Pragmatic Inclusion of Human Factors In Incident Investigation

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Why Human Factors Matter

YOU ARE HERE

Congratulations!

What next?

Consequence / Rate Metric
Why Human Factors Matter

Plant
- Engineering Design
- Equipment Certification
- Operations/Maintenance
- Availability/Reliability
- Fit for Purpose

Process
- Hazard Identification
- Risk Management
- Policies and Procedures
- Integrity Management
- Audit and Verification

People
- Leadership
- Human Factors
- Attitudes/Behaviors
- Training/Competency

Risk

ALARP
What Is / Are Human Factors?

How much is covered elsewhere e.g. in PSM, or in a different organizational function? Where to start?

OGP (From OGP 368)

- CULTURE/WORKING ENVIRONMENT
  - Social and community values
  - Communication flow within the organization
  - Acceptance and willingness for change
  - Language, geography, climate
  - Management support of safety values

- MANAGEMENT SYSTEMS
  - Compatible organizational goals
  - Job safety analysis
  - Quality of operating procedures/work practices
  - Clear interfaces/responsibilities/accountability
  - Risk management
  - Safe working practices
  - Work/task design issues
  - Leadership

- PEOPLE
  - Fatigue and stress
  - Training systems
  - Workload and shift schedule
  - Behavioral safety
  - Physical and mental fitness

- FACILITIES / EQUIPMENT
  - Ergonomics
  - Design
  - Maintenance
  - Reliability
  - Physical layout of facilities and site
  - Noise, lighting, toxics, radiation

Common thread is Human Error / Failure

Management Program for Offshore Operations and Facilities

The interaction and application of scientific knowledge about people, facilities and management systems to improve their interaction in the work place and reduce the likelihood and/or consequences of human error.

Center for Offshore Safety

(Draft: Work in progress) Critical Barriers and Critical Operations that require human actions in order to be implemented effectively, anticipates organizational and situational challenges to effective human action/reaction in implementing them, and identifies preventative and mitigative strategies or tactics to minimize the risk or impact of human ineffectiveness throughout the life cycle of those barriers and operations.
Challenges

• Large number of Unplanned Events
• Limited investigative resources
• Causal analysis often resource intensive
• High proportion of Unplanned Events have a Human Failure component
• Evidentiary basis often low fidelity
• Humans are complicated and unavoidable
• Certain types of Human Failure are not preventable
• Corrective Actions differ according to the Human Failure type involved
Human Failure in an Unplanned Event

**Inadventent At-Risk Action**

- **Action Error**
  - Action-based
    - "Slip"?
      - e.g. inattention
  - Memory-based
    - "Lapse"?
      - e.g. forgetfulness

**Deliberate At-Risk Action**

- **Thinking Error**
  - "Mistake"
  - Rule-based?
    - e.g. misapply experience to novel situation
  - Knowledge-based?
    - e.g. insufficient or incorrect procedure

**Is the evidentiary basis sufficient to differentiate?**

**Person did something other than what they intended to do**

**Person acted as they intended, but should have done something else to satisfy our expectations**

**Deliberate Non-Compliance**

- "Violation"
  - e.g. deviates from procedure
- Routine?
- Situational?
- Exceptional?
Human Failure in an Unplanned Event

Routine Violations

Normalized deviance: “This is how we do it around here”. The workplace consensus is that rules and processes are only selectively applicable.

Situational Violations

Non-compliance driven by context specific and temporary factors such as lack of appropriate equipment, pressure to complete a task, insufficient manpower or time.

Exceptional Violations

Violations arising from unusual circumstances, for example if an emergency arises, a piece of critical equipment breaks down, or something goes wrong during task execution.
Human Failure in an Unplanned Event

Evidentiary basis must be sufficient to differentiate between:

Slip
Lapse
Mistake
Violation

Evidentiary basis must also be sufficient to determine whether At-Risk Act are:

Enabled
Difficult
Non-Enabled
Human Failure in an Unplanned Event

Enabled

The choice between a Safe or At-Risk act or behavior is entirely within the person’s control; there are no external drivers (except possibly group norms).

Difficult

Safe performance of the task has obstacles imposed upon it (e.g. time required to fetch equipment located remotely from the task site). Safe behavior is possible but the At-Risk act or behavior is easier. Before engaging in an At-Risk act or behavior, the worker may conduct a form of cost / benefit analysis, with cost being based on a risk assessment. Note that this process may be unconscious.

Non-Enabled

The worker is forced to engage in an At-Risk act or behavior; there is no other way to perform the task at hand. (e.g. equipment required to do the task safely not available).
Pragmatic Resource Investment

• Should all Human Failure related Unplanned Events be fully investigated?

• Which Human Failure related Unplanned Events are worth investing resources in to prevent reoccurrence?

• How do you decide?
Unplanned Event

Preventable & Significant?

NO

Event / Action Process Overview
Context: Preventability

- Preventable
- Organization chooses not to prevent
- Unpreventable
Context: Preventability
Determining Preventability

Unplanned Event

Caused by act of independent 3rd party
- Yes: Semi-predictable failure
- No: Complex event that cannot be predicted
  - Yes: Act of nature
  - No: Human error that cannot be eliminated
    - Yes: Otherwise unpreventable
    - No: Preventable

Semi-predictable failure
- Yes: Determine risk-based significance
- No: Otherwise unpreventable

Act of nature
- Yes: Determine risk-based significance
- No: Unpreventable

Otherwise unpreventable
- Yes: Determine risk-based significance
- No: Preventable

Consequence Management

Corrective Action

Determine risk-based significance

Preventable
Context: Significance

Risk Appetite / Tolerance

Outcomes

Probability
Context: Significance

![Diagram showing probability and outcomes]

- **Significant**
- **Not Significant**

Outcomes

Probability
Determining Risk-Based Significance

For each category, determine (yes or no) if event exceeds or could have exceeded company risk acceptance criteria

Note: this process applies to both preventable and unpreventable Unplanned Events

Unplanned Event

Unplanned Event

High risk vehicle collision

Excavation collapse

Confined space issue

Personal Injury

Otherwise declared significant

Energy release

Chemical release

Mobile equipment operation

Fall from height

Significant Event

Not a Significant Event
Unplanned Event

Preventable & Significant?

Causal Analysis (If Required / Possible)

Event / Action Process Overview

Data Quality Ladder

Fact

Precise, accurate, verifiable, measurable

Deduction

Logical inference

Assumption

Something taken for granted; a supposition

Opinion

May be based on gut feelings, experience

Belief

A strongly held conviction

Hearsay

Second-or-third hand information

Guess

May be “wild” or “educated” (WAGs or SWAGs)

Fantasy

No basis in reality
Resource Efficient Analysis

Event Complexity vs. Effort Required

- LOW Event Complexity:
  - Two Box (Acts)
  - 1 Why

- HIGH Event Complexity:
  - 5 Why
  - Cause & Effect analysis tools

* C&E: Cause and Effect analysis

Chart illustrates the relationship between event complexity and effort required, showing a resource-efficient analysis approach.
Event / Action Process Overview

Unplanned Event

Preventable & Significant?

YES

Causal Analysis (If Required / Possible)

Immediately Preventable?

NO

Purpose of resource spend is to prevent Unplanned Event from happening again.
What is happening now?  
*Current Undesirable Acts of People*

**Unplanned Event**

**Related to Human Error?**

- Slip
- Lapse
- Mistake
- Violation

Immediately Preventable?
What is happening now?  
*Current Undesirable Acts of People*

Unplanned Event

Implements an achievable Corrective Action that will result in this behavior change in the real world.

What will happen?  
*Desired Future Acts of People*

If no such action can be defined, Unplanned Event is not immediately preventable.
Validation of Corrective Actions

Corrective Action

- Relevant and effective in preventing the unplanned event
- That addresses Human Factors (reliably, in real life)

Cause something to happen
**Example Human Failure Corrective Actions**

- **Inadvertent At-Risk Action**
  - Person did something other than what they intended to do

- **Deliberate At-Risk Action**
  - Person acted as they intended, but should have done something else to satisfy our expectations

- **Action Error**
  - Person believed act to be correct
  - Person knew act was not correct

- **Thinking Error**
  - Difficult to eliminate completely.

  - Accept the risk / exposure.
  - Workplace and/or task design to reduce probability of Action Error.
  - Detect & neutralize: reduce probability of error escalating via independent verification of critical items.
  - Make work process error tolerant.

* Note these are only Corrective Actions when validated in context for a specific Unplanned Event
Example Human Failure Corrective Actions

**Person did something other than what they intended to do**

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- Action Error

**Person acted as they intended, but should have done something else to satisfy our expectations**

- Deliberate At-Risk Action
- Person believed act to be correct
- Thinking Error
- Person knew act was not correct
- Deliberate Non-Compliance

- What if analysis generated scenario based training.
- Job / system specific competency training.
- Procedure revision.
- Improved system data delivery.
- Human Machine Interface (HMI) design.

*Note these are only Corrective Actions when validated in context for a specific Unplanned Event*
Example Human Failure Corrective Actions

Person did something other than what they intended to do

**Inadvertent At-Risk Action**

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**Thinking Error**

**Deliberate Non-Compliance**

Must be relevant to Violation type (Routine, Enabled, etc)

- Engaged supervision increasing reward probability for desired behaviors and negative outcomes for Violations.
- Modify work environment to eliminate forcing conditions.
- Eliminate unnecessary rules and bureaucracy.

* Note these are only Corrective Actions when validated in context for a specific Unplanned Event
ABCs of Behavior

**SIC / PICNIC**

Feedback for a behavior must be:

- Significant
- Immediate
- Certain

- Positive
- Immediate
- Certain
- Negative
- Immediate
- Certain

Positive > Negative
Unplanned Event

Preventable & Significant?

YES

Causal Analysis (If Required / Possible)

NO

Immediately Preventable?

YES

Preventive / Corrective Action

NO

Consequence Management

OR / AND

Long Lead Corrective Action

Potentially problematic wrt Human Failure issues
Actions You Can Take Right Now

- Gap / Opportunity Analysis of current processes from Human Factors / Human Failure perspective
- Implement significance and preventability filters
- Facilitate HAZOP-like HF reviews
- Develop and train onsite Data / Evidence Gathering Protocol to allow incorporation of HF in incident investigation process
- Train personnel in resource efficient and effective analysis of HF issues
- Train personnel in development of efficient and effective corrective actions against HF issues
- Measure the effectiveness of the organization’s response to Unplanned Events, including those involving HF

* Note “Train” in this context means impart and maintain competence
Questions?

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