



**NUCLEAR EXECUTIVE
LEADERSHIP TRAINING**



Human Performance Improvement

Michael A. Schoener

Mike Schoener is the owner and an Executive Consultant with MAS Consultants Inc., an Aiken, SC firm that provides management, technical and organizational improvement services for commercial and government organizations. He has over 30 years of experience in the areas of management, facility operations, training, organizational development and facilitation. He provides management consulting services for electric utilities, process industries, craft labor unions and government agencies. Clients include organizations such as DOE, Centers for Disease Control and Prevention (CDC), Chevron Oil, Cleveland Electric Illuminating, Lockheed Martin Energy Services, Parsons, Ontario Power Generation, United Association of Journeymen and Apprentices of the Plumbing and Pipefitting Industry, and Savannah River Nuclear Solutions.

In addition to starting up and operating MAS Consultants, Mr. Schoener has been the manager of technical training at a commercial nuclear utility, manager of training and procedures assisting in the startup of a troubled DOE nuclear facility. He worked closely with executives at Ontario Hydro and Ontario Power Generation to make significant organizational and programmatic improvements to upgrade the training and certification programs for their nuclear operations in Canada. He has been involved in numerous assessments and reviews at a variety of commercial and DOE nuclear facilities over the past 20 years – particularly in the areas of training, qualification, human performance, management systems and conduct of operations. Mr. Schoener has worked with senior managers at DOE in a variety of capacities. He developed the one-week, in-residence, Nuclear Executive Leadership Training (NELT) for senior DOE executives and has conducted management retreats for DOE executives in several different organizations. He assisted DOE by designing and developing national training and qualification programs to upgrade the technical competence of the Federal workforce across the country and worked with DOE-HQ to start-up the Human Performance Center. He has worked with several organizations at DOE production sites and laboratories to assist in the implementation of human performance improvement (HPI) initiatives and he is assisting the NNSA with complex-wide governance reform initiatives. He also served for eight years as the facilitator for the SRS Citizens Advisory Board.

Mr. Schoener has a Bachelor of Science in Construction Management from Bowling Green State University where he graduated Magna Cum Laude. He has a “Q” level security clearance with the Department of Energy. He served a six year tour of duty in the Navy Nuclear Power Program. He is a member of the American Nuclear Society and the American Society for Training and Development. He is also a licensed residential builder.



Human Performance Improvement

Mike Schoener

August 6, 2010



Course Purpose

GOAL

Provide attendees with an overview of Human Performance Improvement (HPI) concepts, principles, and application.

OBJECTIVES

- Describe the difference between errors and violations, the two different types of errors and violations, and why individuals commit each.
- List and describe the three performance modes and discuss how they can be used in applying HPI concepts and principles.
- Explain the anatomy of an event model and the describe each of the major elements.
- Discuss the role and effect of leadership as it relates to HPI
- Describe the just culture concept and the relationship between it and the reporting and learning culture.

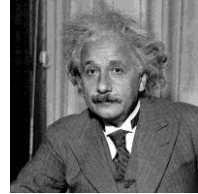
Human Performance



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“The significant problems we face cannot be solved at the same level of thinking we were at when we created them.”

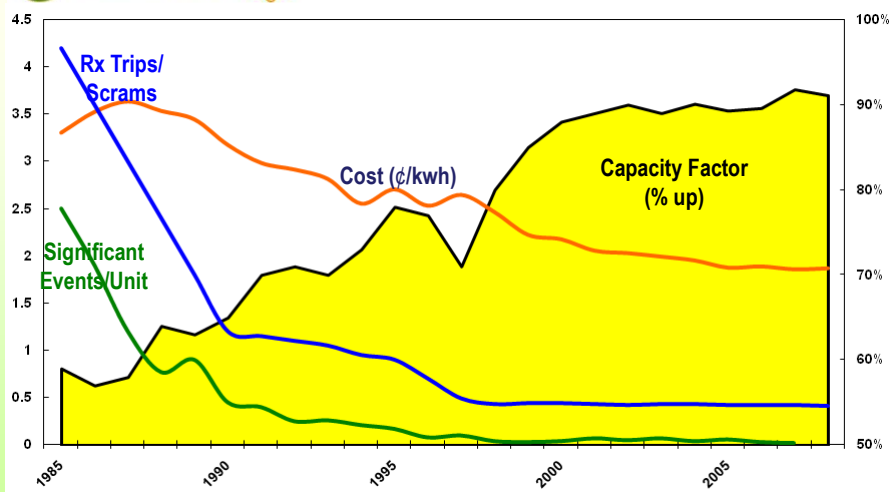


Albert Einstein

US Nuclear Trends



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Conduct of...

Deregulation.....

HPI.....



Why a Human Performance Approach?

Events



Human Errors





What is Human Performance?

An individual...

working within
organizational systems...

to meet expectations
set by leaders.



What is an Error?

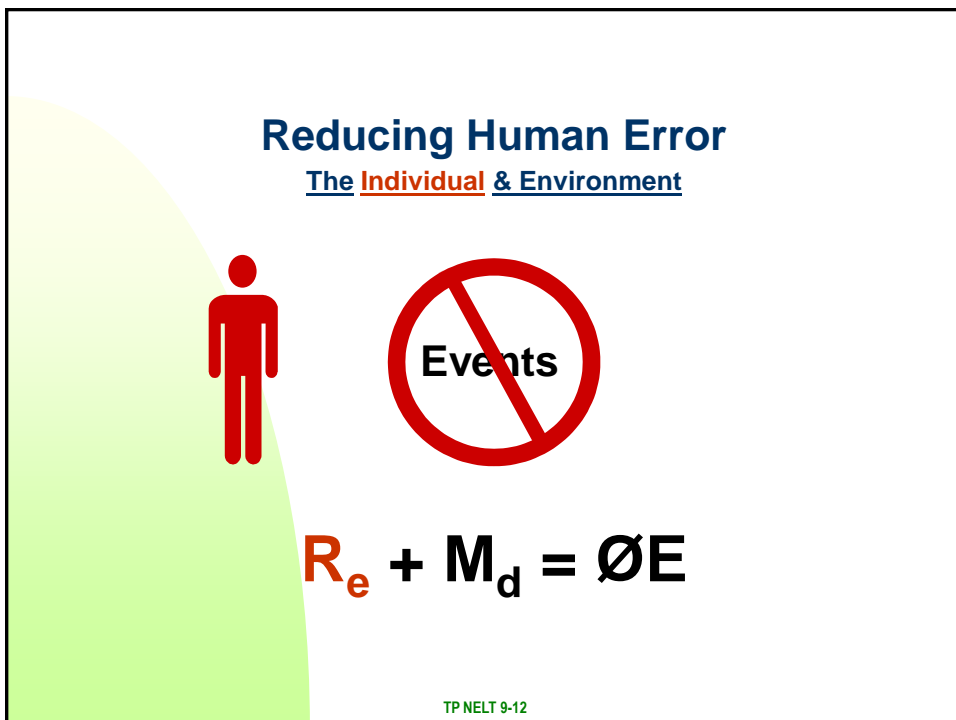
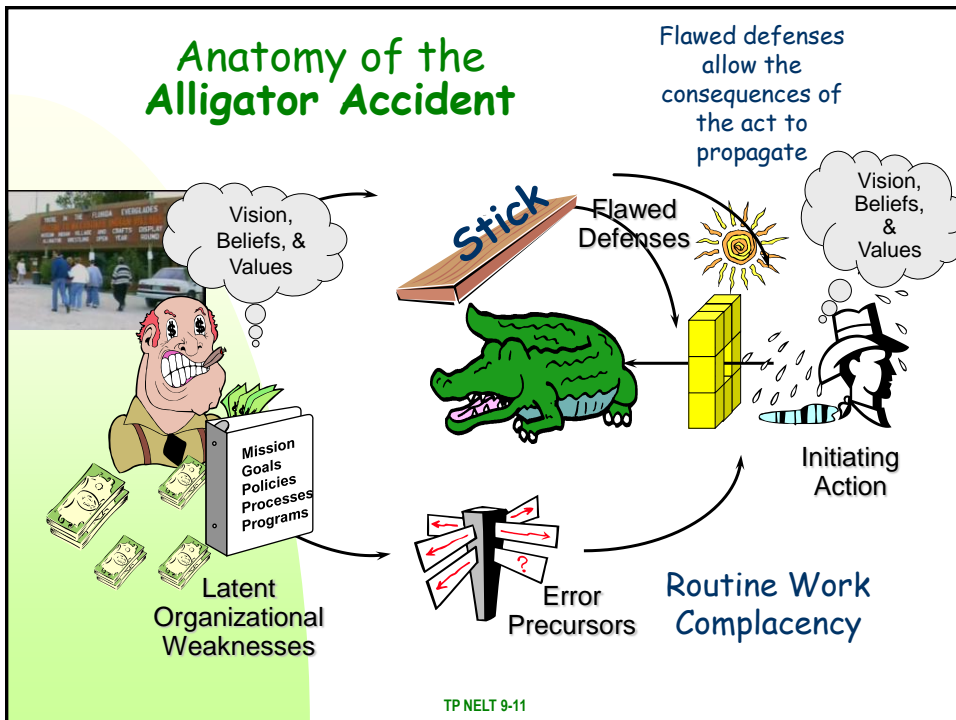




Principles of Human Performance

1. **People are fallible**, and even the best make mistakes.
2. **Error-likely situations are predictable**, manageable, and preventable.
3. **Individual behavior is influenced** by organizational processes and values.
4. **People achieve high levels of performance** based largely on the encouragement and reinforcement received from leaders, peers, and subordinates.
5. **Events can be avoided** by understanding the reasons mistakes occur and applying the lessons learned from past events.



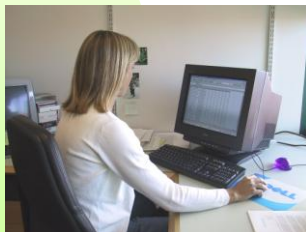




What is an Error?



Two Kinds of Error





Action (behavior) that changes equipment, system, or physical state triggering ***immediate*** undesired ***consequences***.



An error, act, or decision that results in organization-related ***weaknesses or*** equipment ***flaws that lie dormant*** until revealed either by human error, testing, or self-assessment.





Characteristics	Active	Latent
Who?		
What?		
When?		
Visible?		

What is a Violation?





People tend to violate expectations when...

- “We’ve always done it this way”
- “Everyone does it!”
- Low potential for detection
- Absence of authority in the vicinity
- Peer pressure by team or work group
- Standard appears unimportant
- Unawareness of potential consequences
- Competition with other individuals/groups
- Interference or obstacle to achieving goal
- Conflicting demands or goals



Limitations of Human Nature

- **Stress**
- Avoidance of **mental strain**
- Inaccurate **mental models**
- Limited working **memory**
- Limited **attention** resources





Limitations of Human Nature

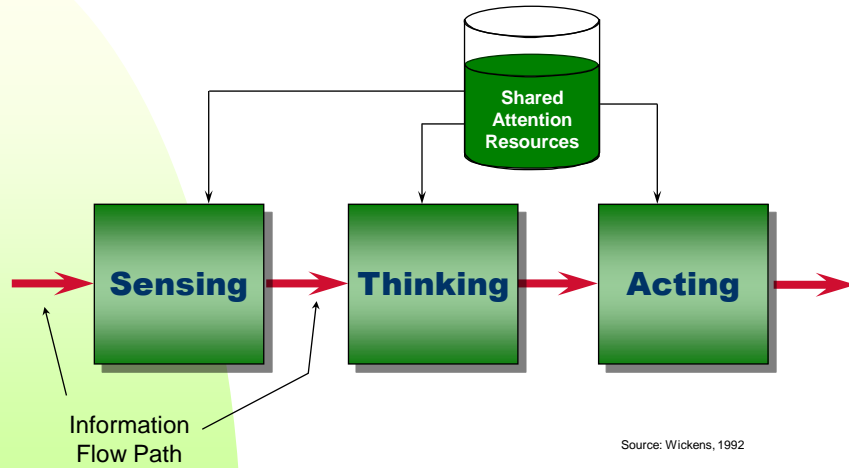
- Mind **set**
- Difficulty **seeing** own errors
- Limited **perspective**
- Susceptible to **emotion**
- Focus on **goal**
- Poor perception of **risk**
- **Fatigue**



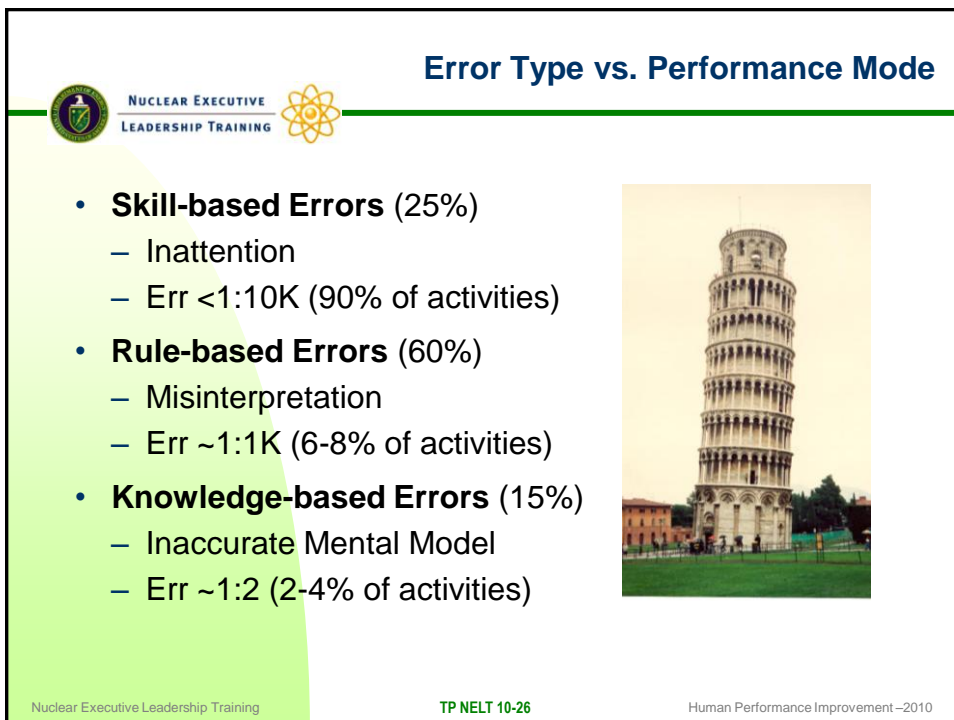
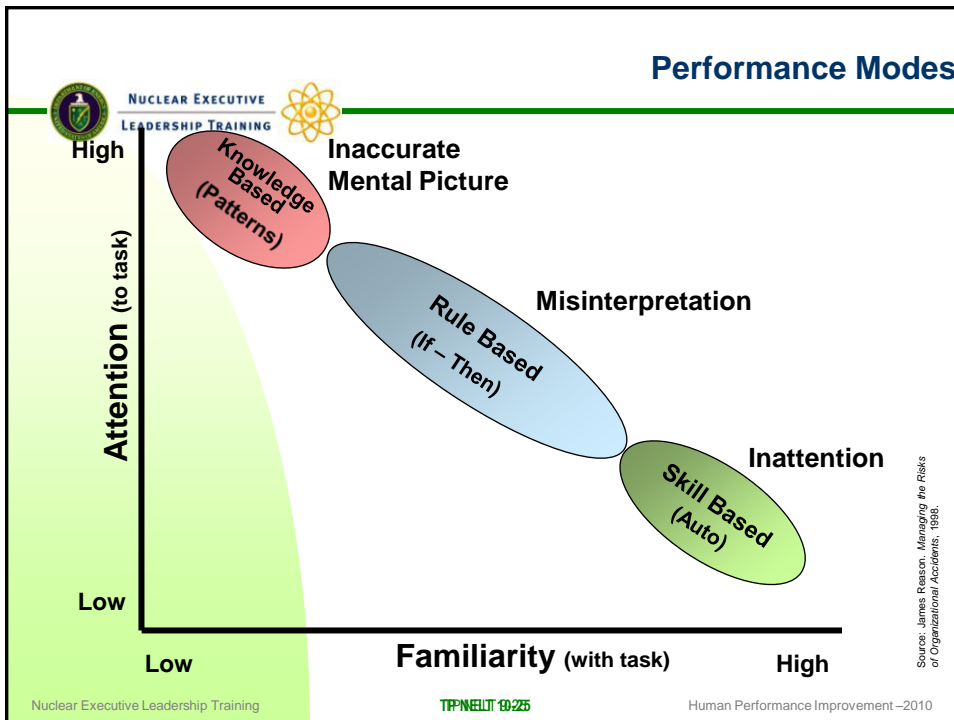
Hazardous Attitudes

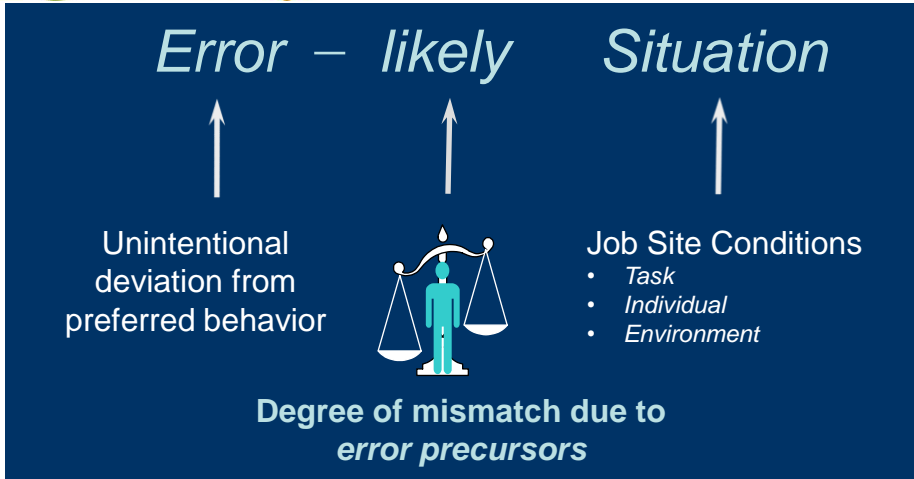
- **Heroic** “I’ll get it done, hook or by crook.”
- **Pride** “Don’t insult my intelligence.”
- **Invulnerable** “That can’t happen to me.”
- **Fatalistic** “What’s the use?”
- **Bald Tire** “Got 60K miles and haven’t had a flat yet.”
 (“It’s a routine job!”)
- **Summit Fever** “We’re almost done.”
- **Pollyanna** “Nothing bad will happen.”





Visual Awareness "Basketball"





Source: Swain & Guttman, *Handbook of Human Reliability Analysis with Emphasis on Nuclear Power Plant Applications*, U.S. Nuclear Regulatory Commission (NUREG/CR-1278), 1983.



Error Precursors short list

Task Demands	Individual Capabilities
• Time pressure (in a hurry)	• Unfamiliarity w/task / First time
• High Workload (memory requirements)	• Lack of knowledge (mental model)
• Simultaneous, multiple tasks	• New technique not used before
• Repetitive actions, monotonous	• Imprecise communication habits
• Irrecoverable acts	• Lack of proficiency / Inexperience
• Interpretation requirements	• Indistinct problem-solving skills
• Unclear goals, roles, & responsibilities	• "Hazardous" attitude for critical task
• Lack of or unclear standards	• Illness / Fatigue
Work Environment	Human Nature
• Distractions / Interruptions	• Stress (limits attention)
• Changes / Departures from routine	• Habit patterns
• Confusing displays or controls	• Assumptions (inaccurate mental picture)
• Workarounds / OOS instruments	• Complacency / Overconfidence
• Hidden system response	• Mindset ("tuned" to see)
• Unexpected equipment conditions	• Inaccurate risk perception (Pollyanna)
• Lack of alternative indication	• Mental shortcuts (biases)
• Personality conflicts	• Limited short-term memory



Error Prevention Tools

- Self-checking
- Peer-checking
- Concurrent verification
- Independent verification
- Stop if unsure
- Procedure use and adherence
- Pre-job briefing
- Post-job briefing
- Communication (3-way and phonetic alphabet)
- Questioning attitude
- Take-two
- Flagging
- Place-keeping

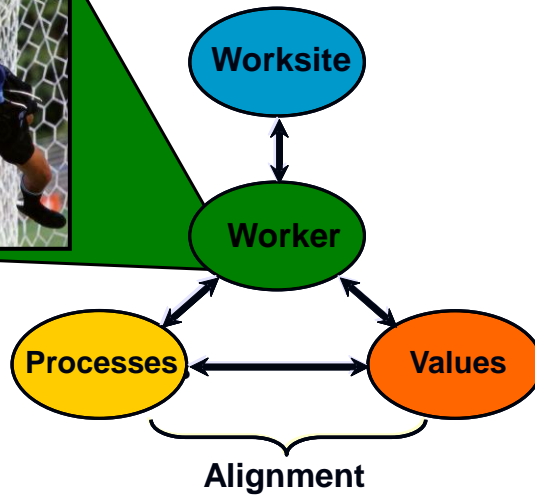
Managing Defenses The Role of the Organization



$$R_e + M_d = \emptyset E$$



The Last Defense!



What is the Organization's Role in Defenses?





Latent Organizational Weaknesses or Conditions

“**Undetected deficiencies** in processes or values or equipment flaws that create workplace conditions that **provoke error** (error precursors) or **degrade the integrity of defenses** (flawed defenses).”

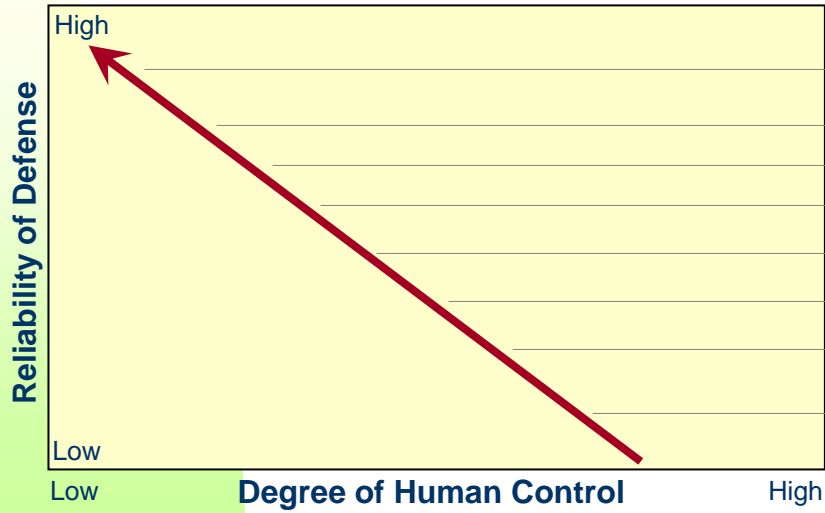


Defense Categories

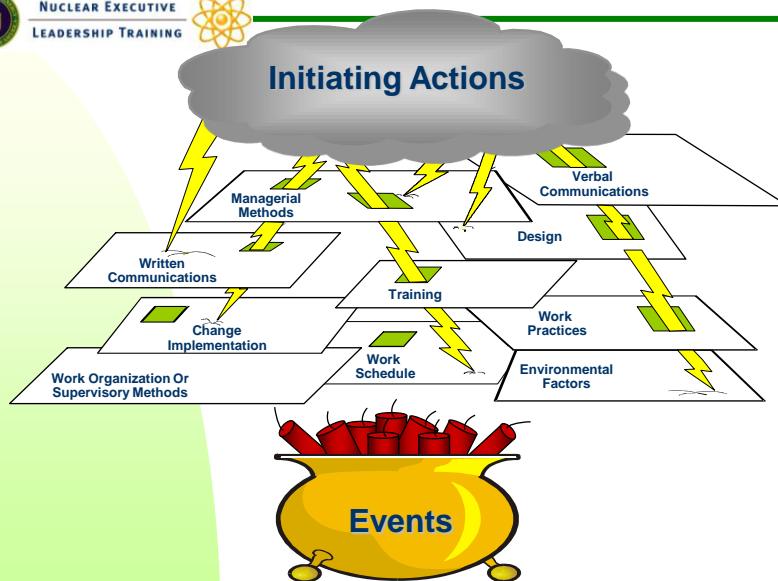


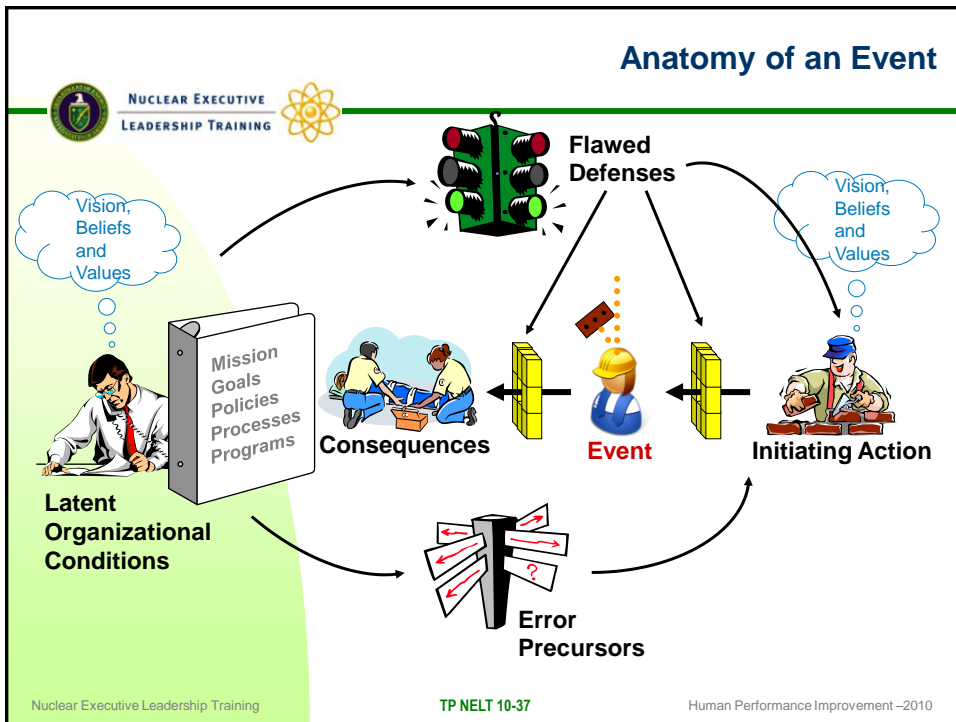


Reliability of Defenses



Defense-in-Depth Is Diverse and Redundant!





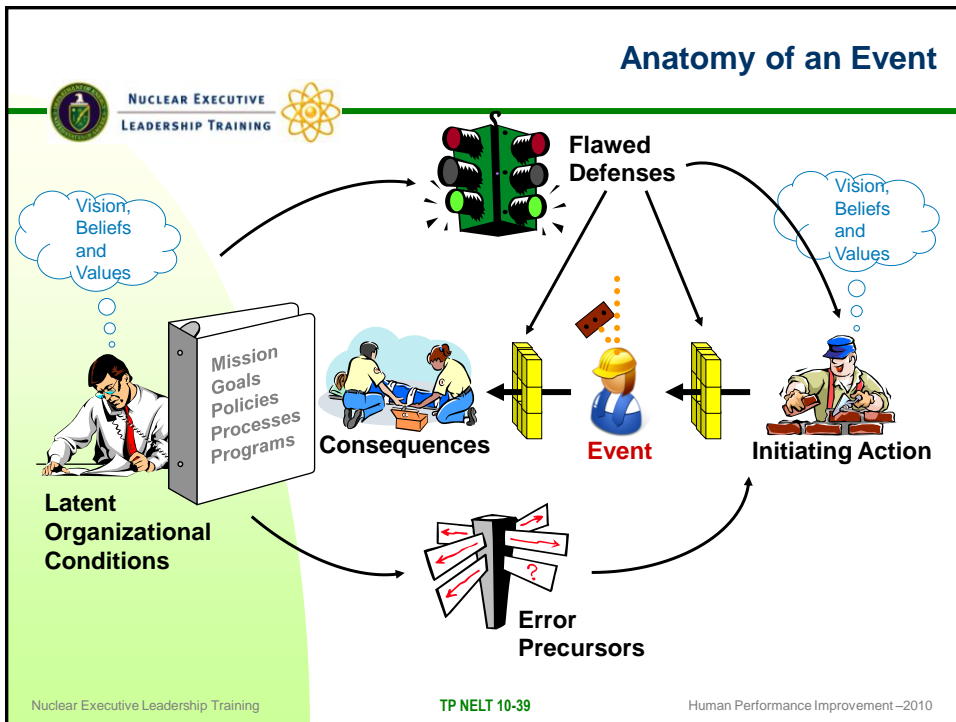
Sterigenics Explosion – August 2004

Safety Video

Ethylene Oxide Explosion
at Sterigenics International
Ontario, California
August 19, 2004

A Case Study from the
Chemical Safety Board


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The Rest of the Story!

Sterigenics Explosion
August 2004

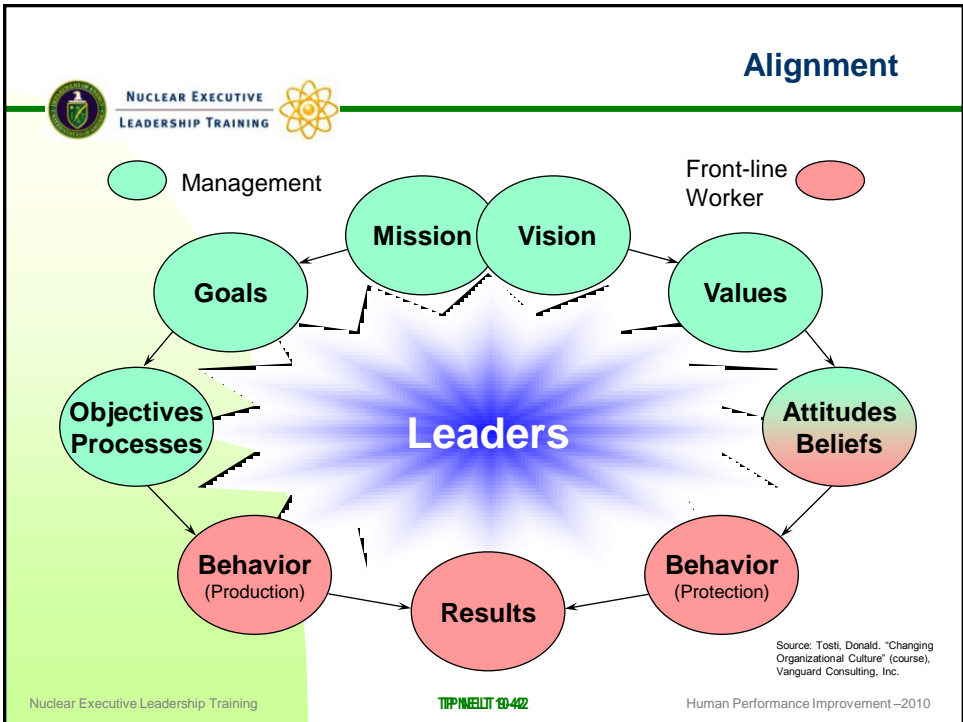
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Leadership & Culture

From an HPI Perspective

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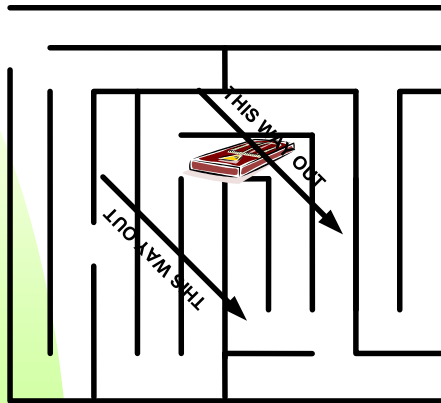


How to Improve Human Performance

(Are your workers in a rat maze?)



Address
Limitations of
Human Nature



Remove Error
Traps

Reinforce Desired
Behaviors

Create Error-Tolerant Systems



Incentives to meet
expectations



How do leaders influence beliefs & values?

1. What leaders **pay attention to**, measure, or control
2. **Reactions** to critical incidents or crisis
3. Criteria used to allocate scarce **resources**
4. Deliberate attempts at role modeling, teaching, and **coaching**
5. Criteria for **reinforcement** and **discipline**
6. **Criteria used to select, promote, or terminate employees**





A Key Principle of Human Performance

People achieve **high levels** of performance based largely on the **encouragement and reinforcement** received from leaders, peers, and subordinates.



You get what you reinforce!

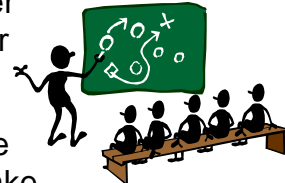


Source: Daniels, *Bringing Out the Best in People*, 1989.



Coaching

The process used to help unlock another person's potential to maximize his or her own performance — to self learn.



Effective coaching helps people become aware of their need for change and to take personal responsibility for taking the appropriate measures to change.

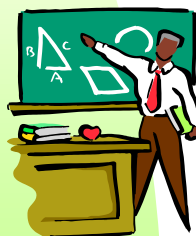


Differences:

Coaching



Counseling



Training



Leader & Organizational Toolbox

- Expectations
- Constant Themes
- Observations
- Post-Job Critiques
- Self-Assessment
- Surveys & Questionnaires





- Metrics & Indicators
- Rewards & Recognition
- Operating Experience
- Benchmarking
- Change Management

"Do No Harm"
Dateline - 2003



May 1, 2006

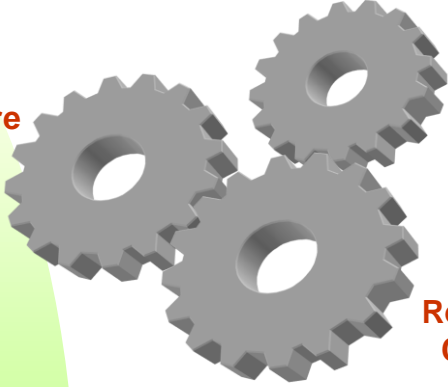
Key Elements of Safety Culture
(from an HPI perspective)

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Just Culture



Learning Culture

Reporting Culture



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Just Culture: The Foresight Test

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Did the individual who committed the error engage in behavior that an average person would recognize as being likely to increase the probability of making a **safety-critical error**?

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Just Culture: **The Culpability Test**

Culpability is likely if the answer is **YES**
to any of the following:

- **Working under the influence** of a substance that impairs performance
- **Clowning around** while driving potentially damaging equipment (or safety-related activity)
- **Taking unwarranted shortcuts** like signing off jobs prematurely
- **Using tools, parts or equipment known to be sub-standard or inappropriate**

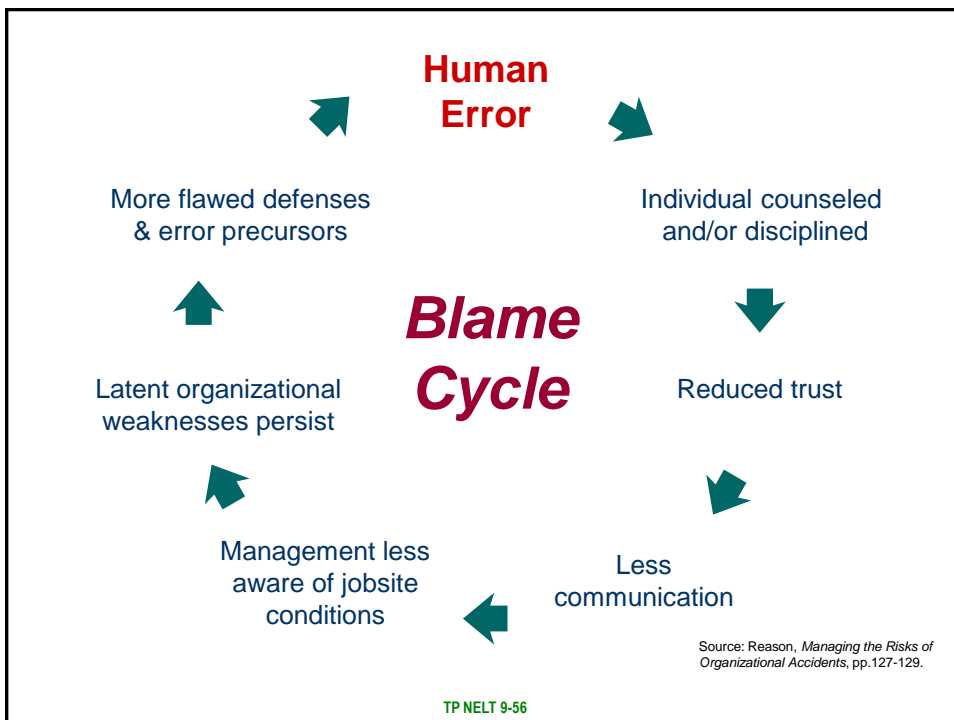
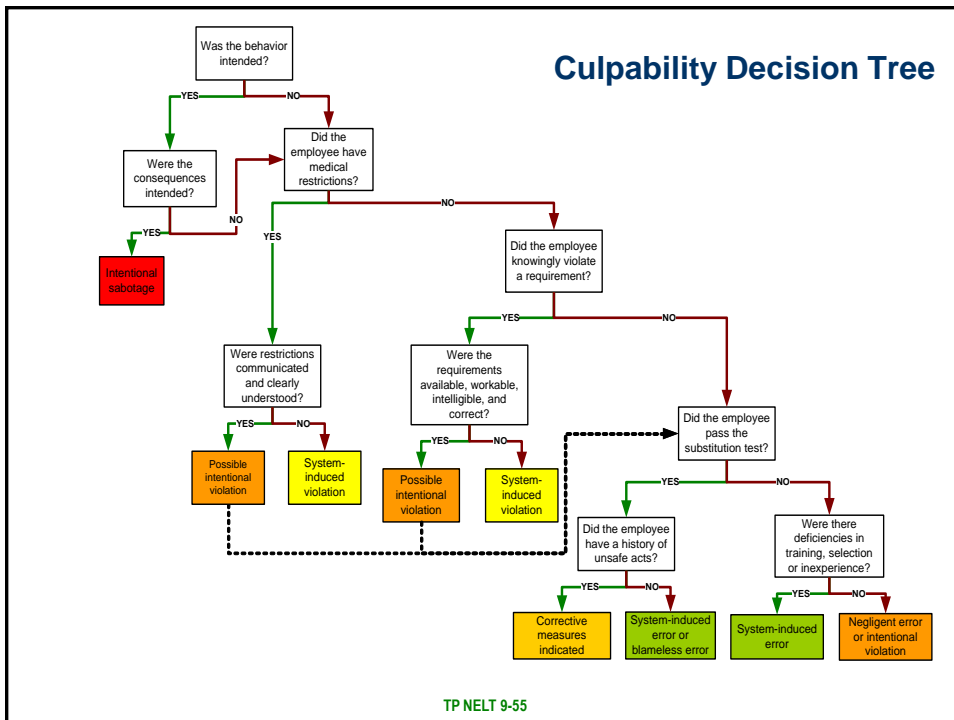


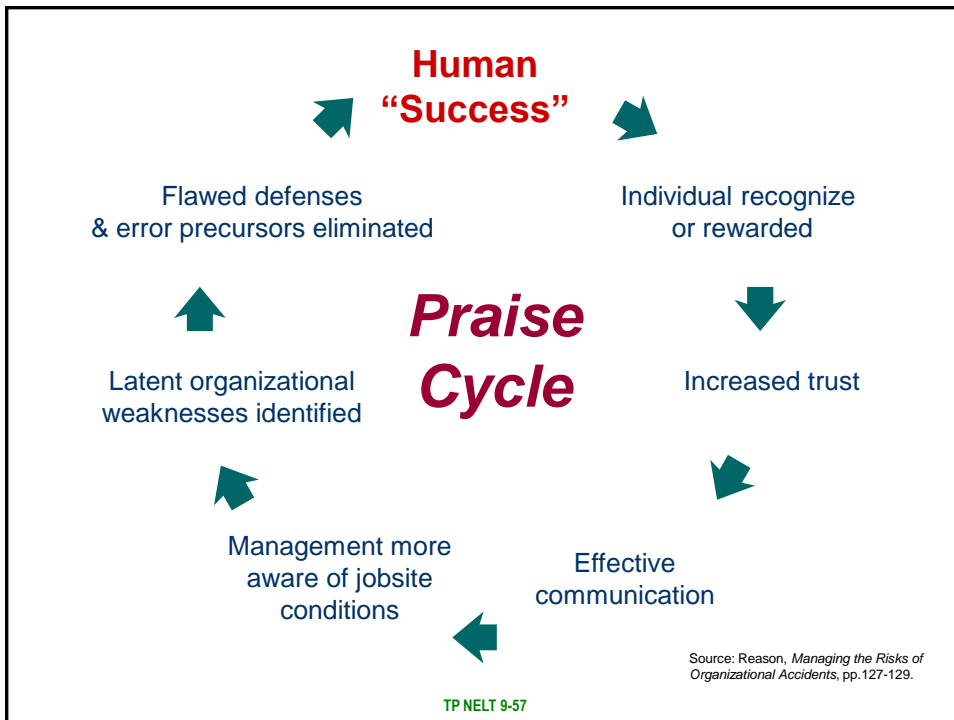
Just Culture: **The Substitution Test**

Replace the individual with another of comparable training & experience:

“Given the situation in which the event occurred, could you be sure that they would not have committed the same or a similar type of unsafe act?”

If the answer is **‘NO’**--then blame is likely to be inappropriate





A Just Culture Means Getting the Balance Right!

Zero Tolerance
for reckless conduct (bad acts)

balanced by

widespread confidence that the vast majority of unintended acts resulting in unacceptable consequences will go unpunished (honest errors).

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Questions?

