Implementing a Leading Indicator Management Scorecard

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Director of Industry Solutions
IHS, Inc. (formerly Syntex Management Systems, Inc.)
Presenter Background

• HSE Professional of more than 20 years in the private and public sector
  – Industrial Hygiene and Employee Health Manager
  – HSE Manager
  – OSHA Compliance Officer

• IHS, Inc. (formerly Syntex Management Systems, Inc.)
  – Formerly - Account Manager with PPG, Shell, Valero, ConocoPhillips, etc.
  – Currently - Director of Industry Solutions
It is my pleasure to announce that Syntex Management Systems, Inc. has been acquired by IHS Inc. (NYSE: IHS – www.ihs.com).

- Headquartered in Englewood, Colorado, USA
- 4,400 colleagues in 30 countries who speak 42 different languages
- Revenue $967 million at year-end 2009
- IHS customers include nearly 70% of the U.S. Fortune 1000 and 80% of the Global Fortune 500
- Went public in 2005; publicly traded at (NYSE: IHS)
- We have tens of thousands of customers and hundreds of thousands of end-users in over 100 countries.
1995 - Syntex Management Systems, Inc. founded
   - First 5 years developed ~100 software apps in Energy industry

1997 - IMPACT born from “Risk Reduction Cycle” process pattern
   - QHSE Incidents, inspections, assessments, observations fit common pattern

2000 - Syntex commits entire business exclusively to IMPACT

The Risk Reduction Cycle “Process Pattern”

1. Discover the exposure.
   - Reactive via Incident-based Events
   - Proactive via “Assessment-based” Events

   - Risk Matrix, Hazards, Controls, Recommendations
   - Reactive = Risk Matrix, Investigations, Mgmt Systems
   - Proactive = Risk Matrix, Findings, Checklist Items

3. Execute reduction tasks.
   - Risk Reduction Action Items
Topics to Cover

• How do we know “what” to measure?
  – Using global data set and math to find leading metrics
• Design of an example leading KPI dashboard
  – Review the structure of a management-driven KPI dashboard
  – Share example leading metrics definitions / dashboard content
Mission: Find the Correct Leading KPI’s

Using a common data model
- Incidents, investigations, observations, audits, action items, etc…
- Worker involvement in above

Millions of records of data
- Spanning > 100 countries
- In 24 different languages

Users of IMPACT software
- Each company with a central database of events and actions

In 2009, statistically analyzed a “sample” data set
- Studied data from over 100 organizational units
- Defined over 200 potential “leading metrics”
- Studied correlations to outcome (loss event) metrics
  - Looking for leading metrics which affect performance outcomes
Research: Data and Math to Find Leading KPI’s

 Searching for the measurable, actionable organizational factors unique to top performers…

- **Research**
  - Customer data, SME feedback, statistical methods to find the best leading KPI’s
  - Searching for the measurable, actionable organizational factors that lead to top-tier performance

- **Implementation (actionable)**
  - Company-specific leading indicators to improve performance…
Leading Indicators - Defined

Predicators of future events?

or

Measurements of activities that reduce loss rates?

“A leading performance indicator is something that provides information that helps the user respond to changing circumstances and take actions to achieve desired outcomes or avoid unwanted outcomes.” - Leading Performance Indicators Guidance for Effective Use by Step Change in Safety
How do we know “what” to measure?
Research: The Opportunity to Correlate

(a) Exposure to Loss
   - Near Loss
   - Low
   - Med
   - Hi

(b) Leading “Events”
   (Data derived from process execution)

Leading “Factors” drawn from the organization’s behavior / treatment of QHSE risk reduction event processes

Both lagging and leading data in same IMPACT ERM® database.

IMPACT Math™ Research
- Correlate leading metrics to lagging performance
- Looking for unique measurable characteristics of best performers
The Data Set: Risk Reduction Events & Actions

Scope: The organization’s collection of ALL events that result in risk reduction...

- Over 1MM incident / near-misses
- Service / Product Quality
- Injuries / Illnesses
- Releases / Spill
- Reliability / Equipment Failure
- Asset Damage
- Security Incident
- Reputation Damage
- Other “kinds” of loss events

Centralized Database

- Millions of findings / “exposures”
  - Behavioral Safety Observations
  - QHSE Management System Audits
  - Risk Profiling / Assessments
  - VPP Self Assessments
  - Site-level “Walk-through” Audits
  - ISO 9000 Certification Assessment
  - Hazard Identification Programs
  - Hundreds of other processes

- Millions of Action Items
- Action Items Resulting in Risk Reduction
Research Result: QHSE Process-based Metrics

- Workers are engaged in reporting events – incidents, near misses, observations, etc…
- Front-line Supervisors (or SME’s) are responsive to reported issues
- SME’s are disciplined in executing processes
- Leadership promptly accepts accountability for actions
- Workers are diligent in completing action items

Interpretation: High-performing organizations engage all levels of the workforce in a collective effort to reduce risks, minimize operational errors, etc…
Research Result: QHSE Process-based Metrics

Organizational factors unique to top performers...
- Reporting culture
- Action item management
- Leadership responsiveness, accountability
- Process discipline

Best Performers
Y = Loss Rates

Worst Performers

Lowest

Highest

- Do X
  - Enable organizational leaders to measure/improve traits of BEST performers

- To achieve Y
  - Lower likelihood of major incidents, reduced rate of loss, sustained reputation, etc.
Thoughts on designing and implementing a leading KPI dashboard ….
FICO as “Model” of Actionable Leading Metrics

- **Actionable leading measurements to steer improvements…**
  - Improvement in FICO factor scores leads to improved credit rating
  - Which leads to approved loans, better interest rates, etc….

  **Analogy: Apply actionable leading metrics for line managers**
  - Such that improvement in organizational factors produces lower loss rates
  - Used by line managers as KPI’s to continuously improve Safety factors, reduce losses
**Shift Management Focus Toward Leading KPI’s**

- **The Goal:** Use Leading Metrics to drive performance
  - Focus on leading but still require a measure of the “outcome” (lagging)
    - Consider a CEO reporting profits to “the board”…
      - “We lost a bunch of money but we have a great culture – so just wait till next year”
  - **The correct leading metrics – WHAT ARE THEY?**
    - Leading indicators of “good” performance (vs. predictors of bad outcomes)
    - Measurable, repeatable, actionable by organizations / leadership

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### Managed KPI Scorecard

<table>
<thead>
<tr>
<th>Managed KPI Scorecard</th>
<th>Executive Analysis ONLY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recordable Rate (Lagging)</td>
<td>Safety Triangle Ratio (as %)</td>
</tr>
<tr>
<td>Site 1 1.50</td>
<td>37%</td>
</tr>
<tr>
<td>Site 2 3.10</td>
<td>22%</td>
</tr>
<tr>
<td>Site 3 1.70</td>
<td>83%</td>
</tr>
<tr>
<td>Site 4 1.30</td>
<td>75%</td>
</tr>
<tr>
<td>Site 5 0.95</td>
<td>93%</td>
</tr>
<tr>
<td>Site 6 5.10</td>
<td>5%</td>
</tr>
<tr>
<td>Corp Mean 2.44</td>
<td>53%</td>
</tr>
<tr>
<td>1st Quartile 0.51</td>
<td>91%</td>
</tr>
<tr>
<td>50% Level 1.75</td>
<td>63%</td>
</tr>
</tbody>
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*Push the lagging to the “side”, leading to the front…*
Traffic-lights: Benchmarks or Weighted Scale

- **Benchmarks**
  - Industry-specific
  - Membership-wide
  - Internal for large company

- **Company-specific scale**
  - Risk-based or consequence-based
  - Matrix of targets / ranges (example below)
    - Above site, lowest score rolls-up to levels above

**Managed KPI Scorecard**

<table>
<thead>
<tr>
<th>Corp Mean</th>
<th>2.44</th>
<th>53%</th>
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<tbody>
<tr>
<td>1st Quartile</td>
<td>0.51</td>
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<td>67%</td>
</tr>
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<td>22%</td>
<td>62%</td>
</tr>
<tr>
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<td>83%</td>
<td>95%</td>
</tr>
<tr>
<td>Site 4</td>
<td>1.30</td>
<td>75%</td>
<td>77%</td>
</tr>
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<td>5%</td>
<td>34%</td>
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**Most typical starting point**

- Low: 50% <40% 40%-49% >=50%
- Medium: 75% <65% 65%-74% >=75%
- High: 100% <90% 90%-99% >=100%
Approach: "Manage" the Practical Leading KPI’s

Keep it simple for today.

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<td>34%</td>
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Corp Mean | 2.44 | 53% | 68% |
1st Quartile | 0.51 | 91% | 87% |
50% Level | 1.75 | 63% | 64% |

But prepare to evolve tomorrow.

Executive Analysis ONLY

<table>
<thead>
<tr>
<th>Days to Accept 1st Action</th>
<th>Avg Days to Supv Response</th>
<th>% Incidents with Causes</th>
<th>% Lateness of Late Actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.79</td>
<td>2.10</td>
<td>24%</td>
<td>11%</td>
</tr>
<tr>
<td>5.25</td>
<td>1.40</td>
<td>17%</td>
<td>41%</td>
</tr>
<tr>
<td>17.10</td>
<td>7.50</td>
<td>54%</td>
<td>57%</td>
</tr>
<tr>
<td>7.10</td>
<td>4.10</td>
<td>72%</td>
<td>3%</td>
</tr>
<tr>
<td>22.00</td>
<td>18.30</td>
<td>46%</td>
<td>21%</td>
</tr>
<tr>
<td>5.20</td>
<td>6.10</td>
<td>64%</td>
<td>12%</td>
</tr>
</tbody>
</table>

| Corp Mean | 10.24 | 6.58 | 45% | 24% |
| 1st Quartile | 4.10 | 1.50 | 93% | 8% |
| 50% Level | 9.70 | 6.30 | 71% | 31% |

Owned by Line Managers
- choose short list of “stewarded” KPI’s
- practical, acceptable to management
- calculated / monitored on monthly basis
- accountability cascaded throughout operations leadership

Analyzed by Leadership Committee
- reviewed only by exec steer committee
- looking for interesting trends
- calculated / monitored on quarterly basis
- consideration as future “managed” KPI’s
- Iterate / review benchmarks / evolve KPI’s...
Reporting Culture

- Safety triangle metrics...
  - Near miss as % of total incidents
  - Proactive events as % of total events
- Other relevant metrics
  - % of workforce involved in reporting
  - Rate of total events reported per total hours worked
  - Distribution of workforce involved
  - Studied dozens of other reporting culture metrics...

An Advanced Consideration

- **Near Miss “Quality”**
  - % of near misses with risk rating of medium or higher
  - Measures risk reduction opportunity afforded by near misses

**Example…**
Matrix of actual consequence to risk potential

<table>
<thead>
<tr>
<th>Near Misses</th>
<th>Low Risk</th>
<th>Med Risk</th>
<th>High Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recordable</td>
<td>243</td>
<td>85</td>
<td>20</td>
</tr>
<tr>
<td>&gt; Recordable</td>
<td>1</td>
<td>1</td>
<td>3</td>
</tr>
</tbody>
</table>

Compare sites with equal near miss quantity

- Site A (above):
  - Near miss = 348
  - % ≥ med risk = 30%

- Site B:
  - Near miss = 348
  - % ≥ med risk = 2%

Better Quality of Near Misses
(more risk reduction opportunity)
Content: Action Item Management

- Metrics...
  - % of high priority actions completed prior / equal to due date
- Other relevant metrics
  - % of total actions completed on-time
  - % of events with action
  - Rate of completed actions from med-high risk items per total hours worked
  - Studied dozens of other action item metrics...

An Advanced Consideration

- All actions are not created equal
  - Actions from source events with varying risk-level
- Measuring risk reduction contribution
  - % completed weighted by risk of source event
  - Sample scale
    - Actions from high risk ➔ weight of 10
    - Actions from med risk ➔ weight of 5
    - Actions from low risk ➔ weight of 1
- Example comparison of 2 sites
  - Site A
    - Raw % on-time = 80%
    - But skewed toward easier actions from low-risk events
    - Weighted % on-time = 52%
  - Site B
    - Raw % on-time = 80%
    - A focus on completing actions from higher-risk events
    - Weighted % on-time = 92%

Better Quality of Action Items
Leadership and Process (Advanced)

- Leadership / process execution
  - Measuring “expected” organizational behavior per HSE processes
  - Example metrics
    - Accountability for action
      - Avg days to “sponsor” accept 1st action
    - Responsiveness to reported items
      - Avg days for supv to validate reported items
    - Discipline to perform incident cause analysis
      - % of incidents with root causes identified
    - Reaction to escalation of late action items
      - % of total duration for “lateness” of actions

- Use an index to avert “gaming”
  - Mix of leadership and process metrics
  - Capture overall leader commitment and process discipline

An Advanced Consideration
- Leadership-driven
  - Committee of operational and HSE leaders
  - Bi-monthly review of “advanced” metrics
  - Educate / promote desired results

- Annual performance planning
  - Review benchmarks, performance of both managed and advanced metrics
  - Consider promotion of advanced metrics to managed KPI scorecard
## Example DASHBOARD of LEADING and LAGGING INDICATORS

<table>
<thead>
<tr>
<th>Category</th>
<th>Observations</th>
<th>Incidents</th>
<th>Near Misses</th>
<th>Action Items - Incident/NM</th>
<th>High Potentials</th>
<th>Total Recordable Incident Rate</th>
<th>Lost Work Incident Rate</th>
<th>Injuries</th>
<th>Spills/Releases</th>
<th>Days Since Last Incident</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corporate-wide</td>
<td>163</td>
<td>370</td>
<td>75</td>
<td>198</td>
<td>256</td>
<td>4.8</td>
<td>3.8</td>
<td>102</td>
<td>41</td>
<td>114</td>
</tr>
<tr>
<td>Chemicals</td>
<td>8</td>
<td>10</td>
<td>4</td>
<td>2</td>
<td>5</td>
<td>4.6</td>
<td>5.1</td>
<td>1</td>
<td>1</td>
<td>114</td>
</tr>
<tr>
<td>Construction</td>
<td>1</td>
<td>14</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>1.0</td>
<td>0.0</td>
<td>3</td>
<td>2</td>
<td>638</td>
</tr>
<tr>
<td>Life Sciences</td>
<td>4</td>
<td>20</td>
<td>1</td>
<td>8</td>
<td>18</td>
<td>3.9</td>
<td>18.5</td>
<td>9</td>
<td>2</td>
<td>333</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>10</td>
<td>20</td>
<td>5</td>
<td>9</td>
<td>17</td>
<td>12.4</td>
<td>6.7</td>
<td>3</td>
<td>4</td>
<td>154</td>
</tr>
<tr>
<td>Mining</td>
<td>12</td>
<td>14</td>
<td>5</td>
<td>9</td>
<td>11</td>
<td>2.0</td>
<td>0.0</td>
<td>6</td>
<td>1</td>
<td>471</td>
</tr>
<tr>
<td>Oil &amp; Gas</td>
<td>11</td>
<td>253</td>
<td>60</td>
<td>150</td>
<td>202</td>
<td>5.0</td>
<td>1.4</td>
<td>68</td>
<td>29</td>
<td>141</td>
</tr>
<tr>
<td>Transportation</td>
<td>165</td>
<td>18</td>
<td>0</td>
<td>5</td>
<td>4</td>
<td>0.0</td>
<td>0.0</td>
<td>9</td>
<td>2</td>
<td>441</td>
</tr>
<tr>
<td>Utilities</td>
<td>6</td>
<td>13</td>
<td>0</td>
<td>3</td>
<td>12</td>
<td>2.1</td>
<td>0.0</td>
<td>3</td>
<td>0</td>
<td>164</td>
</tr>
</tbody>
</table>

### Behavior Categories

- **BBS 1.0 BODY USE / ERGONOMICS**
  - Safe: 9
  - Unsafe: 3
  - % Safe: 75%
  - % Unsafe: 25%

- **BBS 2.0 BODY POSITION**
  - Safe: 8
  - Unsafe: 3
  - % Safe: 73%
  - % Unsafe: 27%

- **BBS 3.0 TOOLS / EQUIPMENT**
  - Safe: 5
  - Unsafe: 1
  - % Safe: 83%
  - % Unsafe: 17%

- **BBS 4.0 PROCEDURES**
  - Safe: 10
  - Unsafe: 0
  - % Safe: 100%

- **BBS 5.0 WORK ENVIRONMENT**
  - Safe: 9
  - Unsafe: 0
  - % Safe: 100%

### Sources of Findings

- Annual Compliance
- Ergonomic Analysis
- Assessment
- Facility Tour
- Other PSM
- Behavioral Observation
- Agency Inspection
- Citation/Notice Of...
- ISO 14001 Certification
- Management Directive
- Risk Assessment
- VPP
- Permits
- Assurance Letter

- % of Findings:
  - Annual Compliance: 8%
  - Ergonomic Analysis: 9%
  - Assessment: 8%
  - Facility Tour: 7%
  - Other PSM: 6%
  - Behavioral Observation: 4%
  - Agency Inspection: 4%
  - Citation/Notice Of...: 4%
  - ISO 14001 Certification: 3%
  - Management Directive: 3%
  - Risk Assessment: 3%
  - VPP: 3%
  - Permits: 2%
  - Assurance Letter: 1%
Thank You!!