Investigating Unplanned Events In A Fraction Of The Time Currently Spent (Including Near Misses)

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Houston, Texas

Norman Ritchie was educated as a Mechanical Engineer at the University of Glasgow in Scotland. He has 35 years of experience of project and risk management, largely in the oil and gas industry.

As a Director of vPSI group, LLC, which he co-founded in 2003, Ritchie provides consulting and training in performance measurement and improvement, principally in the areas of risk, loss prevention, safety, human performance, and organizational learning.

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Rick Theriau, vPSI Canada Ltd
Calgary, Alberta

Rick recently retired from Halliburton Group Canada after 32 years of leadership and engagement with each of the Canadian product service lines and specialized within service quality improvement and efficiency while leading the continuous improvement efforts on health, safety, and environmental initiatives.

He believes in giving back to the energy industry and has been assisting Energy Safety Canada, Enform and PITS since 2002 as a thought leader on many successful industry initiatives. These have included leading the teams that compiled IRP #7, IRP #8, Chemical classification, Contractor Management and currently is involved with the Fit for Duty initiative.

Rick is also the Canadian director of operations for RONEsoft software company and one of the founders. His professional education has included becoming a Petroleum Engineering Technologist, a Registered Environmental Manager and a Canadian Registered Safety Professional.

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Objectives

3 key objectives of today’s webinar:

- Incident investigation and incident analysis are not the same thing
- Incident analysis doesn’t have to be complicated
- Corrective actions should be validated
Pragmatic Resource Investment

- Should all Unplanned Events be fully investigated?
- Which Unplanned Events are worth investing resources in to prevent reoccurrence?
- Sustainable Organizational Learning requires systems / processes BUT there’s a fine line between added value processes and bureaucracy.

Poll #1: Does your organization investigate all incidents?

<table>
<thead>
<tr>
<th>Choices</th>
<th>Responses</th>
<th>Percentage of Total Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>15</td>
<td>42%</td>
</tr>
<tr>
<td>No</td>
<td>9</td>
<td>25%</td>
</tr>
<tr>
<td>Depends on the consequences</td>
<td>12</td>
<td>33%</td>
</tr>
</tbody>
</table>
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Event / Action Process Overview

Unplanned Event

- Significant & Preventable
  - YES
  - Causal Analysis (If Required / Possible)
    - YES
      - Immediately Preventable?
        - YES
          - Preventive / Corrective Action
          - Validate Corrective Actions
        - NO
          - Significant Not Preventable
            - Consequence Management
            - OR / AND
              - Long Lead Corrective Action
              - Record and trend
      - NO
        - Potential problematic wrt Human Failure issues

- NO

Significant & Preventable?

- YES

Preventive / Corrective Action

- NO

Record and trend

The Investigation

- Input Data
- Analysis
- Implementation
- Quality Assurance
- Quality Control
- Learning Metrics
  - Key Performance Indicators

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Poll #2: Do you believe that there is a different skillset needed in order to Investigate versus Analyze Unplanned Events?

<table>
<thead>
<tr>
<th>Choices</th>
<th>Responses</th>
<th>Percentage of Total Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>2</td>
<td>6%</td>
</tr>
<tr>
<td>No but some events require SMEs</td>
<td>2</td>
<td>6%</td>
</tr>
<tr>
<td>Yes investigations have a process of their own</td>
<td>5</td>
<td>15%</td>
</tr>
<tr>
<td>Yes investigations and analysis are two different skills</td>
<td>24</td>
<td>73%</td>
</tr>
</tbody>
</table>

Investigation Process Anatomy

- Secure scene
- Initial reporting
- Form team
- Develop investigation plan
- Collect data / materials / information / evidence / statements
- Information Quality Assurance
- HEAR
- Two Box
- HPA (Human Performance Analysis)
- 5-WHY
- Sophisticated cause & effect analysis e.g. TapRoot, Apollo, etc.
- Develop corrective action(s)
- Quality Control on Corrective Actions
- Gain approvals
- Finalize incident report
- Implement corrective action(s)
- Monitor & report status of corrective action(s)
- Communicate Lessons Learned (internally & externally)
- Evaluate & Measure organizational learning (KPIs)
- Ongoing audit & verification
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Types and Reliability of Materials

- Physical materials
  - Parts / Equipment / Structure
  - Paper / Digital
  - Environment
  - Patterns
  - Positions

- People’s recollections
  - On-scene
  - Off-scene

Most Reliable

Least Reliable

Sample Interview Questions

- Please tell me what happened.
- What were the initial conditions?
- What were you doing just before the event?
- What were you doing during the event?
- What was the timing of the event?
- How did you find out about the event?
- How did you know what to do when you saw ___?
- List and explain any equipment that was not working properly.
- List and explain any equipment that was not labeled properly.
- Timing of events
- Location of event within the facility
- Environmental conditions
- Histories of similar incidents
- Training and competence
- Preparation of equipment
- Use of JSAs, TBTs, permits, etc
- Use and condition of equipment and PPE such as goggles, boots, fall protection, etc
- Relative positions of actors / victim(s)
- Anything moved / repositioned
- Actions of other people
- Emergency response activities
- What other individuals were in the area?
- Where were they?
- What were they doing?
- What were the environmental conditions?
- What communications did you have with others in the area?
- Any training or preparation issues?
- Were there any JSAs, SCPs, permits, other management processes, etc. applicable to this work?
- Were they referenced?
- When was the last time you saw them?
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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

Investigation Process Anatomy

- Unplanned Event
  - Gather Information
    - Secure scene
    - Initial reporting
    - Form team
    - Develop investigation plan
    - Collect data / materials / information / evidence / statements
  - Analysis
    - Information Quality Assurance
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  - Corrective Actions
    - Develop corrective action(s)
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H-E-A-R Components

- **Harm**: Actual or potential consequences resulting from the unplanned event
- **Unplanned Event**: The point where things diverged from expectations
- **Acts or Conditions**: What caused or allowed an unplanned event to occur
- **Reasons**: Why acts were committed or conditions existed

Resource Efficient Analysis

- **Event Complexity**
  - LOW
  - MED
  - HIGH

- **Effort Required**
  - LOW
  - MED
  - HIGH

- **Resource Efficiency**
  - LOW
  - MED
  - HIGH

- **Cause & effect analysis tools**
  - “X” Why
  - 1 Why
  - Two Box
Case Study: Equipment Container

The design of an equipment transport container includes a piston cylinder to hold the lid open and a chain to keep it from opening too far.

As workers were unloading a new container on site the chain twisted and the box lid did not open to a stable position. This particular container had no piston cylinder fitted, so when the lid was caught by a gust of wind it fell, landing on one of the worker’s hands and amputating 3 of his fingers.

The warehouse team had not noticed that the container was missing a piston cylinder before shipping it out.
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Case Study: Equipment Container

<table>
<thead>
<tr>
<th>Harm</th>
<th>Worker injury, down time, mental anguish</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unplanned Event</td>
<td>The container lid fell</td>
</tr>
<tr>
<td>Acts and / or Conditions</td>
<td>Container lid did not have a piston cylinder fitted</td>
</tr>
</tbody>
</table>

Reasons

Case Study: Equipment Container

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<tr>
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<tr>
<td>Acts of People</td>
<td>Warehouse shipped the container with no piston cylinder fitted</td>
</tr>
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</table>

Reasons
## Investigating Unplanned Events In A Fraction Of The Time Currently Spent (Including Near Misses)

### Case Study: Equipment Container

#### Step 1: What is happening now? *(Undesirable Acts of People)*

<table>
<thead>
<tr>
<th>Warehouse shipped the container with no piston cylinder fitted</th>
</tr>
</thead>
<tbody>
<tr>
<td>Procurement did not specify piston cylinders on new containers</td>
</tr>
</tbody>
</table>

#### Step 2: What will happen in the future? *(Desired Acts of People)*

<table>
<thead>
<tr>
<th>Warehouse will not ship containers with no piston cylinder fitted</th>
</tr>
</thead>
<tbody>
<tr>
<td>Procurement will specify piston cylinders on all new containers</td>
</tr>
</tbody>
</table>

#### Step 3: Develop an achievable Corrective Action that will result in this behavior change in the real world.

- Corrective Action
  - Relevant and effective in preventing the unplanned event
  - The vPSI Test™

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Resource Efficient Analysis

- **Effort Required**
  - **LOW**
  - **HIGH**

- **Event Complexity**
  - **LOW**
  - **HIGH**

- **Resource Efficiency**

**1-Why (Human Performance*)**

- **Slip**
- **Lapse**
- **Mistake**
- **Violation**

- **Focus**
- **Verify**
- **Inform**
- **Motivate**

---

Case Study: Electrician on Ladder

An electrician was sent to repair a ceiling light fixture at a site 30 minutes away from the workshop. He took a 6-foot ladder with him but was surprised to discover the ceiling was 12 feet high. He stepped on the top rung of the ladder to try to reach the fixture, and his foot slipped off. He fell to the floor and broke his left ankle.

Harm: Broken ankle, down time, reputation damage

Unplanned Event: Electrician fell off ladder

Acts of People: Electrician stepped on top rung instead of getting a taller ladder

Reasons: 

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Case Study: Electrician on Ladder

Step 1: What is happening now? (Undesirable Acts of People)
- Electrician is stepping on top rung instead of getting a taller ladder

Step 2: What will happen in the future? (Desired Acts of People)
- Electrician will not step on top rung of ladder and will get the proper ladder for the job

Step 3: Develop an achievable Corrective Action that will result in this behavior change in the real world.

The vPSI Test™
### Case Study: Electrician on Ladder

<table>
<thead>
<tr>
<th>People / Undesired Acts</th>
<th>Slip</th>
<th>Lapse</th>
<th>Mistake</th>
<th>Violation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Planner did not provide ladder requirement or ceiling height on job card</td>
<td>Planner was distracted while filling out online job card</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>People / Desired Acts</th>
<th>Focus</th>
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<th>Inform</th>
<th>Motivate</th>
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<tbody>
<tr>
<td>Planner will provide ladder requirement or ceiling height on job card</td>
<td></td>
<td></td>
<td>?</td>
<td></td>
</tr>
</tbody>
</table>

**Corrective Action**

- Make ceiling height a required field in the online job order system so the job cannot be issued without it

---

### Case Study: Electrician on Ladder

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<th>Violation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electrician stepped on the top rung of the ladder instead of getting a taller ladder</td>
<td></td>
<td></td>
<td>Electrician took the wrong ladder when he left the shop</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
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<th>Focus</th>
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<tbody>
<tr>
<td>Electrician will not step on the top rung of the ladder</td>
<td></td>
<td></td>
<td>?</td>
<td></td>
</tr>
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**Corrective Action**

- Provide ceiling height information on the job order
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</tr>
</thead>
<tbody>
<tr>
<td>Electrician stepped on the top rung of the ladder instead of getting a taller ladder</td>
<td></td>
<td></td>
<td></td>
<td>Electrician did not follow ladder policy</td>
</tr>
</tbody>
</table>

<table>
<thead>
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<th>Focus</th>
<th>Verify</th>
<th>Inform</th>
<th>Motivate</th>
</tr>
</thead>
<tbody>
<tr>
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<td></td>
<td></td>
<td></td>
<td>?</td>
</tr>
</tbody>
</table>

Corrective Action

<p>| |</p>
<table>
<thead>
<tr>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>?</td>
</tr>
</tbody>
</table>

Example Human Failure Corrective Actions*

Person did something other than what they intended to do OR Person acted as they intended, but should have done something else to satisfy our expectations

- Inadvertent At-Risk Action
  - Action Error
  - Person believed act to be correct
  - Thinking Error
  - Person knew act was not correct

- Deliberate At-Risk Action

Slip ➔ Focus
Lapse ➔ Verify
Mistake ➔ Inform
Violation ➔ Motivate

* Note these are only Corrective Actions when validated against a specific Unplanned Event
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Investigation Process Anatomy

Unplanned Event → Gather Information → Analysis → Corrective Actions → Communicate & Measure

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**Communicate & Measure**

Validation of Corrective Actions

**Corrective Action**

Relevant and effective in preventing the unplanned event

+ that addresses Human Factors (reliably, in real life)

It MUST be possible to identify a cause and effect relationship between an activity presented as a Corrective Action and the desired result.

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The vPSI Test™

Evaluation of activities presented as Corrective Actions

- Cause something to happen
- Relevant and effective in preventing the unplanned event
- Quality of the Corrective Action

There MUST be a demonstrable cause & effect relationship between an activity and the desired result

<table>
<thead>
<tr>
<th>P</th>
<th>S</th>
<th>E</th>
<th>T</th>
</tr>
</thead>
<tbody>
<tr>
<td>People</td>
<td>Schedule</td>
<td>Event</td>
<td>Type</td>
</tr>
</tbody>
</table>

Responsibility Competence Authority Reasonable Timeframe In the real life work context

Measuring Learning

One-time application of learning is OK

Apply to current work equipment or project: Type 1

Apply to all current work, equipment or projects: Type 2
Measuring Learning

Objective: Encourage application of learnings as broadly and permanently as applicable and practicable

Long-lasting business process or management system changes: **Type 3**

This is organizational learning

Poll #3: Has your C-Suite asked you for leading indicators in their regular statistics results?

<table>
<thead>
<tr>
<th>Choices</th>
<th>Responses</th>
<th>Percentage of Total Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>4</td>
<td>17%</td>
</tr>
<tr>
<td>Yes but want more tangible measurements</td>
<td>6</td>
<td>25%</td>
</tr>
<tr>
<td>Yes but do not understand what they are asking</td>
<td>2</td>
<td>8%</td>
</tr>
<tr>
<td>Yes but organization does not have the capacity/capability to produce</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>Yes and includes B, C, and D above</td>
<td>12</td>
<td>50%</td>
</tr>
</tbody>
</table>

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<table>
<thead>
<tr>
<th>Future Webinar</th>
</tr>
</thead>
<tbody>
<tr>
<td>Please join us for the sequel:</td>
</tr>
<tr>
<td>• Using Performance Measurements to keep you on the right track</td>
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Questions?

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