Safety Culture Metrics:
Funded by EnCana

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Workshop program

- Introduction and overview
- Culture and safety
- Safety culture improvement model
- Safety culture metrics
- Conclusions
Cross industry experience
Piper Alpha

The Public Inquiry into the Piper Alpha Disaster
The Hon Lord Cullen
Ubiquitous cause of negative events

Coast Guard slams exploded Gulf rig's owner for 'poor safety culture'

Government panel blasts lack of 'safety culture' in nuclear accident

LACK of a "health and safety" culture at Macclesfield Borough Council and an outdated water system at the Leisure Centre have been blamed

A recent consultant's report found that the city's injury rate for the last few years is three times ... I suspect that a poor safety culture is to blame

Hospital's poor safety culture blamed for deaths of stomach patients

Report on Fatal Plane Crash Blames Safety Culture ... The report points to the airline's poor safety culture as responsible for many of the failures.
Why focus on culture?

- Safety management system not effective unless accompanied by a “good” safety culture
- Wish to stay alert to potential risk factors that increase the risk of a major disaster
- Pro-active approach involving self-assessment and feedback of less visible elements of safety management system
- Desire to win “hearts and minds” to improve safety
- Alternative, leading safety performance indicator
Safety culture definitions

- “The attitudes, beliefs and perceptions shared by natural groups as defining norms and values, which determine how they act and react in relation to risk and risk control systems” – Hale (2000)

- “Those aspects of organisational culture which will impact on attitudes and behaviour related to increasing or reducing risk” – Guldenmund (2000)

- “Organisations with a positive safety culture are characterised by communications founded on mutual trust, by shared perceptions of the importance of safety and by the efficacy of preventive measures.” ACSNI
## Regulator definitions

<table>
<thead>
<tr>
<th>Regulator</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>NEB/ C-NLOPB/CNSOPB</td>
<td>Safety culture is defined as the attitudes, values, norms and beliefs which a particular group of people share with respect to risk and safety.</td>
</tr>
<tr>
<td>Transport Canada SMS working group</td>
<td>The safety culture of an organization is the result of individual and group values, attitudes, perceptions, competencies and patterns of behaviour that determine the commitment to, and the style and proficiency of, an organization’s health and safety management system.</td>
</tr>
<tr>
<td>BSEE</td>
<td>The BSEE defines safety culture as the core values and behaviors resulting from a collective commitment by leaders and individuals to emphasize safety, over competing goals, to ensure protection of people and the environment.</td>
</tr>
</tbody>
</table>
Culture and Safety

Safety Culture → Norms and Behaviour → Safety Outcomes

Safety Culture → Enabler/Barrier → Safety Interventions
Safety culture and injury rates

- Safety culture questionnaire responses have been linked with accident rates in the following industries:
  - Nuclear power (Lee, 1998)
  - Offshore oil (Mearns, Flin, Fleming & Gordon 1997)
  - Road construction (Niskanen, 1994)
  - Chemical industry, (Donald & Canter, 1994)
  - Manufacturing, (Brown & Holmes 1986), (Zohar, 2000)
Safety culture and behaviour
Safety culture threats

Graphic courtesy of the NEB
Safety culture and disasters

- Reviewed 17 offshore disasters to identify cultural causal factors
- 14 disasters contained cultural causes
  - Tolerance of inadequate systems and resources (identified 10 times)
  - Normalization of deviance, (identified 9 times)
  - Complacency, (identified 8 times)
  - Work pressure/ cost (identified 4 times)
Safety culture protection

Graphic courtesy of the NEB
Safety culture protection

Graphic courtesy of the NEB
Safety culture improvement system

- Safety culture vision
- Audit
- Responsibilities
- Plans and actions
- Assessment
- Review and refine

Dr. Mark Fleming Saint Mary’s University
Safety culture vision

- Similar to general health and safety policy
- States the desire to continuously strive to improve the safety culture in pursuit of perfection
- May include a definition of a positive (ideal) safety culture
Responsibilities

- Defines responsibility and accountability for key groups in creating and maintaining a positive safety culture
  - Managers
  - Supervisors
  - Contractor management
  - Non managerial staff
- Presents a safety culture framework
## Plans and actions

- Review current practices (e.g. using safety culture planning tool)
- Sets short and long term safety culture improvement objectives
- Specifies processes to promote a positive safety culture
- Links with other aspects of the SMS (e.g. training, incident reporting)
Creating plans and strategies

- Change management systems to support the desired culture
- For example perceived management commitment can be improved by:
  - Providing managers with the skills to be effective safety leaders
  - Motivating managers to change by monitoring performance (leading indicators)
  - Rewarding effective performance
Safety culture planning tool (SCPT)

- SCPT developed to enable organisations to identify safety culture improvement strategies
- Based on extensive literature review and practice
- Rational for SCPT:
  - Employee perceptions are based in reality
    i.e. perceptions of management commitment reflect their interactions with managers
  - Organisations with different cultures have different practices
  - Safety culture improvement involves system change
    e.g. perceptions of management commitment is improved through training and evaluating leadership practices
SCPT elements

- Organisational learning
  - Incident Investigation Team
- Workforce involvement
  - Workforce Involvement
- Training
  - Frontline Worker Safety Training
  - Supervisor Safety Training
  - Manager Safety Training
SCPT elements

- Safety performance evaluation
  - Manager Safety Performance Evaluation
  - Supervisor Safety Performance Evaluation

- Communication
  - Safety Communication

- Commitment to safety
  - Planned Maintenance
  - Rules and Procedures
  - Managers Visiting the Worksite
  - Supervisors Visiting the Worksite
## Sample: Commitment to safety

<table>
<thead>
<tr>
<th>Managers Visiting the Worksite</th>
<th>Select level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Managers do not visit worksite to specifically discuss safety</td>
<td>0</td>
</tr>
<tr>
<td>Managers visit worksite regularly to discuss safety as specified by a formal policy/program (e.g. STOP)</td>
<td>1</td>
</tr>
<tr>
<td>There is a formal manager worksite visit program that specifies the number of visits to be conducted by each manager and tracks completion.</td>
<td>2</td>
</tr>
<tr>
<td>There is a comprehensive program that specifies how to perform a worksite visit, trains managers how to conduct a visit, evaluates managers to ensure they are competent and tracks frequency of visits and close out of actions.</td>
<td>3</td>
</tr>
<tr>
<td>There is a comprehensive program described above plus the quality of the managers’ visits is evaluated by workers and anonymous feedback is provided.</td>
<td>4</td>
</tr>
</tbody>
</table>
## Sample: Supervisor Training

<table>
<thead>
<tr>
<th>Front line Supervisor Safety Training</th>
<th>Select level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supervisors do not receive health and safety training</td>
<td>0</td>
</tr>
<tr>
<td>Supervisor safety training is limited to informing supervisors about their responsibilities as specified by legislation and safety program</td>
<td>1</td>
</tr>
<tr>
<td>Supervisors are offered fundamentals of safety course (which covers more than just system or legal responsibilities).</td>
<td>2</td>
</tr>
<tr>
<td>Supervisors are trained to be effective safety leaders, through skill based training and development (course must include leadership practice e.g. role play or leadership demonstration based on real life scenario by senior leader)</td>
<td>3</td>
</tr>
<tr>
<td>Supervisor safety leadership training and development tailored to individual needs, as identified through 360 degree evaluation. Ongoing coaching is provided Training varies between supervisors based on individually identified needs</td>
<td>4</td>
</tr>
</tbody>
</table>
How to use SCPT

- Self assessment of systems supporting the safety culture
  - Completed by safety department to assist in annual planning
  - Completed by senior management team to form basis for improvement workshop
  - Self assessment
Assessment

- **Episodic (biannual)**
  - Multi method safety culture assessment (e.g. questionnaire, interviews, document review)

- **Continuous**
  - Safety culture metrics
    - Capturing the markers left by safety culture on daily operations (e.g. the quality of safety reports)
Episodic assessment

- Perceptual indicators
  - Questionnaire
  - Workshops

- Organisational level indicators
  - Safety culture audit
    - Self assessment by senior administrator responsible
    - Independent audit via document analysis, interview and observation
Good indicators

- **Accurate**
  - Direct relationship with system status
  - Difficult to manipulate

- **Predictive**
  - Related to future system states and performance

- **Current**
  - Real time information
Safety climate questionnaires

- **UK HSE**
  - Health and Safety Climate Survey Tool (71 items)

- **Multi-level Safety Climate Survey**
  - 34 items (Zohar & Luria, 2005)

- **Safety Management Questionnaire**
  - 38 items (Fleming, 2000)

- **IAEA Safety Culture Perception survey**
Assessment

Traditional approach

Organisational environment

Culture perceptions

Safety behaviour

• Management practices
  • Safety systems
  • Communication
  • Supervision practices

• Management attitude toward safety
  • Production pressure
  • Status of safety
  • Supervisor attitude

• Complying with rules and procedures
  • Risk taking
  • Encouraging others to work safely
Alternative approach

Organisational environment

Culture perceptions

Safety behaviour

• Management practices
  • Safety systems
  • Communication
  • Supervision practices

• Management attitude towards safety
  • Production pressure
  • Status of safety
  • Supervisor attitude

• Complying with rules and procedures
  • Risk taking
  • Encouraging others to work safely

Audit and metrics assess
### Assessing safety culture via indicators

- Indirect ‘assessment’ of safety culture by determining the presence of systems that promote a positive culture
- Systematically determine the presence or absence of processes to promote a positive safety culture
  - Use a valid safety culture framework (e.g. IAEA)
  - Review documents and interview key informants
- Systematically seek evidence of the outcomes of a positive safety culture
  - Review documents (e.g. safety reports)
  - Observe meetings, Interview managers and employees
Continuous assessment

- Safety culture metrics
  - Continuous safety culture improvement indicator
  - Tracks the output of safety culture
  - Provides a simple indication of change over time
  - Focuses on the key aspects of safety culture
## How metrics were developed

- Reviewed safety culture frameworks
- Identified common dimensions
- Described what a positive culture would look like
- Brain stormed indicators
- Created draft set of metrics
- Revised bases on steering group feedback
Safety culture dimensions

- Leadership commitment to safety
  - Words, actions and decisions
- Employee empowerment and accountability
  - Active engagement of employees
- Resiliency
  - Capacity to manage risk and change
- Vigilance
  - Learning from events, encourage reporting
# Metrics by dimension

<table>
<thead>
<tr>
<th>Leadership</th>
<th>Empowerment and Accountability</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Presence of safety in daily meetings</td>
<td>• Quality of employee peer observations.</td>
</tr>
<tr>
<td>• Speed of management response to employee safety concerns</td>
<td>• Quality of safety observations of manager behavior.</td>
</tr>
<tr>
<td>• Quality of feedback employee receives when they raise a safety concern</td>
<td>• Compliance with rules and procedures</td>
</tr>
<tr>
<td>• Quality of explanation for sensitive safety decisions</td>
<td>• Involvement of employees in development of procedures</td>
</tr>
<tr>
<td>• Quality of interaction between managers and frontline workers.</td>
<td></td>
</tr>
<tr>
<td>• Quality of interaction between managers and supervisors.</td>
<td></td>
</tr>
<tr>
<td><strong>Metrics by dimension</strong></td>
<td></td>
</tr>
<tr>
<td>--------------------------</td>
<td></td>
</tr>
<tr>
<td><strong>Resiliency</strong></td>
<td></td>
</tr>
<tr>
<td>• Emergency maintenance</td>
<td></td>
</tr>
<tr>
<td>• Unplanned delays</td>
<td></td>
</tr>
<tr>
<td>• Effectiveness of corrective action process</td>
<td></td>
</tr>
<tr>
<td>• Compliance with management of change process</td>
<td></td>
</tr>
<tr>
<td>• Effectiveness of management of change process</td>
<td></td>
</tr>
<tr>
<td>• Bypassing critical control interlocks</td>
<td></td>
</tr>
<tr>
<td><strong>Vigilance</strong></td>
<td></td>
</tr>
<tr>
<td>• Timely completion of improvement actions</td>
<td></td>
</tr>
<tr>
<td>• Insight gained from management inspections/observations</td>
<td></td>
</tr>
<tr>
<td>• Quality of near miss reports</td>
<td></td>
</tr>
</tbody>
</table>
## Sample metrics

<table>
<thead>
<tr>
<th>Number</th>
<th>Dimension</th>
<th>Metric criteria</th>
<th>Metric data collection</th>
<th>Rating</th>
<th>Metric score</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Leadership</td>
<td>The amount and degree of integration of safety discussion in operational meetings is a reflection of leader priority for safety. Ideally safety will be discussed as a part of every item on the agenda.</td>
<td>Review minutes/ notes/ action items from daily operational meetings. Select 10 meetings at random and review the minutes or notes and compare to previous reporting period.</td>
<td>Less discussion of safety</td>
<td>-1</td>
</tr>
<tr>
<td>9</td>
<td>Empowerment and Accountability</td>
<td>The degree of compliance to safety rules and procedures is a reflection of employee commitment to safety. The higher the degree of compliance the better.</td>
<td>Review records of management inspections and count the number of observed procedural noncompliance during the reporting period and compare to previous reporting period.</td>
<td>Less compliance (greater number of observed non compliance)</td>
<td>0</td>
</tr>
</tbody>
</table>

### Compliance with rules and procedures

<table>
<thead>
<tr>
<th>Compliance with rules and procedures</th>
<th>Rating</th>
<th>Metric score</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0</td>
<td>0.00</td>
</tr>
</tbody>
</table>
Summary statistics

<table>
<thead>
<tr>
<th>Total dis-improved</th>
<th>Total no change</th>
<th>Total improved</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>9</td>
<td>4</td>
<td>-0.15</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>2</td>
<td>0.00</td>
</tr>
<tr>
<td>0</td>
<td>4</td>
<td>0</td>
<td>0.00</td>
</tr>
<tr>
<td>4</td>
<td>1</td>
<td>2</td>
<td>-0.29</td>
</tr>
<tr>
<td>1</td>
<td>2</td>
<td>0</td>
<td>-0.33</td>
</tr>
</tbody>
</table>
Using metrics

- Review programs designed to promote a positive safety culture under key dimensions (e.g. leadership)
- Review existing metrics that map onto these programs
- Adapt metrics to fit with program
- Develop new metrics if necessary:
  - Specify key outcomes of the safety culture program
  - Identify how the desired outcome can be observed (focus on essence or quality of outcome not quantity)
  - Develop draft metrics
  - Pilot new metrics
- Collect metric data
Audit

- Assessing the implementation of safety culture improvement processes:
  - Compliance with specified plan (e.g. leadership training plan)
- Assessing the effectiveness of the processes
  - Extent to which process met desired objective (e.g. change leader behavior)
Review and refine

- Review
  - Safety culture assessment
  - Audit
  - Other safety performance information (e.g. incident reviews)
  - External (e.g. research, other organisations)
- Refine safety culture management system
Conclusions

- Safety culture research highlights the importance of organizational factors in determining human behaviour.
- Safety culture improvement requires system change.
- Leadership involvement and commitment are required for successful change.
- Safety culture metrics can provide an additional indicator of safety culture health.
- The process of customizing the metrics to your organization is an excellent way to develop a clear understanding of how current systems are designed to promote a positive safety culture.
Safety Culture Change

“Peoples attitudes and opinions have been formed over decades of life and cannot be changed by having a few meetings or giving a few lectures”

(Mao Tse Tung)