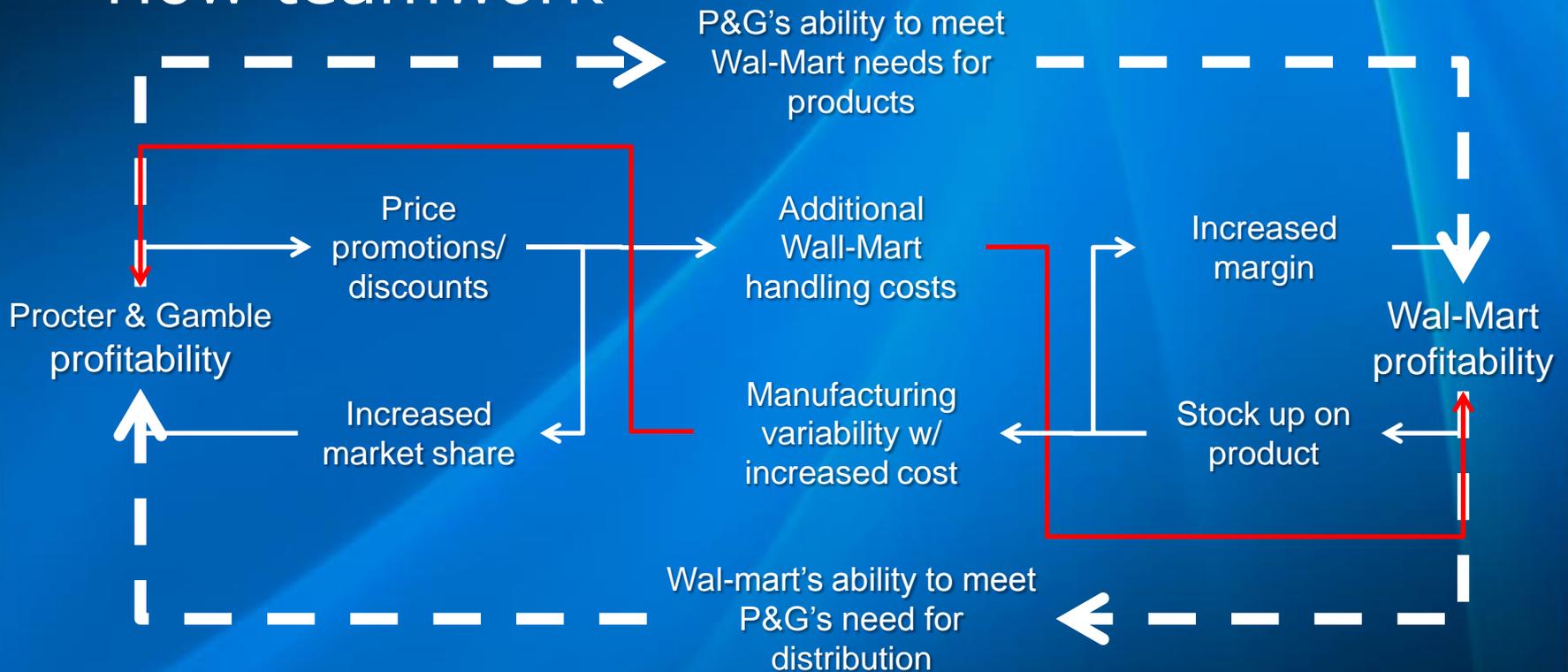
Fixes that Backfire

- **“Between 1979 and 1989, when roughly 1,100 commercial banks failed, 99.7% of all deposit liabilities were fully protected through the discretionary actions of U.S. policymakers”** (Stern & Feldman, 2004)



Accidental Adversaries Example

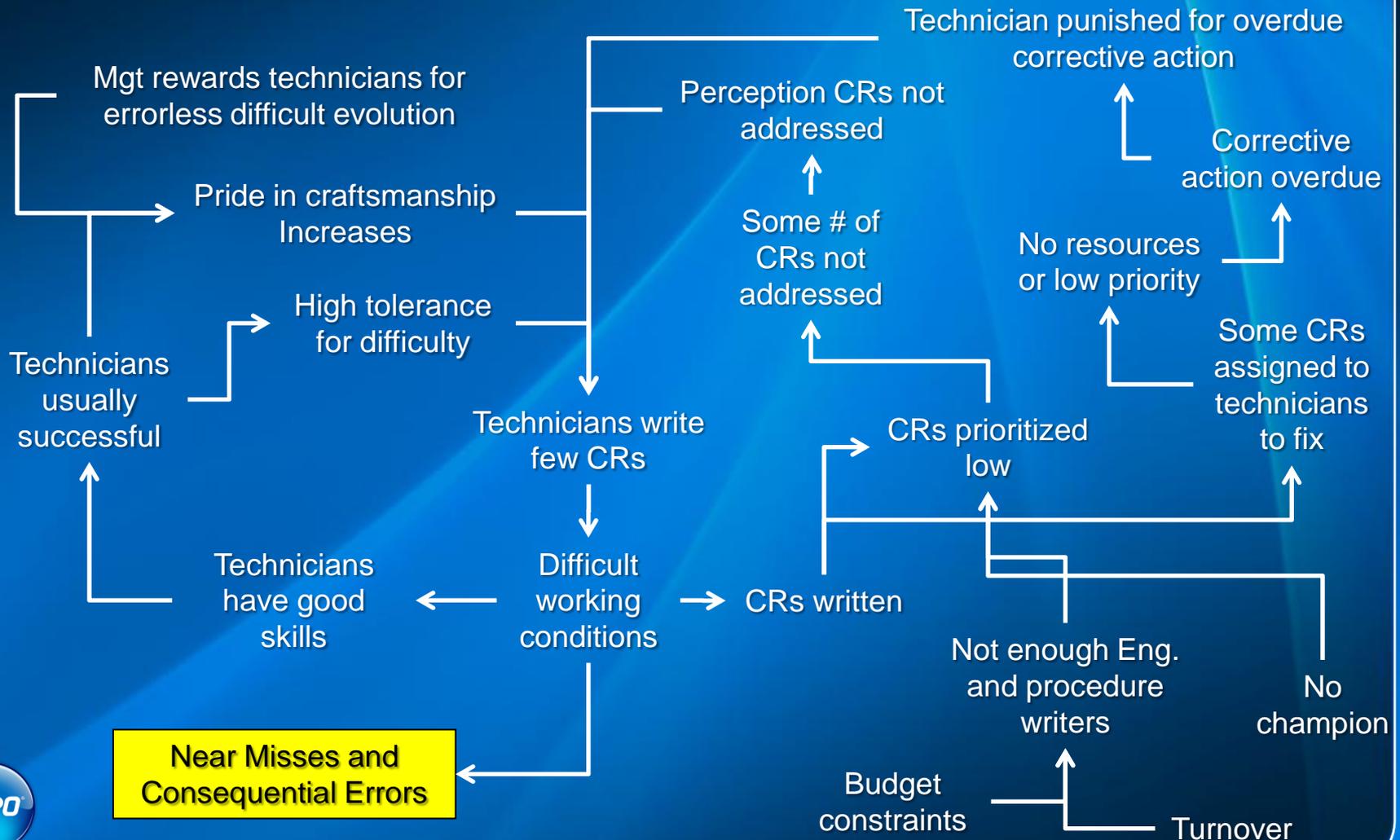
- How teamwork



turns into competition and mutual blame



Dissipation Loop



Why do Some Find Systems Thinking so Difficult?

- Systems thinking, in a sense, is the opposite of our culture and training
- “Often there is a missing link in our training. Often we fail to link together the disparate pieces of knowledge and technique into a cohesive, comprehensive whole. Instead we have a patchwork – and do not even realize this has happened.”
 - J.P. O'Conner, USA Shooting News, March 2010



What to Expect from Systems Thinking

- You won't be able to 'divide the elephant in half' (or even fifths)
- The easiest way out will lead back in
- There are no 'right' answers
- Behavior will probably grow worse before it grows better
- Cause and effect will not be closely related in time and space
- It's a skill that is developed – made easier with others

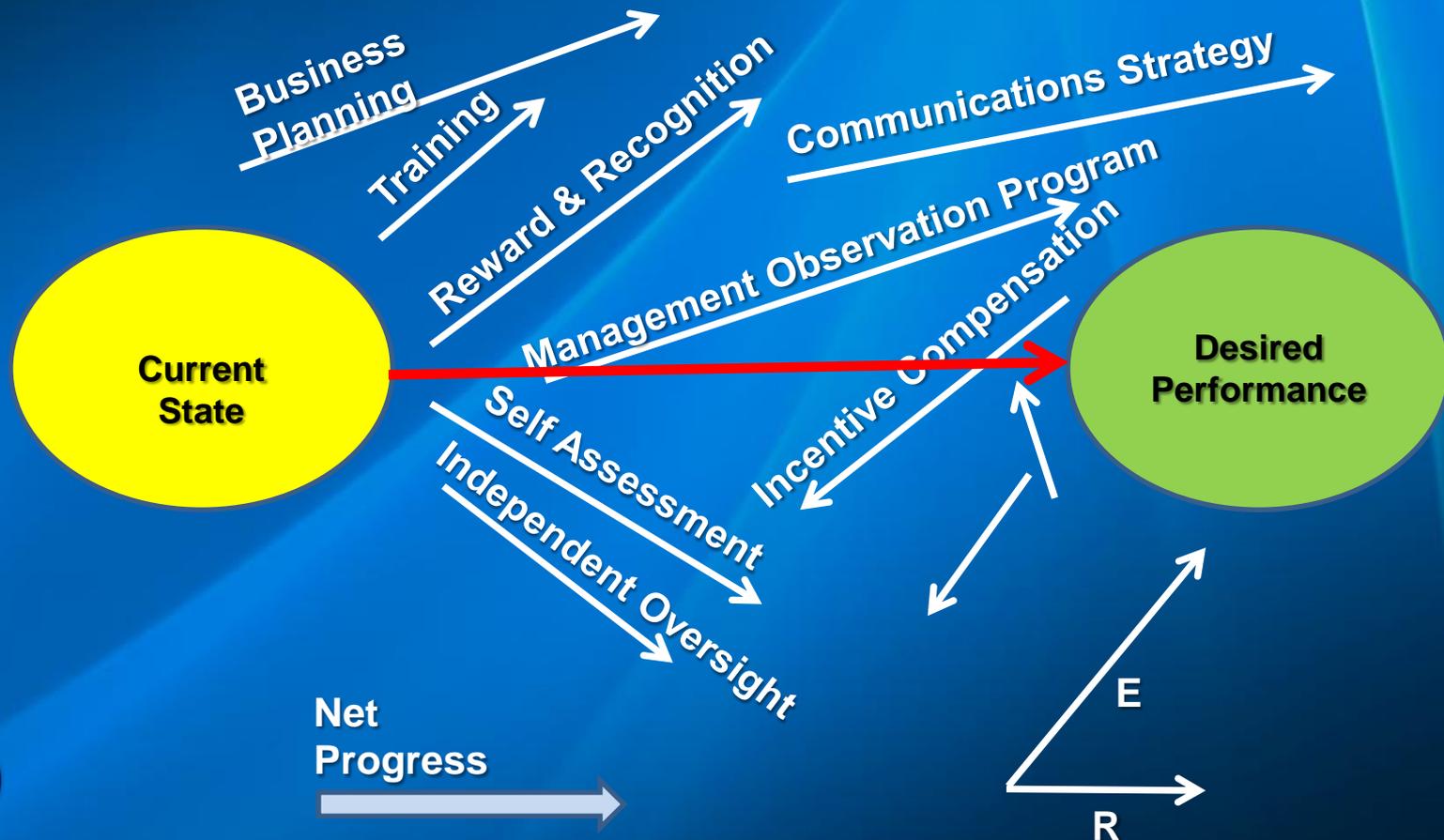


Tips/Suggestions

- “Never accept the individual as the single source of an event” (John Summers, INPO)
- See the context – look for loops
- Use multiple events – see the pattern
- Use others in the quest
- Use models
- Draw a picture
- Develop hypotheses – tell the story
- Verify with data/facts



The Concept of Alignment (or the lack thereof)



Alignment





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Defining Safety Culture

What is Safety Culture?

- A volunteer
- A construct, like the construct of 'health'
- It is a psycho/social phenomenon (construct/heuristic/general category) that naturally arises when people are faced with outcomes that are driven by complex interactions of complex systems that, at a detailed level, are beyond our current understanding

– (Koves, 2012)



Definitions of Nuclear SC

- IAEA
 - That assembly of characteristics and attitudes in organizations and individuals which establishes that, as an overriding priority, nuclear plant safety issues receive the attention warranted by their significance.



Definitions of SC

- INPO
 - An organization's values and behaviors — modeled by its leaders and internalized by its members — that serve to make nuclear safety the overriding priority



Definitions of SC

- 2012 NRC SC Policy Statement
 - The core values and behaviors resulting from a collective commitment by leaders and individuals to emphasize safety over competing goals to ensure protection of people and the environment



What is Safety Culture?

- A very broad, holistic concept; like health
- 'The way we do things around here'
- Assumptions as seen through attitudes and behaviors
- For example, the Deepwater Horizon preliminary findings
 - Listed 19 deficiencies where they sacrificed safety to save time and/or money
 - Ended with "No evidence at this time to suggest that there was a conscious decision to sacrifice safety concerns to save money"



Why is SC Confusing? A Problem of Language

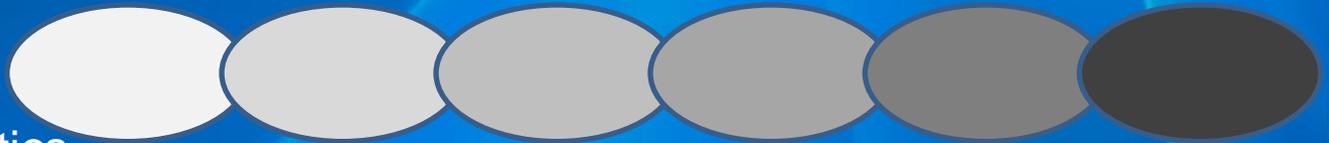
Tier 1

INPO – Definition
IAEA / NRC – Definition



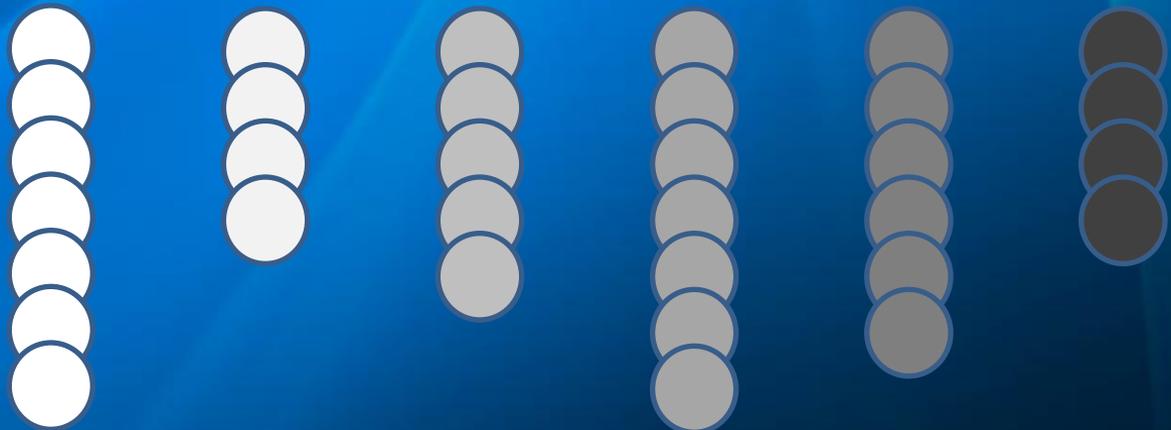
Tier 2

INPO – 8 Principles
IAEA – 5 Characteristics
NRC – 13 Components / 9 Characteristics / 9 Traits



Tier 3

INPO – Attributes
IAEA – Attributes
NRC – Aspects



Aligned Language Initiative

- The Need
- Critical Events
- Traits Compared with Principles



The Need – A Common Framework

- US power reactors currently need to use two different 'languages' when reporting on safety culture to the NRC and INPO
 - At best: Needless rework or duplication
 - At worst: Reduces understanding of safety culture and therefore our ability to change it



Critical Events

- February 2010
 - NRC workshop to develop a definition (Tier 1) and Traits (Tier 2) of a positive safety culture that would apply to all NRC stakeholders
 - 16 individuals representing all NRC stakeholders
- June 2011
 - NRC published the Safety Culture Policy Statement that included a definition and nine Traits
- December 2011
 - Workshop with the power reactor industry and NRR to define the Attributes (Tier 3) of a positive safety culture



Relationship of Dec 2011 Traits to the Principles

- Personal Accountability
 - Principle 1 – Everyone is personally responsible for nuclear safety
- Leadership Safety Values and Actions
 - Principle 2 – Leaders demonstrate commitment to safety
- Respectful Work Environment
 - Principle 3 – Trust permeates the organization
- Decision-Making
 - Principle 5 – Decision-making reflects safety first
- Questioning Attitude
 - Principle 6 – A questioning attitude is cultivated



Relationship of Dec 2011 Traits to the Principles

- Continuous Learning
 - Principle 7 – Organizational learning is embraced
- Problem Identification and Resolution
 - Similar to Principle 8 – Safety undergoes constant examination
- Environment for Raising Concerns (SCWE)
 - In the Principles Background section
 - Was going to be made more visible in 2008 revision
- Work Processes
 - Planned on adding in the 2008 revision
- Effective Safety Communication
 - Scattered throughout the Principles



Tier 2 Summary

- 7 of the 10 Traits from the December 2011 workshop are, essentially, 7 of the 8 INPO Principles
- 2 of the 10 Traits were going to be strengthened in the 2008 Principles revision



Trait (Tier 2) and Attribute (Tier 3) Results of the Dec. Workshop

- 10 Traits
- 40 Attributes





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Measuring Safety Culture

How do you Measure SC?

- Difficult to measure
- A continuum, not digital
- Inferred from a holistic approach
 - Continuous assessment
 - Periodic assessment



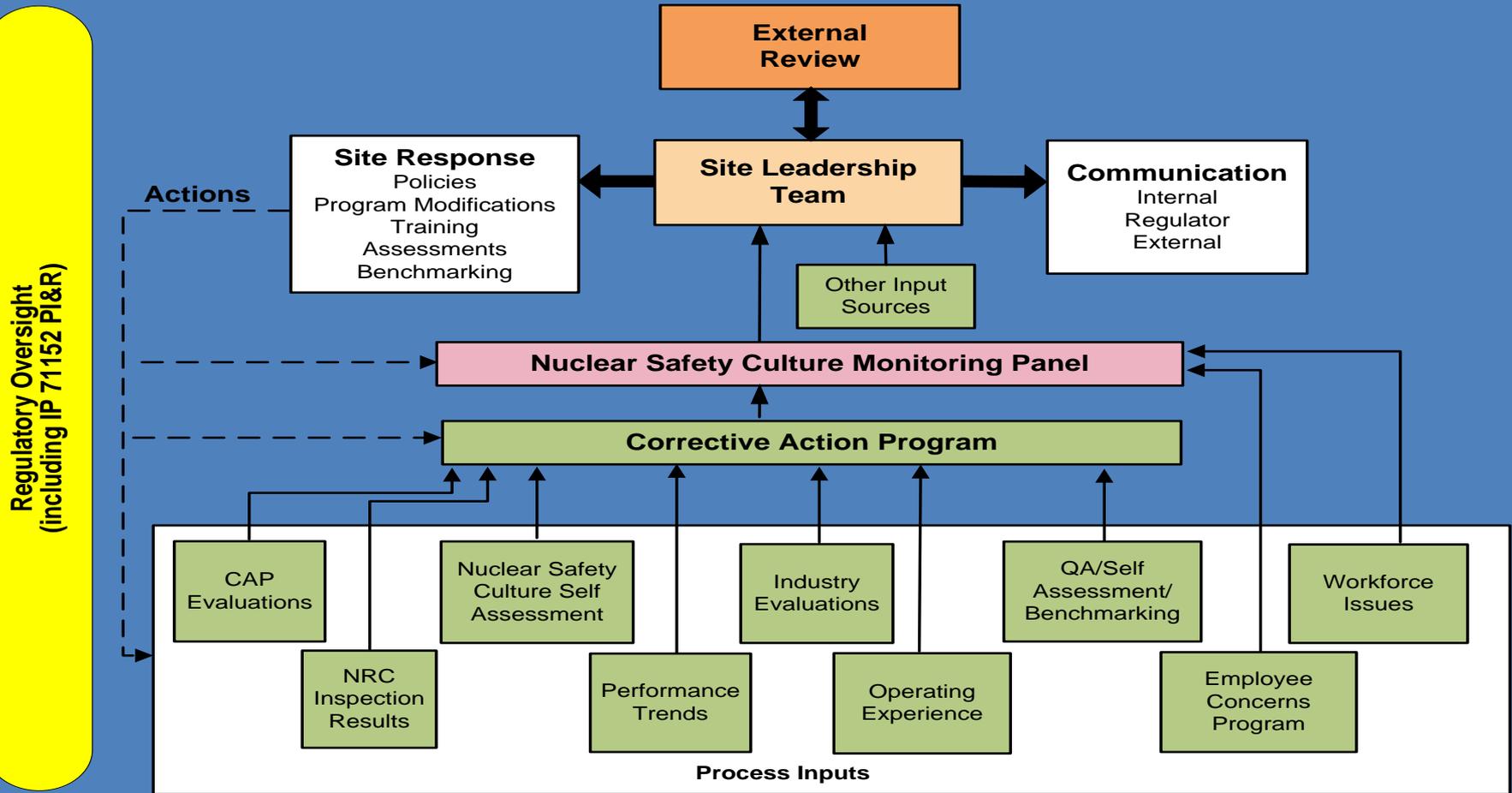
Continuous Assessment

- NEI 09-07 Fostering a Strong Nuclear Safety Culture
- Purpose
 - Common framework for continuously assessing and addressing nuclear safety culture issues
 - A process to provide an early indication of a safety culture problem and implement corrective actions



NEI 09-07 Process Structure

Site Nuclear Safety Culture Process



Biggest Benefit

- In my opinion the biggest benefit of the process is that it puts safety culture 'front and center' in the front of the lead team on a regular basis, not only after an event or crisis



More on NEI 09-07

- Not all details are specified
- Can modify to meet your needs
- It looks a lot easier than it is



Comments on Using the Process

- One site VP said, 'This process is the only time I can talk in a focused manner with my direct reports about the state of the culture. Most of the data I use in other ways to improve processes, but this is where I can get at the heart and soul of my organization.'
- Another VP said, 'This is a great way to identify the "faint signals" that something is not right before it becomes an issue.'



Results

- The NEI 09-07 guidance provides a structured and tiered process that drives the site to own and actively monitor / improve safety culture
- The process identified opportunities for training and other actions
- INPO attributes subjective, binning not always “clean,” but this improves over time



Results

- Monitoring Panel identified safety culture weaknesses in specific departments and with specific site issues
- Monitoring Panel binning and focus areas were consistent with independent SC assessment
- NSCA and SLT review noted effective site action and improvements in decision making – which was consistent with recent NRC feedback



Periodic Nuclear Safety Culture Assessments

- Both overview and detail information regarding the Nuclear Safety Culture Assessment (NSCA)
- The material will not answer all questions (too much information)
- Best to observe one or two NSCAs before trying to implement



Agenda

- Introduction – 5.1
- Requirements – 5.2
- Team Membership – 5.3
- Conduct of Assessment – 5.4
- Other SC assessment methods (SCART, SCAV, etc.)
- Next Steps



Introduction – 5.1

- Purpose of the NSCA is to
 - “Conduct a self-assessment to determine to what degree the organization has a healthy respect for nuclear safety and that nuclear safety is not compromised by production priorities
 - The self-assessment should emphasize the leadership skills and approaches necessary to achieve and maintain the proper focus on nuclear safety...”



Periodic Assessment

- This type of assessment process looks at perceptions, feelings, behaviors, policies, procedures, and documentation to help see the underlying culture
- A process to assess a safety culture is not an “engineered” activity
- No “safety culture meters” are available



Introduction – 5.1

- Types of assessment – Self, Independent, and Third-party
- Assessment report provides strengths, observations, weaknesses and recommendations for action
- Written to use INPO Principles but can use other frameworks (WANO, IAEA, JANTI, VTT, etc.)
- Started by Utilities Service Alliance in 2003



Requirements 5.2

- Some type of SC assessment is strongly recommended every two years
- NSCA methodology a proven approach
- Required in the US in certain regulatory situations



Team Membership 5.3

- Team Leader
- Team Executive
- Host Peer
- Admin
- Process Manager
- Team Members



Team Responsibilities

- Team Leader:
 - Interfaces with host site and team members prior to the assessment
 - Conducts training with team before assessment
 - Leads team to ensure adequate number of interviews and observations are conducted
 - Briefs site management
 - Leads exit
 - Prepares report obtaining team concurrence



Team Responsibilities

- Team Executive:
 - An executive from another plant/utility
 - Provides senior perspective to the team
 - Interfaces with site executives
 - Preferred attendance for entire week



Team Responsibilities

- Host Peer:
 - Ensures logistics including badging, interview and observation scheduling
 - Coordinates survey administration
- Administrator:
 - Ensure smooth execution of assessment and manage data collection
- Process Manager:
 - Ensures NSCA process is being followed

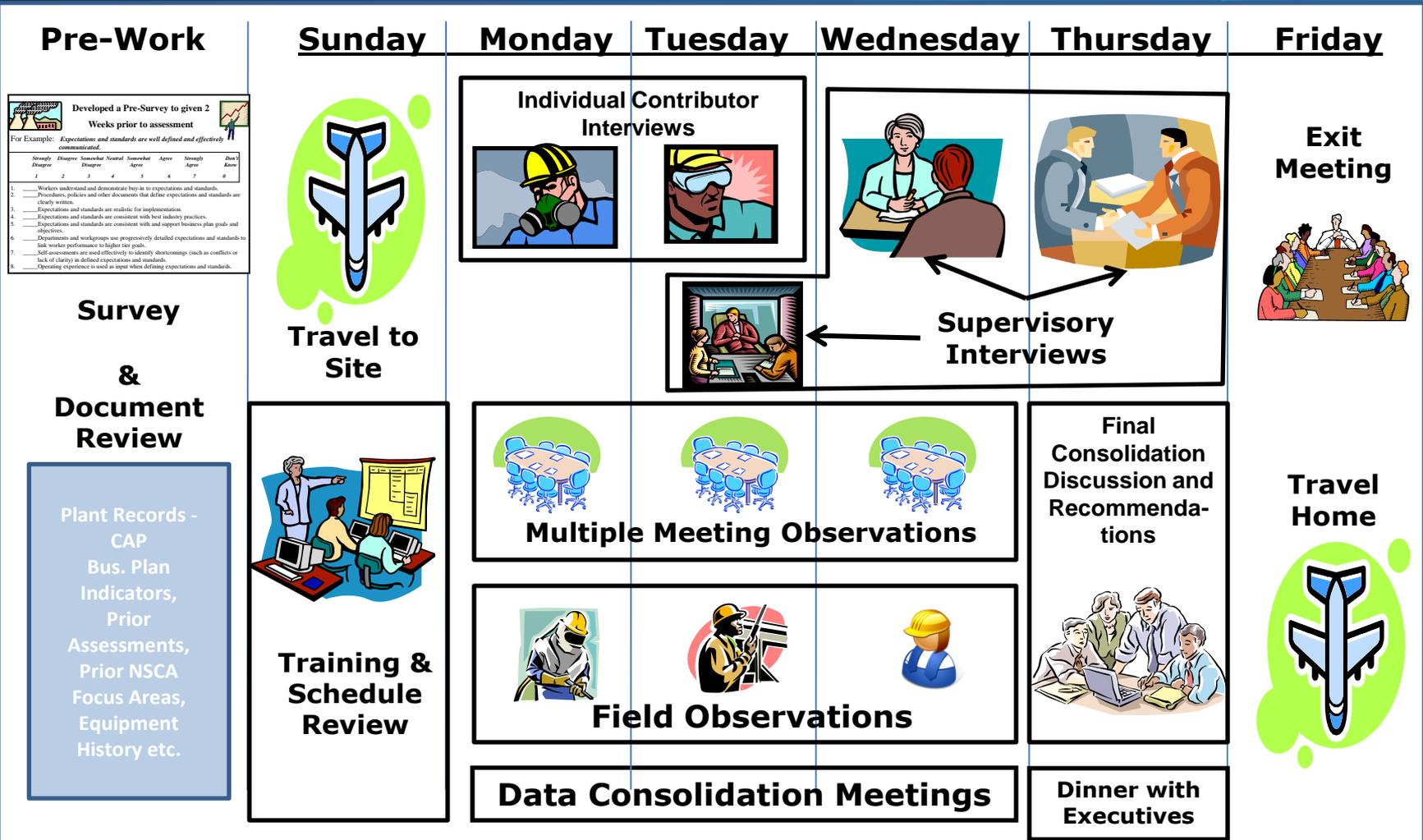


Team Responsibilities

- Team Members:
 - Table 2
 - Self-assessment
 - Independent assessment
 - Third-party assessment
 - Conduct interviews and observations as two person teams
 - Jointly rate observations
 - Develop conclusions and findings for assigned Principles



Conduct of Assessment 5.4





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Changing Safety Culture

Culture Change

- Louis V. Gerstner argues that strategy and corporate culture are intimately linked. "You can't talk a culture into changing," he said. "You can't just exhort people to be different. You've got to point to fundamental, strategic changes you're going to implement and then drive the execution of that strategy. And it is in the execution of the strategy that the culture begins to change."

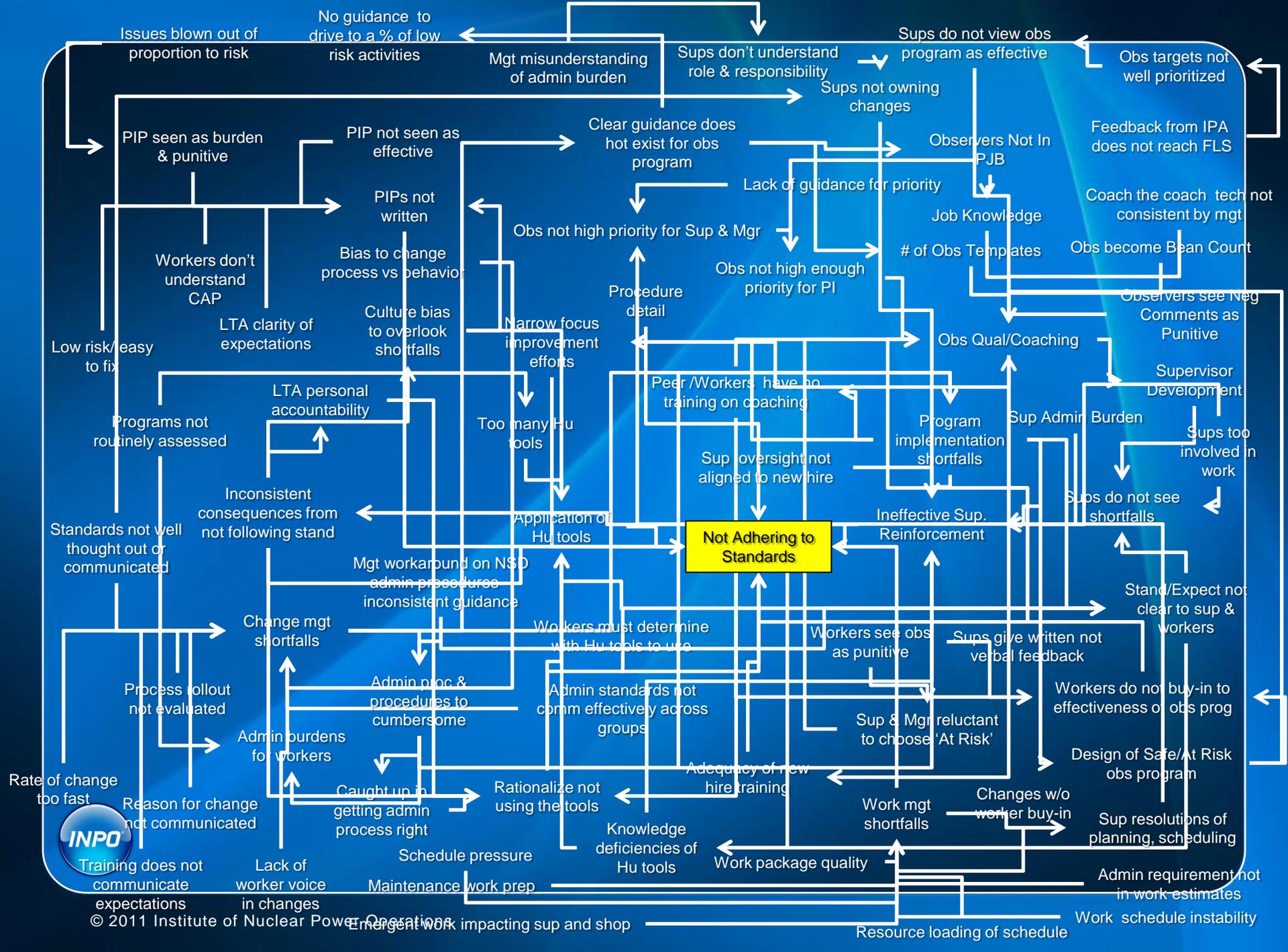


New York Times, March 10, 2002

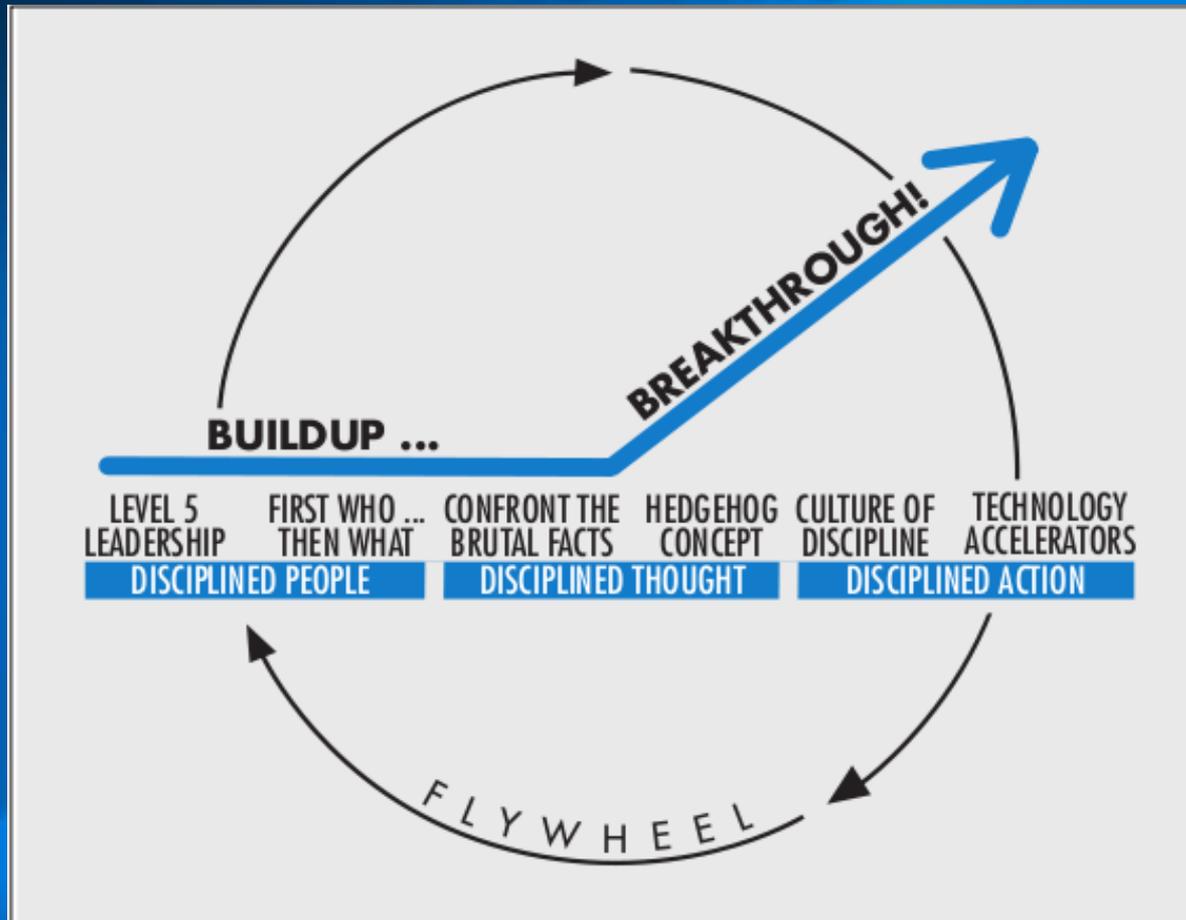
Culture Change at a Plant

- Received an Area For Improvement (AFI) from INPO
- Was an excellent plant for ~18 years
- AFI was workers not adhering to procedures
- Contributor was 'lack of supervisory reinforcement'
- Self-assessment listed 70+ contributors

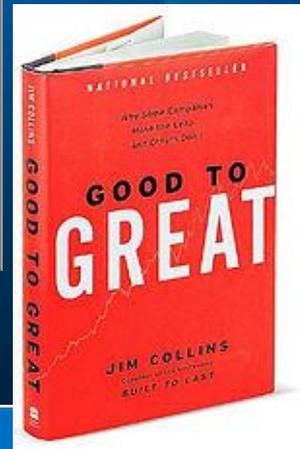




Their Improvement Looked Like This



– (Collins, Jim, 2001) *Good to Great*





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Identifying Safety Culture Issues

Models

- Why teach models?
 - If you want to teach people a new way of thinking, don't bother trying to teach them. Instead, give them a tool, the use of which will lead to new ways of thinking.
 - (Buckminster Fuller)
- What are they?
 - A representation of how something works – the important variables and how they relate to each other
 - A list of important considerations



AFI PI.2-1

- 'Management does not sufficiently challenge the conclusions of some completed causal investigations to ensure that important organizational or programmatic contributors are identified. The emphasis observed in several causal analyses has been on identifying and resolving technical causes... A more structured challenge process, for example ***use of pre-developed checklists*** as proposed by management, would be beneficial.'



Models

- Models provide multiples “lenses”
 - National Treasure video
- They are frameworks, not recipe books
 - Show where to look, give ‘threads to pull’
 - But not the ‘right’ answer
- Might modify with experience
- “I found that the more tools I used, the better evaluator I became.”
 - Art Daniels – Exelon – Previous INPO Loanee



NRC Examples of Model Use

- DC Metro
- Cooling Tower





Exercise

- Scaffolding



Principles for a Strong Nuclear Safety Culture

- Pages 54-65
 - Graphic on 54
 - Detail on 56-65



Exercise

- Strategic Petroleum



IAEA Characteristics

- Characteristics from GS-G-3.1
- Document is from the IAEA SCART Guidelines
- Questions associated with the Characteristics and Attributes



Exercise

- Rig owner with 3 other rigs



Warning Flags for Extended Plant Shutdowns

- Page 79 It's not just for plant shutdowns any more...
- "Over time, the plant appeared to become complacent.(1) In many areas, a minimum compliance standard existed in management and thus throughout the organization.(3) The plant did not use industry experience or vendors effectively, and in many areas became isolated from the industry...(2) There was a lack of sensitivity to nuclear safety and the focus was to justify existing conditions.(5) Management ineffectively implemented processes and failed to detect and address plant problems.(8)"
– Davis-Besse Root Cause Analysis Report, 2002





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Case Study

Herald of Free Enterprise Case Study

- Overview of Event
- http://news.bbc.co.uk/onthisday/hi/dates/stories/march/6/newsid_2515000/2515923.stm



Case Study Instructions

- You are part of a root cause team working to understand the causes behind this event
- Elaborate the organizational drivers of the event
- Include a graphic/visual of what you think may be happening organizationally
 - (An outline is not a graphic!)
- Use the models
- (If it helps) Answer the question, “Should the company be charged with corporate manslaughter?” and convince the jury



Herald of Free Enterprise Results

- http://news.bbc.co.uk/onthisday/hi/dates/stories/october/8/newsid_2626000/2626265.stm



INEEL Human Performance Fundamentals, February 2001

1



Models Summary

- Observations / Pros and Cons
- Favorite / Most useful



Q&A

- **Plus/Delta**
- **koveskg@inpo.org**

