10 Steps for Developing Safety Performance Measures

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Barry S. Spurlock, Esq, CSP
Earl H. Blair, EdD, CSP

Step 1. Evaluate, Inventory and Prioritize

- Trends
- Critical Safety Initiatives
- High Impact Drivers
Tools for Identifying and **Prioritizing** Potential Measures

- Perception Surveys
- Risk Assessment
- Injury/Loss Data Analysis
- Trending/Benchmarking
- Pareto Principle

Pareto – The 80/20 Rule

Bar chart showing the rate of incidents for different issues:

- Failure to Wear PPE
- Failure to Use Lift Assist
- Lack of PM on Lift Assist
- Walking on Pallets
- Failure to Secure Product

Legend:

- #/Rate of Incidents
Pareto – The 80/20 Rule

% of Injuries/Rate By Cause

- Walking on Pallets: 33.3%
- Lack of PM on Assists: 25.9%
- Failure to Use Lift Assist: 20.7%
- Failure to Wear PPE: 11.1%
- Failure to Secure Product: 9%

Step 2: Verify Efficacy of Hazard Controls
ID Obstacles

- Ensure Efficacy of Existing Controls
- Implement Needed Controls
- Identify System and Cultural Blocks
“Before becoming a KPI, a performance measure **needs to be tested** to ensure that it creates the desired behavioral outcome…” [emphasis added]


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**Key Questions**

- Does the intervention/hazard control really work?
- Does measuring the control drive superior performance?
- Is the measure a focal point?
Most Common Drivers of Safety Performance - 2015 ASSE SeminarFest

- Audits: 4
- Management Support/Engagement: 4
- Preventive Maintenance Activities: 3
- Safety Meetings: 3
- SOPs/Manuals/Policies: 2
- Safety Communications: 2
- PPE: 2
- Employee Accountability: 2
- Management Led Stretching Prgm/Stretching: 2

Tools

- Pareto Analysis
- Perception/Climate Surveys
- Performance Ratios
- SPC
- Correlation
Training Evaluation Instruments

- Level One – Reaction
- Level Two – Learning Results
- Level Three – Application
- Level Four – Business Impact & Return on Investment

(adapted from Phillips & Stone)

Training Evaluation

Value

Level of Training Evaluation Sophistication
Measuring Knowledge Change

KC = \frac{Ka}{Kb}

KC = Knowledge Change
Ka = Knowledge after training
Kb = Knowledge before training

Evaluating Training: Knowledge

Knowledge Transfer Ratio = \frac{Post Training Score – Pre Training Test Score}{Possible Score – Pre Test Score}
Measuring Skill Change

\[ SC = \frac{Sa}{Sb} \]

- \( SC \) = Observable change in skill as a result of training
- \( Sa \) = Skill demonstration after training; output / critical items
- \( Sb \) = Skill before training based on same criteria as \( Sa \)

Measuring Attitude Change

\[ AC = \frac{Aa}{Ab} \]

- \( AC \) = Attitude Change
- \( Aa \) = Attitude after training
- \( Ab \) = Attitude before training
Measuring Performance Change

PC = \frac{Pa}{Pb}

PC = Performance Change
Pa = Performance after training
Pb = Performance before training

SPC

Monthly Accident Control Chart

<table>
<thead>
<tr>
<th>Month</th>
<th># of Accidents</th>
</tr>
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<tbody>
<tr>
<td>J</td>
<td>Series1</td>
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<tr>
<td>F</td>
<td>18</td>
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<tr>
<td>M</td>
<td>23</td>
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<td>A</td>
<td>14</td>
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<tr>
<td>M</td>
<td>17</td>
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<td>J</td>
<td>21</td>
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<td>A</td>
<td>33</td>
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<tr>
<td>O</td>
<td>25</td>
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<td>N</td>
<td>22</td>
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<td>D</td>
<td>12</td>
</tr>
<tr>
<td>N</td>
<td>12</td>
</tr>
<tr>
<td>D</td>
<td>10</td>
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</table>

UCL
mean
LCL
Correlations

- Strong Positive Correlation
- Weak Positive Correlation
- Strong Negative Correlation

Correlations – The Numbers

<table>
<thead>
<tr>
<th>Strong Negative</th>
<th>No Correlation</th>
<th>Strong Positive</th>
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<tbody>
<tr>
<td>-1</td>
<td>0</td>
<td>+1</td>
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</table>
Step 3: Consider Metric Owners within Organization

- Top Management
- Middle Management
- Front Line Supervisor
- Employee

Organizational Level

- Top Management: MACRO
- Middle Management: MACRO / micro
- Front Line Supervisors: macro / MICRO
- Employees: MICRO

More Results Oriented

More Activity Oriented
Organizational Level

- Top Management
  - MACRO
- Middle management
  - MACRO / micro
- Front Line Supervisors
  - macro / MICRO
- Employees
  - MICRO

Need for Engagement

Need for Data Collection Integrity

Ability to Achieve Statistical Reliability

More Timely Feedback
<table>
<thead>
<tr>
<th>Level of Org. Chart</th>
<th>Micro or Macro Focus</th>
<th>Activity or Outcome</th>
<th>Ability for Statistical Accuracy</th>
<th>Need for Data Integrity</th>
<th>Need for Employee Engagement</th>
<th>Need for Timely Feedback</th>
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</thead>
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<tr>
<td>Top Mgmt.</td>
<td>Macro</td>
<td>Outcome</td>
<td>High</td>
<td>Lower</td>
<td>Lower</td>
<td>Lower</td>
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<tr>
<td>Middle Mgmt.</td>
<td>Macro w/ some micro</td>
<td>Mix</td>
<td>Moderate</td>
<td>Moderate</td>
<td>Moderate</td>
<td>Moderate</td>
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<tr>
<td>Frontline Sup.</td>
<td>Micro w/ some macro</td>
<td>Mix</td>
<td>Moderate</td>
<td>Moderate</td>
<td>Moderate</td>
<td>Moderate</td>
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<tr>
<td>Prod. / Rank</td>
<td>Micro</td>
<td>Activity</td>
<td>Lower</td>
<td>High</td>
<td>High</td>
<td>High</td>
</tr>
</tbody>
</table>

4 Determine Simple List of Measures

Prioritize Your Most Important Safety Metrics
Simple Measures Case Study

You Can’t Measure Everything at Once!

Select and Customize a Short List of Measures

Identify Three to Five Key Measures
Gulf Platform Case Study: Hoover-Diana Project

Specific measures:
1. Safety meetings
2. Housekeeping
3. Barricade performance
4. JSA
5. Safety walks

Results (Outcome Measures)

Hoover-Diana Platform Project:

• 2 Mil. Hrs of Work
• 1 Recordable Injury
5. Identify Means for Employee Engagement

Large Brewery: SMP Measures
Employee Engagement
Important Distinctions about SMP

- **Scorecards:** Employees are “score-carded” for safety
- **Quotas:** Employees are given a quota for safety activities, however...
- **Choices:** Employees have a choice on which safety activities they will participate in (Coors considers this a **key factor** in their success)

Anne Bevington
Individual Participation

60 pts

- Observation Cards
- Job Safety Analyses
- JSA Training
- JSA Auditing
- Safety Meetings
- Safety Audits
- Maintenance Walkthroughs
- Pre-Shift Stretching
- IH Sampling Requests
- IH Sampling Results
- Ergonomic Assessment Requests
- Ergonomic Assessment Actions
- Project Walkthroughs
- Safety Work Orders
- Incident Reviews
- Safety Visual Aids
- Hazard Alerts
- Individual Safety Initiative
- Housekeeping Audit

SMP Results (Trailing Indicators)

- Average SMP Score for plant 83
- 1 Million Hours w/o Lost Time July 2004 and again in March 2005
- LWCIR 2005 < 1
- Total Case 2005 - 2.4

Anne Bevington
6. Develop Methods and Tools

- Checklists
- Audits
- Observations
- Surveys
- Scorecards
- Dashboards
- Audit Reports
- Inspections

### Example Safety Scorecard

<table>
<thead>
<tr>
<th>Category</th>
<th>Measurement</th>
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<tbody>
<tr>
<td>Safety Work Orders</td>
<td># or % Completion</td>
</tr>
<tr>
<td></td>
<td># or % Completed on Time</td>
</tr>
<tr>
<td>Safety Coaching</td>
<td># of Observations</td>
</tr>
<tr>
<td></td>
<td>% Safe</td>
</tr>
<tr>
<td>Safety Committee Activity</td>
<td># of Meetings</td>
</tr>
<tr>
<td></td>
<td># of Audits</td>
</tr>
<tr>
<td></td>
<td># Completed Projects</td>
</tr>
<tr>
<td>Supervisor Activity</td>
<td># or % Training Completed</td>
</tr>
<tr>
<td></td>
<td># or % JSA Completed/ Updated</td>
</tr>
<tr>
<td>Housekeeping</td>
<td>Cleanliness Score</td>
</tr>
<tr>
<td></td>
<td>Maintenance Score</td>
</tr>
</tbody>
</table>
7. Develop Delivery Strategies

8. Set Performance Goals

- Specific
- Measurable
- Actionable
- Realistic
- Timely
- Aim High
- Employee Engagement
Alcoa Case Study Demonstrates Meeting Compliance Goals

Measures Critical Processes

100% Compliance Expected

Monitored Regularly with Feedback

Compliance Case Study: Requires 100% Compliance

Measures **Critical Four** Safety Processes

Must have 100% Compliance to be Acceptable

Monitors Regularly and Provides Timely Feedback
### Compliance Example: Leading Indicators

<table>
<thead>
<tr>
<th>Location</th>
<th>Comp with Procedures</th>
<th>Documented Obs</th>
<th>Latest Results</th>
<th>Comp with Procedures</th>
<th>Documented Obs</th>
<th>Latest Results</th>
<th>Comp with Procedures</th>
<th>Documented Obs</th>
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<th>Comp with Procedures</th>
<th>Documented Obs</th>
<th>Latest Results</th>
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<td>No</td>
<td>No</td>
<td>No</td>
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<td>Cleveland Works</td>
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<td>Yes 98.36%</td>
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<td>Yes 97%</td>
<td>Yes 98.36%</td>
<td>Yes</td>
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<td>Yes 98.36%</td>
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<td>Cover Operations</td>
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<td>Yes 100%</td>
<td>Yes 100%</td>
<td>Yes</td>
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<td>Yes 100%</td>
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<td>Yes</td>
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<td>Yes 97%</td>
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<td>Yes 97%</td>
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<td>Yes</td>
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<td>Yes 95%</td>
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<td>Hummel/Winsted</td>
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<td>Yes 94%</td>
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<td>Yes</td>
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</tr>
</tbody>
</table>

### 9. Monitor Safety Progress

- Look for Correlations with Injury Trends
- Engagement of Employees
- Improved Systems
10. Adjust and Modify for Continuous Improvement

Concluding Activity

Directions: We would like to conclude with an opportunity for you to draft a blueprint for your organization. You can ask questions from the Instructors or other Participants.

1. Do you have a safety measure you use at your organization but you are uncertain if it is effective? Would you like some feedback?

1. Would you like to share a success story regarding a safety measure that drives success that other participants might find helpful?
Questions

• earl@blairspurlock.com
• barry@blairspurlock.com
  — (502) 595-7227

Appendix A

REFERENCES AND READING
References & Recommended Reading


References & Recommended Reading

Daniels, Aubrey C., Bringing Out the Best in People: How to Apply the Astonishing Power of Positive Reinforcement, McGraw-Hill: 1994


FranklinCovey: The 4 Disciplines of Execution, 2006.


Krause, Thomas R., Safety Incentives from a Behavioral Perspective, Ch.21 in Current Issues in Behavior-Based Safety, BST, 1999


References & Recommended Reading


Woerz, Paul, Personal Correspondence, 2006.

Appendix B

CALCULATIONS
UCL / LCL Calculations for #s of Events / Samples

- 95% Statistical Significance = 2 std. deviations from mean = 1.96 = normal distribution
- UCL = \( x + \text{normal dist. (std. deviation of population)} \)
- LCL = \( x - \text{normal dist. (std. deviation of population)} \)
- \( X = \text{mean} \)
- \( Z = \text{normal distribution} \)
- \( S = \text{Std. Deviation of Population} \)

UCL / LCL Calculations for Proportions / %

- 95% Statistical Significance = 2 std. deviations from mean = 1.96 = normal distribution
- UCL = \( p + 1.96[p(1-p)/n]^{0.5} \)
- LCL = \( p - 1.96[p(1-p)/n]^{0.5} \)
- \( p = \text{mean proportion} \)
Standard Deviation

* If only a sample of population.

\[
\text{Standard Deviation} = \sqrt{\frac{\Sigma (v_1 - \text{mean})^2 + (v_2 - \text{mean})^2 + \ldots}{n - 1}}
\]

* If entire population sampled.

\[
\text{Standard Deviation} = \sqrt{\frac{\Sigma (v_1 - \text{mean})^2 + (v_2 - \text{mean})^2 + \ldots}{n}}
\]
Pearson Correlation Coefficient

\[ r = \frac{n(\Sigma xy) - (\Sigma x)(\Sigma y)}{\sqrt{[n\Sigma x^2 - (\Sigma x)^2][n\Sigma y^2 - (\Sigma y)^2]}} \]

Tip: Use a Calculator with stats functions.