Practical Implementation of an Enterprise Measurement System: From Inception to Transformation

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Overview

• Organizational Background, the Measurement System, and the Case Study

• Development & Adoption

• Practical Implications

• Direction & Challenges
Background – Case Study Formulation

1. Questions

How was VBS implemented (developed and adopted) and what have been seen as the short-term and long-term advantages of this enterprise measurement system?

2. Propositions

What is the future direction of VBS, considering both past challenges and those likely to arise?

3. Unit of Analysis

Investigate emerging themes arisen through exploratory questioning

4. Logic to Support Propositions

Short-term improvements are brought front & center by real-time information and visual displays is understood (often exaggerated), the long-term challenges associated with organizational change and employee motivation are understated

5. Criteria for Interpreting Findings

Feedback & observation from 2 plant tours, 15 interviews from stakeholders, & a workshop

Business Unit, Interfaces & Relevant Stakeholders

http://lean.mit.edu
Background – The Case Study

The Company

- Corporate Revenue ~ $20B
- Business Unit: ~ 3,500 (40% union)

Raytheon

Customer Success Is Our Mission

The Measurement System

- Started from a Value Crises
- Enabled Shift from Proactive to Reactive Problem Solving
- Ended With Savings: $150M ('05-'07)
- IT Enabler for Lean Principles

Bottoms-Up, Real-time visual dashboard

http://lean.mit.edu

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Background – The Case Study

**Case Study:** 2 Plant tours, 15 interviews, 1 workshop

**Figure 1** – *Cumulative User Growth of VBS*

**Figure 2** – *Growth of Raytheon’s VBS Boundary*
Development & Adoption

Development
• Independent Functional Reporting Structure
• Draws information from ~ 40 databases (most run by IT)
• LabVIEW© Graphical Programming (quick learning curve)
• Modular Architecture (allows flexibility/trialability)

Adoption
• Fostered non-blame oriented culture
• Considered the needs of all stakeholders
• Managers & engineers accountable for considering employee feedback
• Proactive in teaching the community how to use the tool
• Total Employee Engagement
Practical Implications: Advantages

- Wealth of Data
- Visibility & Freshness of Data
- Communication
- Accountability & Feedback
- Culture of Continuous Improvement
- Employee Engagement
Practical Implications: Advantages

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Practical Implications: Employee Engagement

What is engagement???

engagement [en-geyj-muhnt] ? Show IPA

-noun
1. the act of engaging or the state of being engaged.
2. an appointment or arrangement: a business engagement.
3. betrothal: They announced their engagement.
4. a pledge; an obligation or agreement: All his time seems to be taken up with social engagements.
5. employment, or a period or post of employment, esp. in the performing arts: Her engagement at the nightclub will last five weeks.
6. an encounter, conflict, or battle: We have had two very costly engagements with the enemy this week alone.
7. Mechanics. the act or state of interlocking.
8. engagements, Commerce. financial obligations.
Practical Implications: Employee Engagement

Problem Solving

- Non-blame culture
- Long-Term Thinking
  - Long term sustained success

People & Partners

- Mutual Respect
  - *Trust
- Teamwork
  - *Motivate
  - *Feel Valuable
- *Leadership Support
  - *Provide training
  - *Empower Decision Making

Process

- Eliminate Waste

Continuous Improvement

Total Employee Engagement:
The Wisdom of the Workforce

Adapted from 4 “P” Model of the Toyota Way (Liker, 2004)
Direction & Challenges: Enterprise Expansion

How can we analyze this expanding enterprise?

**Structure:** organizational hierarchies & how different departments interact

**Function:** how people within the enterprise establish relationships & interact to get work done

**Value Delivery:** how value is created and maximized for a specifically-defined group of stakeholders

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Who owns the data?

How do engineers feel about being measured?

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Figure 2 – Growth of Raytheon’s VBS Boundary
Can we predict the effects of expanding measurement systems on the enterprise?

### Table 2 - Hypothesized Implications of VBS Engineering Annexation

<table>
<thead>
<tr>
<th>Engineering Metrics</th>
<th>Structure</th>
<th>Function</th>
<th>Value Delivery</th>
</tr>
</thead>
<tbody>
<tr>
<td>Out-of-Phase &amp; In-Phase Defect Reduction</td>
<td>Engineering departments will communicate more, with themselves, the customers, and manufacturing – in hopes of preventing problems before their weaknesses are exposed</td>
<td>More incentive for workers to ID defects proactively</td>
<td>Less re-work is needed, cost of product decreases</td>
</tr>
<tr>
<td>Root Cause ID</td>
<td></td>
<td>ID areas of improvement &amp; discrepancies can be addressed</td>
<td>Confusing or contradictory documents or issues can be addressed</td>
</tr>
<tr>
<td>CN 1st-Pass Yield</td>
<td>HESITATION TO CONSIDER MINOR CHANGES</td>
<td>Higher quality CNs</td>
<td></td>
</tr>
<tr>
<td>Engineering WIP</td>
<td>All issues considered in a timely fashion</td>
<td>QUALITY DECREASE (NOT ENOUGH TIME SPENT ON EACH ITEM)</td>
<td></td>
</tr>
</tbody>
</table>

**Quality (+)**

**Quality (-)**

**Communication**
Direction & Challenges: Four Critical Areas of Concern

1. Employee Engagement & the Aging Workforce
2. Resistance to Measurement
3. Information Misinterpretation & Management by Numbers
4. Information Saturation for Managers & Touch Laborers
1. Employee Engagement

Problems

Turnover

“When a senior nuclear weapons designer retires from the Los Alamos National Laboratory after 30 years he leaves no one in the lab who understands the design of missiles built in the 1950s and 1960s, which are still deployed in military bases worldwide” (DeLong, 2004)

Motivation

Recommendations

• Intrinsic Rewards
• Formal system of continuity
• Training Incentives

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"Mr Trimley, sir, can I have a word about the motivational artwork..."
2. Resistance to Measurement

**Problem**
Massive amounts of data collected at frequent intervals...

**Recommendations**
- Policy of using data to find solutions → don’t punish
- Allow workers to be involved in decisions regarding data collection, use & interpretation
3. Data Misinterpretation

Problem
The 2nd Order Effects of Management by Data: Don’t get lost or overconfident in the system & blind to the environment

Recommendations
- Maintain close business relationship with workers
- Have a mechanism for ensuring qualitative information can supplement data
- Thermostat approach considering thresholds
4. Information Saturation

Problems:
- Analysis by paralysis for managers
- Overwhelming employees with too many metrics

Recommendation
Measure the critical few, not the trivial many
Notes Moving Forward

• Harnessing the wisdom of the crowds – the large specialized workforce

• Myopia effect – Near term effects exaggerated, long-term effects are understated

• The use of atypical “softer” metrics in enterprise transformation
Review

- Organizational Background, the Measurement System, and the Case Study

- Development & Adoption

- Practical Implications

- Direction & Challenges

Any Questions
Background – Case Study Formulation

• **Questions**
  - *How was VBS implemented (developed and adopted) and what have been seen as the short-term and long-term advantages of this enterprise measurement system?*
  - *What is the future direction of VBS, considering both past challenges and those likely to arise?*

• **Propositions**
  - Short-term improvements are brought front & center by real-time information and visual displays is understood (often exaggerated), the long-term challenges associated with organizational change and employee motivation are less understated

• **Unit of Analysis**
  - Business unit using the measurement system and interfaces

• **Logic to Support Propositions**
  - *Feedback & observation from two plant tours, fifteen interviews from stakeholders, & a workshop*

• **Criteria for Interpreting Findings**
  - Investigate emerging themes arisen through exploratory questioning

(Yin, 2003)