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Chronic Sense of Uneasiness – Stimulating Risk-Based Thinking

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The Certified Performance Technologist (CPT) designation is awarded by the International Society for Performance Improvement (ISPI) to experienced practitioners in the field of organizational performance improvement whose work meets both the performance-based Standards of Performance Technology and application requirements.

Video: Crossing the Street

Workplace Realities

- Human fallibility: 3 – 4 errors per hour; 50 errors per day (awake)
- Error traps – local factors that provoke error
- Land mines – hidden sources of energy, mass, and information that could cause harm
- Defenses – missing, faulty, or circumvented
- Overconfidence in the System

"Nothing is always as it seems!"

Risk-Based Thinking*

AMRL

- **Anticipate** – *know* what to expect
- **Monitor** – *know* what to pay attention to
- **Respond** – *know* what to do
- **Learn** – *know*:
  - what has happened
  - what is happening
  - what to change

Touching = Risk

* Adapted from Hollnagel, et al., *Resilience Engineering*, (2006), p.350, and *Resilience Engineering Perspectives, Vol. 2*, (2009), pp.117-133.

Nominal Error Rates*

Situation	Error Rate (nominal)	Probability of Success
High personal stress	3:10	70%
Optimum Conditions	1:10,000¥	99.99%
Simple Arithmetic	3:100	97%
Omitting procedure step	3:1000	99.7%
Select wrong control	3:1000	99.7%
Supervising error	1:10	90%
Routine, repetitive action	1:100	99%
Pilots (low workload)	6-9 per hour	(at altitude)
Driving new car	10 per hour	(including rental cars)
Using a computer	4 per hour	(not counting spelling)

¥ With augmentation, such as Hu Tool

* WASH-1400 (NUREG-75/014); "Reactor Safety Study — An Assessment of Accident Risks in U.S. Commercial Nuclear Power Plants," 1975 (See Appendix I, attached.) and NUREG/CR-1278; "Handbook of Human Reliability Analysis with Emphasis on Nuclear Power Plant Applications," 1980

Error Traps – Examples

- Hurrying
- High workload
- Distractions
- Multiple tasks
- Production pressures
- Changes
- Competing goals
- Vague procedure
- Unfamiliarity
- First-time
- Stress / fatigue
- Habits
- “Get-r-done” mindset
- Overconfidence
- Assumptions
- Fears
- Fatalism

Comparative Risk by Error Trap*

Confusing displays	x50
Unavailable procedure	x20
Unfamiliarity with task	x17
Hurrying	x10
Information overload	x6
Misperception of risk	x4
Inexperience	x3
Boredom / monotony	x1.1

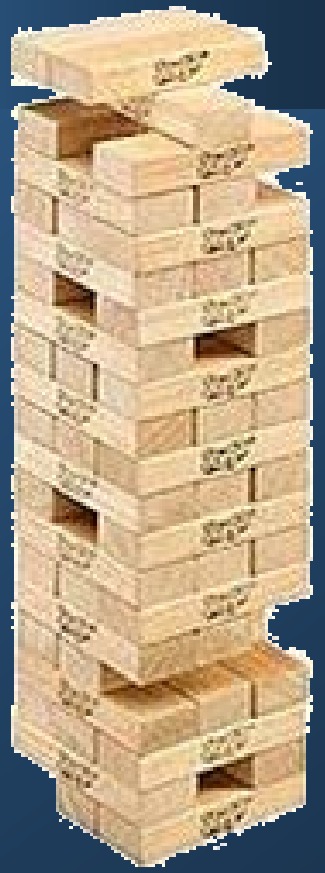
* Swain and Guttman (1983), *Handbook of Human Reliability Analysis with Emphasis on Nuclear Power Plant Operations*. NUREG/CR-1278. us NRC.

Error Rates vs. Task Difficulty*

Degree of Task Difficulty	Nominal Error Rate
Simplest possible task	1:10,000
Repetitive simple task	1:1,000
Repetitive task requiring care	1:100
Complex, infrequently-performed task	1:10

* Smith, David J., (2005), *Reliability and Maintainability and Risk*, extracts from Appendix 6, 7th ed., Elsevier.

System Over-Optimism*



Unrealistic assumptions that operations go right because:

- Facility systems are well designed and scrupulously maintained.
- Designers foresee and anticipate even minor contingencies.
- Procedures are complete and correct [available and usable] for every occasion.
- People behave as they are expected to; as they are trained to.

* Hollnagel, E. (2012), *The Tale of Two Safeties*, [white paper], University of Southern Denmark.

Land Mines*

Latent Conditions, in the workplace that are poised (armed) to trigger harm in combination with human errors or violations; includes compromised or missing barriers and safeguards

* The concept of *land mines* as a source of harm produced by latent system weaknesses was first suggested by Tim Autrey and the Practicing Perfection Institute.

Land Mines – Examples

- Mispositioned components
- Hidden energy sources
- Long-term equipment deficiencies
- Out-of-service indicators or alarms
- Inoperable emergency systems
- Unsecured moveable objects
- Missing barriers between assets and hazards
- Hidden configurations
- Inaccessible or confusing controls
- Worn out or lack of tools
- Software errors
- Sneak circuits

Management Perspectives

Safety

An asset's freedom from the risk of harm

Resilience (Reliability)

The ability to succeed amidst varying circumstances*

* Adapted from Hollnagel, et al.,(2011). *Resilience Engineering in Practice: A Guidebook*.

Safety Misunderstood*

- Safety is NOT the absence of accidents.
- Safety is the *presence* of defenses in your processes, procedures, facilities, methods, and practices.
- Safety is what you ***DO*** to ensure the integrity of *assets* using a variety of controls, barriers, and safeguards

*Woods, D. et al. (2010), *Behind Human Error* (2nd ed.), Ashgate, pp.38-39, 244-246.

Chronic Sense of Uneasiness*

A Preoccupation with Failure | No such thing as "routine"

An attitude of *mindfulness* to protect assets regarding:

1) one's capacity to err, i.e., error traps
2) the presence of hidden threats, i.e., land mines

how you perceive, think, and feel about assets and their hazards (beliefs)

"What can I do to rise above my circumstances to get the results I desire?"

-- The Oz Principle

* Reason, J. (2008), *The Human Contribution*, p.274.

Critical Step℠
– Point of No Return | What MUST Go Right

Single-Error Vulnerability

A human action that ***will*** trigger ***immediate, irreversible, intolerable harm*** to an asset (if that action or a preceding action is performed improperly)

Video: Homemade Firecracker

Dr. Ignaz Semmelweis

- Vienna General Hospital's obstetrical clinic
- Maternal mortality rate in midwifery unit three times lower than doctor's unit
- Doctors often moved directly from autopsies in morgue to maternity ward
- Maternal death rates dropped from 18.3% to 1.3% after adopting new defense
- Current compliance around 60%

- What was the new defensive measure?

Drift Factors*

$$\text{Drift} \approx \frac{B_- \cdot B_+ \cdot C \cdot N \cdot P}{S \cdot T \cdot U}$$

B_- – Burden (mental / physical)
B_+ – Benefit
C – Sense of Control
N – Group Norm
P – Production pressure
S – Supervisory presence
T – Traceability to individual
U – Sense of Uneasiness

* Adapted from Hudson, P. et al. , *Bending the Rules: Managing Violation in the Workplace*; and Robert Fisher, HPRCT Presentations

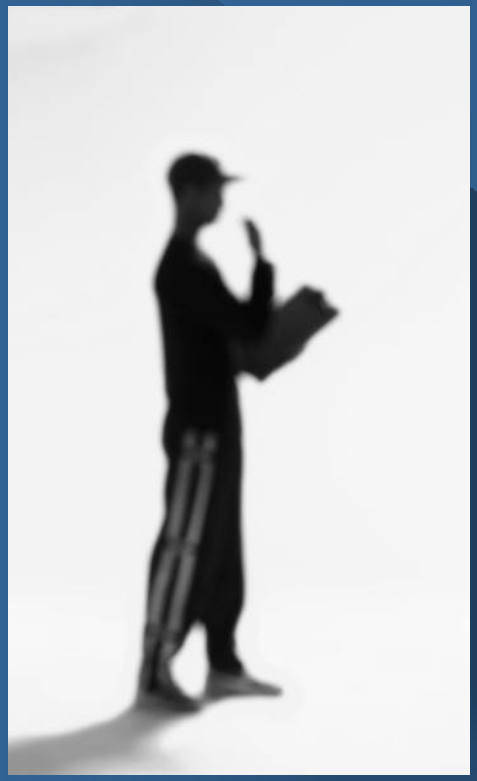
How Culture is Influenced*

* Weick, K. and Sutcliffe, K. (2007), *Managing the Unexpected*, p.117.

Expectations

- **Accomplishment**: clear description of work output / outcome, criteria for a good one, and related behaviors
- **Organization Alignment**: sustained, local support for new behaviors
- **Communication**: describe, demonstrate, do, debrief, do again
- **Inspect**: feedback through observation and coaching

Effective Feedback Reduces Drift

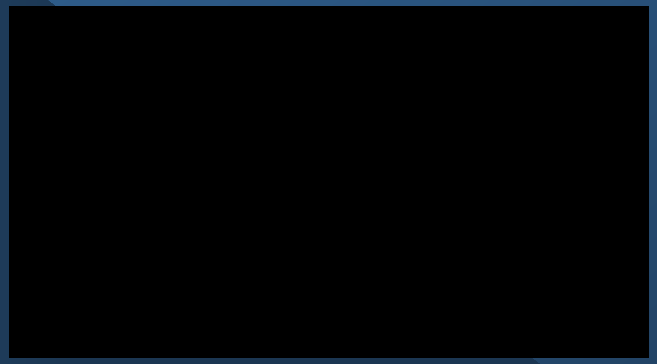


- Reinforcement is feedback that *encourages* repetition of behavior (expectation).
- Coaching is feedback that *improves* behavior.
- Correction is feedback that *stops* an unwanted behavior.

Accountability Conversation: 1) Close the gap between current practices and expectations, AND 2) Improve the health of the work system.

Building Blocks of HOP: Manage the Risk!!!

Video: Changing Tyres



Live Long and Prosper

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