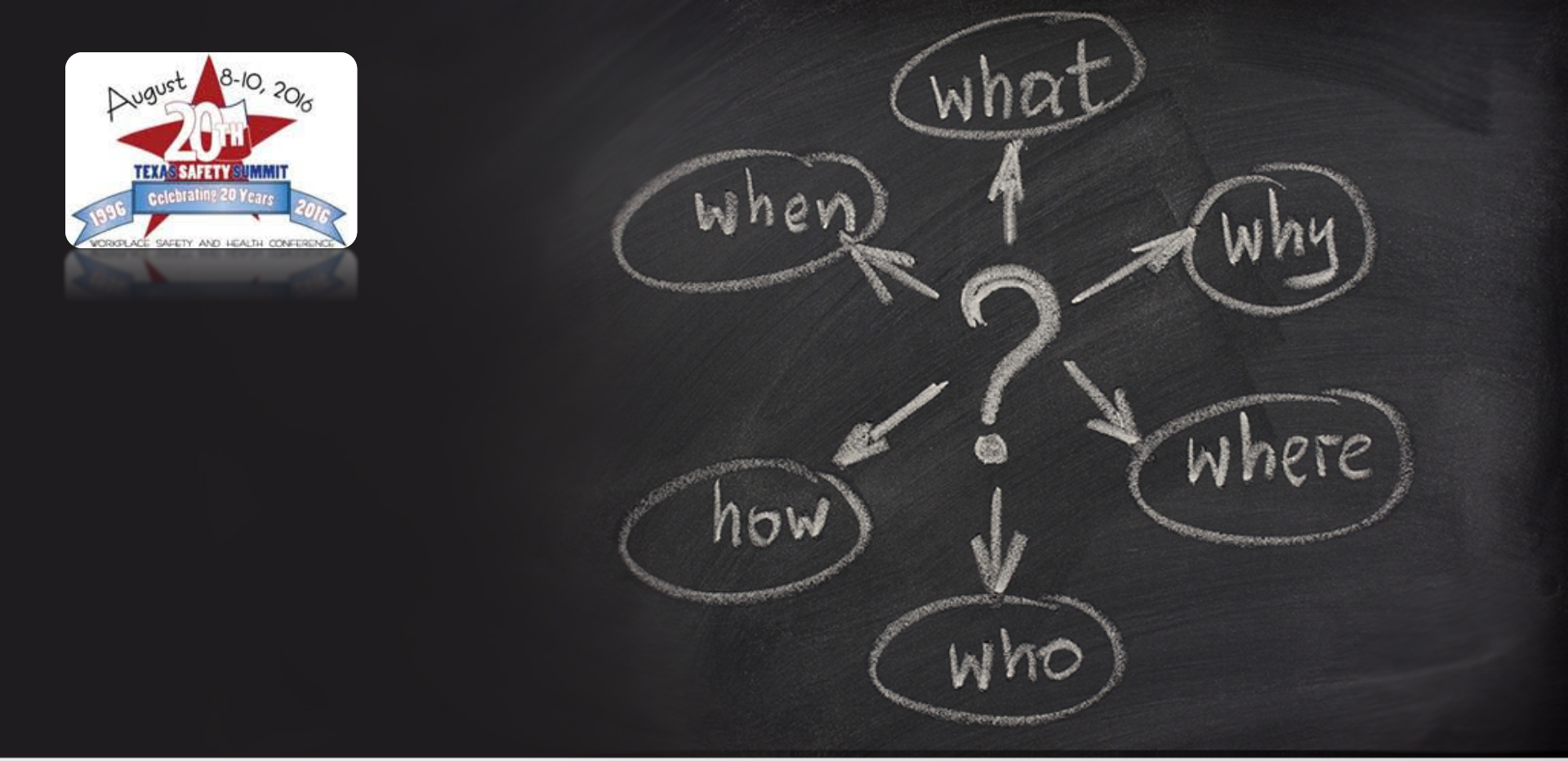

USING HUMAN FACTORS IN INCIDENT INVESTIGATION

20th TEXAS SAFETY SUMMIT

JAMES "SKIPPER" KENDRICK, CSP

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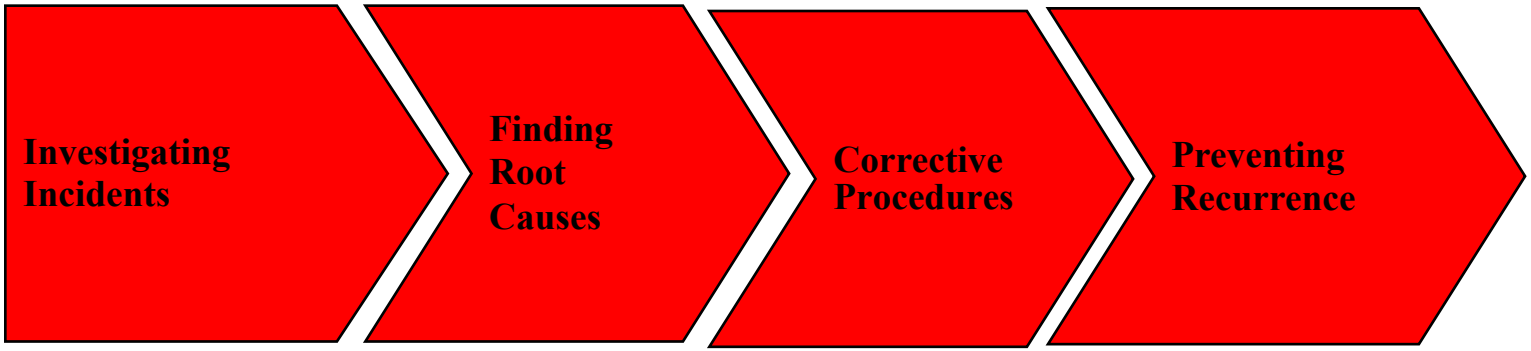
DWC
Division of Workers' Compensation
Texas Department of Insurance

Reactive Culture

History suggests we should be very good at:



But are we?

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Typical Incident Investigations

FOR IMMEDIATE DISTRIBUTION

SEVERE INJURY & FATALITY REPORT
FACSIMILE TRANSMISSION SHEET

DATE:	9-26-08	PAGES (Including this sheet)	1
TO: CORPORATE EHS GROUP			
FACSIMILE #: 1-401-457-6028 *or* e-mail to a member of the corporate staff			
FROM:	Leroy E. Burton		
DIVISION/PLANT:	Cessna Aircraft Company		

NAME OF INJURED:	Steve McCaslin				
Job Title:	Maintenance Mechanic	Length of Employment:	18 yrs.	Date in Occupation:	1990
Contractor/Visitor:					
Supervisor (Name/Title)	Alan Richardson				
Plant Mgr. (Name/Title)	Tom Butherus				
Plant Health & Safety Coordinator :	Leroy E. Burton				

INCIDENT			
Time of Incident:	Date of Incident	Shift	Department and Location Employee Assigned To:
8:35 AM / PM	9/ 26 / 08	1st	163, Maintenance

Description Of Incident:
Employee was cutting scrap metal. When a piece of metal was cut, it allow

Preliminary Medical Diagnosis:
Left foot, broken metatarsal.

Assistance Requested:
First Aid for evaluation.

Facts Revealed and Control Measures Taken During Investigation:
Scrap metal was being demolished on an unstable surface.

Actions To Prevent Recurrence:
The process has been reviewed with all maintenance team members. All metal being demolished or cut will be lying on a flat stable surface.

Responsibility Assigned to:	Bruce Hoffer
Target Date for Completion:	9-26-08

Status:
Complete.

Investigated by (Name & Title) Bruce Hoffer, Maintenance Superintendent — Date: 9-25-08

Follow-Up (Days)	30	____	60	____	90	____	Other	____days

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Scrap metal was being demolished on an unstable surface.

Actions To Prevent Recurrence:

The process has been reviewed with all maintenance team members.

What is the likelihood this event will recur in the future?

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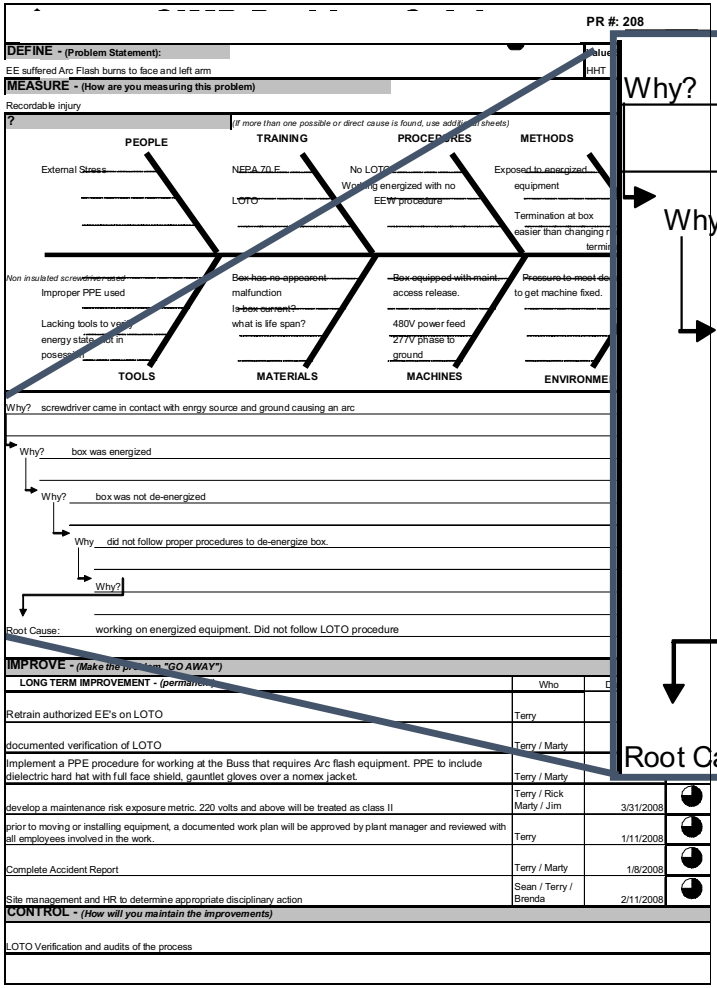
TEXAS SAFETY SUMMIT

Typical Incident Investigations



Why? XXXXXX came in contact with enrgy source and ground, causing an arc

Why? box was energized

Why? box was not de-energized

Why did not follow proper procedures to de-energize box.

Why?

Root Cause: Employee working on energized equipment.
Employee did not follow LOTO procedure.

Was the employee the *root* cause?

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Problem Statement

- Companies may lack a consistent, comprehensive incident investigation model that can be used across the enterprise
- Most incident investigations fail to reach all the causal factors
- Commonly used processes (5-Why, TAP ROOT, SIMP, etc.) do not consistently lead investigators to all of the causal factors

Design a model incident investigation tool that focuses the investigation on "WHY" and not just "WHO", "WHAT" or "HOW"

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A Flawed Approach

- Lack of a consistent incident investigation process that can be used across the enterprise.
- Most investigations stop short of determining WHY an incident has occurred.
- What's missing? The human factor. Without it, workable and sustainable preventive measures cannot be determined.

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Causal Factors

- Causal Factors are basic causes.
- Causal Factors are those causes that can reasonably be identified.
- Causal Factors are those causes over which management has control.
- Causal Factors are those causes for which effective recommendations can be generated.

Most incidents do not have a single, root cause; they have multiple causal factors.

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Causal Analysis

- Causal Analysis is a tool:
  - Describe WHAT happened during an incident.
  - Determine HOW it happened.
  - Determine WHY it happened.
- Most failed investigations never determine WHY an incident occurred.
- Workable and sustainable preventive measures then cannot be determined.

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Basic Example

- Incident:
  - An operator is instructed to close Valve A.
  - Instead, the operator closes Valve B.
- The incident investigation determines "operator error" was a cause and develops corrective actions:
  - Retrain operator on the procedure.
  - Remind employees to be alert when closing valves.
  - Require operators to use careful attention.

The process fails to determine <u>WHY</u> the incident occurred

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Desired Outcome

- Determine WHY the incident occurred:
  - Valves were not labeled?
  - Procedure was incorrect?
  - Employee was under stress to complete the work quickly?
  - Process changes were made without proper review?

We begin to use concepts that support the Human Performance Improvement way of thinking.

Only then can we determine the <u>relevant</u> causes.

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Incident Investigation Model

- This Incident Investigation Model will use concepts of Human Performance Improvement:
  - To drive us to find all relevant causes, or causal factors, of incidents
  - To help us determine the organizational weaknesses that contribute to incidents
  - To help us understand that our errors are rarely the primary cause of an incident
  - To raise employee morale and improve culture by avoiding the blame cycle

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Deployment and Use

- Use of a standard format and tool will make sharing of investigation results and corrective actions across the enterprise much easier.

"To address this mistake we must use root-cause analysis. I'll begin by saying it's not my fault."

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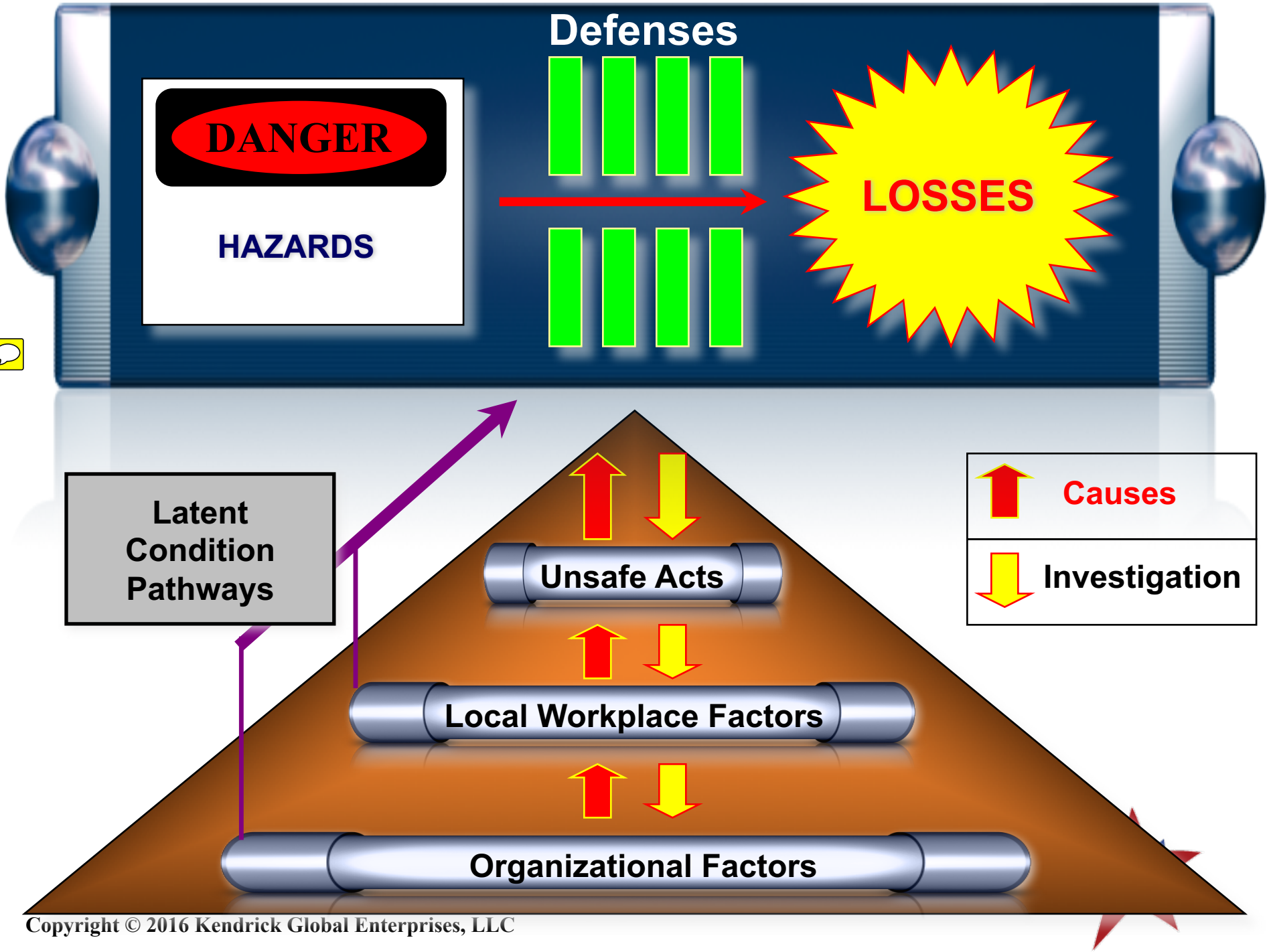

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HPI Investigation Model

1. Determine Performance Mode
2. Identify Traps/Precursors
3. Identify Latent Organizational Weaknesses
4. Identify Tool Utilization
5. Implement Corrective Actions

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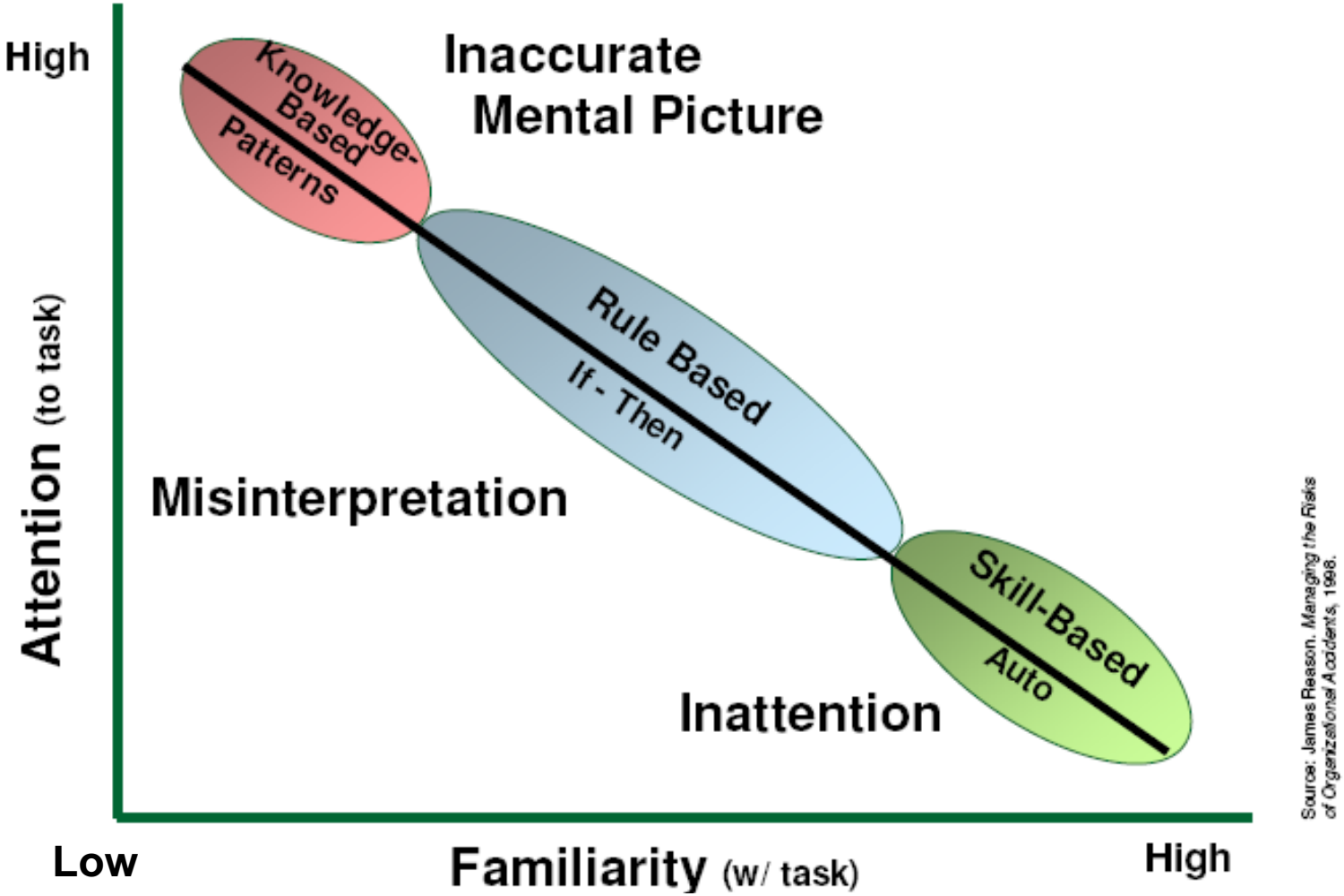
Analyze: Performance Modes



Source: James Reason. *Managing the Risks of Organizational Accidents*, 1998.

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Analyze: Error Precursors

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

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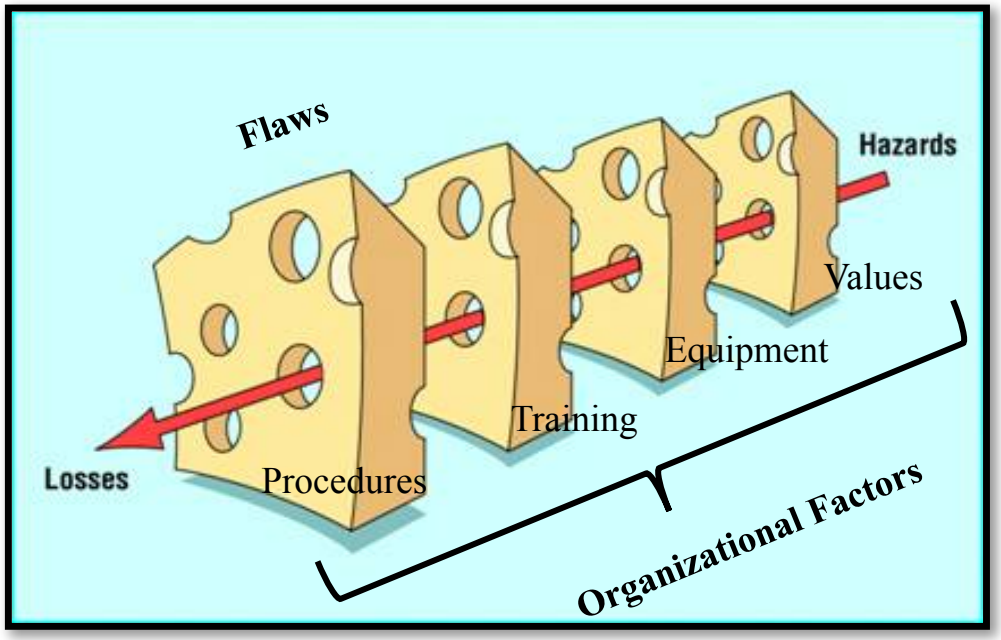

Poorly written, missing, needed, or out-of-date procedures

Vague policies

Out-of-date programs

Conflicting values

Ineffective training

Broken or out-of-date equipment

Old technology

Unapproved modifications

Incorrect equipment / component drawings or labeling

Normalized Deviation

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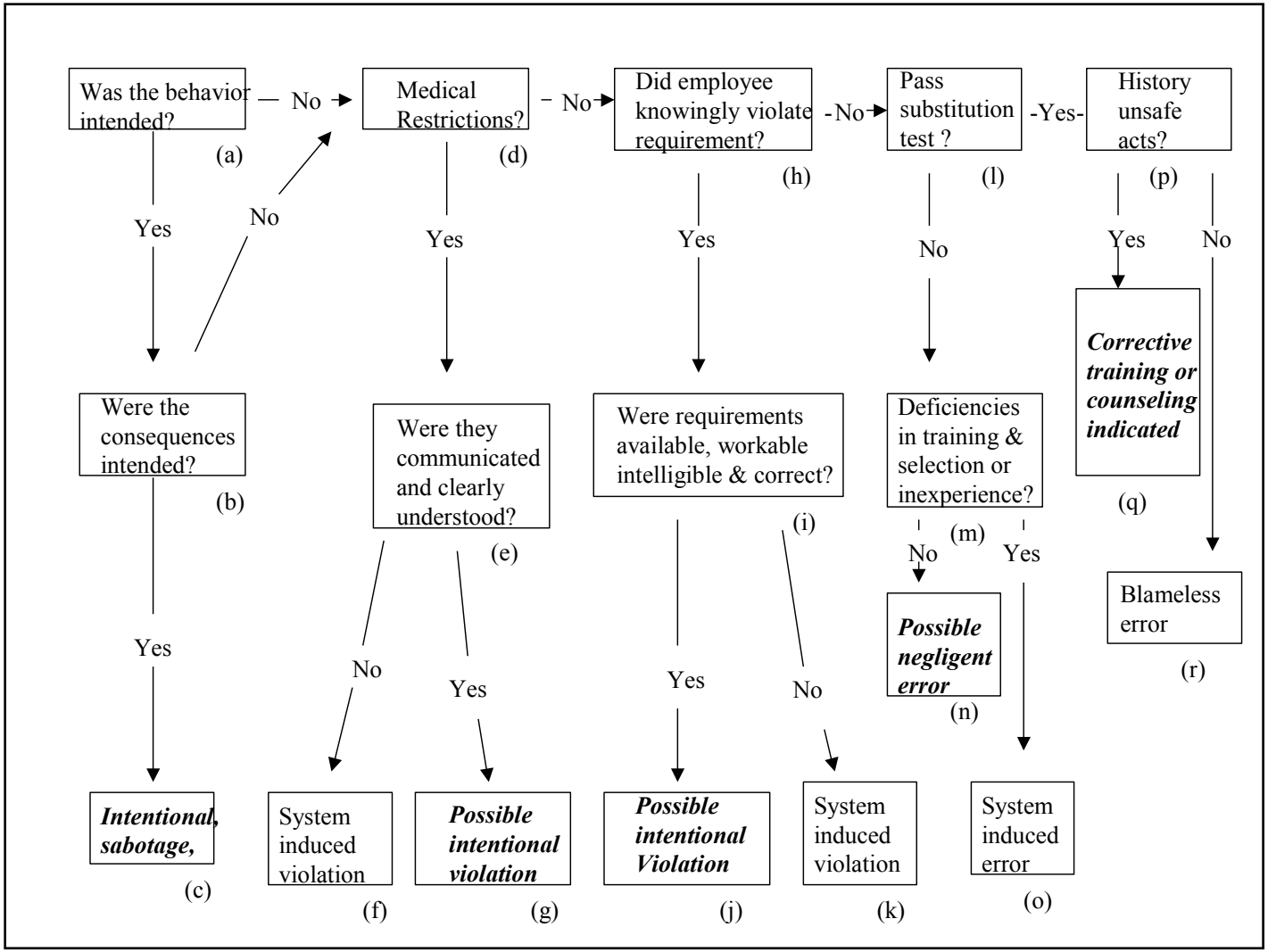
What Would _____ Do?



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HPI WORKSHEET

HUMAN PERFORMANCE IMPROVEMENT WORKSHEET

Incident Description:

Performance Mode		
❑ Skill Based	❑ Rule Based	❑ Knowledge Based

Traps / Precursors	
❑ Time Pressure	❑ Repetitive Action/Monotony
❑ Distraction/Interruption	❑ Vague Guidance (verbal or written)
❑ Multiple Tasks	❑ Unskilled / Lack of Proficiency
❑ Overconfidence	❑ High Workload (mental or physical)
❑ First Shift / Late Shift	❑ Set Habit Patterns
❑ Peer Pressure	❑ Poor / Inadequate Risk Perception
❑ Change / Abnormal Conditions	❑ Illness
❑ Physical Environment	❑ Other
❑ Fatigue / Mental Stress	❑

LOW's (Latent Organizational Weaknesses)	
❑ Procedure / Documentation	❑ Goals / Priorities
❑ Roles / Responsibilities	❑ Values / Norms
❑ Displays / Labels / Signs	❑ Task Structure
❑ Training / Qualification / Certification	❑ Change Management
❑ Maintenance / Testing	❑ Resource Management
❑ Engineering Design / Design Changes	❑ Work Planning / Scheduling
❑ Normalized Deviation	❑ Inadequate / Ineffective Supervision
❑ Other	❑

TOOLS (check all that may apply)

TOOL	Used - Effective	Used – Not Effective	Not Used - Needed	NA
Self-Checking	❑	❑	❑	❑
Peer Checking	❑	❑	❑	❑
Pre-Job Review	❑	❑	❑	❑
Post-Job Review	❑	❑	❑	❑
Procedure Usage	❑	❑	❑	❑
Questioning Attitude	❑	❑	❑	❑
Place Keeping	❑	❑	❑	❑
Communication	❑	❑	❑	❑
Coaching	❑	❑	❑	❑
Observation	❑	❑	❑	❑
Turnover	❑	❑	❑	❑
Job Site Review	❑	❑	❑	❑
Knowledge / Training	❑	❑	❑	❑

Reviewed By:	**Date:**
Approved:	**Date:**

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Workshop

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Questions

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THANK YOU !

James "Skipper" Kendrick. CSP

skipper.kendrick@gmail.com

(817) 428-3270

www.safetybyskipper.com

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