PROFOUND PROJECT KNOWLEDGE

Bringing together the PMI® Talent Triangle, changes in the Sixth Edition of the PMBOK® Guide, and Edward Deming’s seminal System of Profound Knowledge, this presentation will highlight the importance of Leadership, Strategic Project Knowledge, and Team Development using multiple case studies in large, medium, and small projects.

Larry W. Smith

Systems Engineer and Project Consultant
April 27, 2018
PMI® Talent Triangle and New Adjustments – Why?

Principles of Profound Knowledge (Deming)

1. Appreciation for a System
2. Knowledge about Variation
3. Theory of Knowledge
   - Knowledge about Individuals
   - Knowledge about Teams
   - Knowledge about Programs
4. Knowledge of Psychology
5. *Added: Knowledge of Leadership*

Examples of Knowledge Capture

Summary: Reflections on Profound Knowledge
PMI® Talent Triangle

“These are the areas of competence, in which a project manager can act safely, in order to optimally fulfill his role.”

PM as Business Expert

PM as Thinker and Integrator

PM as Leader

Why did PMI make the following changes to the PMOArk® Guide 6th Edition?

- Added: Manage Project Knowledge (Executing | Integration Mgmt)
- Added: Control Resources (Monitoring and Controlling | Resource Mgmt)
- Added: Implement Risk Responses (Executing | Risk Mgmt)
- Changed: Control Stakeholder Expectations > Manage Stakeholder Engagement
- Added: Agile Practice Guide
- Increased?: Common tools grouped: Data gathering, analysis, representation, etc. (ITTOS 618 > 722)

Sources:
- PMI’s Pulse of the Profession In-depth Report: Navigating Complexity. (Effective 1 December 2015.)
1. **Create constancy of purpose toward improvement** of product and service, with the aim to become competitive and to stay in business, and to provide jobs.

2. **Adopt the new philosophy.** We are in a new economic age...must awaken to the challenge...learn responsibilities...take on leadership for change.

3. **Cease dependence on inspection** to achieve quality.

4. **End the practice of awarding business on the basis of price tag.** Instead, minimize total cost. ...relationship(s) of loyalty and trust.

5. **Improve constantly and forever the system** of production and service... .

6. **Institute training on the job.**

7. **Institute leadership.** The aim of supervision ... to help people and machines and gadgets to do a better job. Supervision...in need of overhaul... .

8. **Drive out fear**, so that everyone may work effectively for the company.

9. **Break down barriers between departments**. People...must work as a team, to foresee problems...

10. **Eliminate slogans, exhortations, and targets for the work force**...only create(s) adversarial relationships...the bulk of the causes of low quality/productivity belong to the system...
   a. Eliminate work standards (quotas) on the factory floor. **Substitute leadership.**
   b. Eliminate management by objective. Eliminate management by numbers, numerical goals. **Substitute leadership.**

11. **Remove barriers that rob the hourly worker of his right to pride of workmanship**.

12. **Remove barriers that rob people** in management and in engineering of their right to **pride of workmanship**.

13. Institute a **vigorous** program of education and self-improvement.

14. Put everybody in the company to work to accomplish the transformation. **The transformation is everybody’s job.**
Profound Knowledge

System of Profound Knowledge® (SoPK) is the culmination of W. Edwards Deming’s lifelong work.

1. Appreciation for a system
   - Leader should understand the system thoroughly.
   - To fix or alter must realize: the whole is greater than the sum of the parts.

2. Knowledge about variation
   - Common cause: Within the system structures (often consistent) that can be predicted.
   - Special cause: Occurs unexpectedly with/without a known change.

3. Theory of knowledge
   - How do we know what we know? Are our facts correct?
   - What other ways should we look at things?

4. Knowledge of psychology
   - How do we best motivate people? How do we best resolve conflicts?
   - In what ways are people and their behaviors predictable and knowable?
“The goal of systems theory is systematically discovering a system's dynamics, constraints, conditions and elucidating principles (purpose, measure, methods, tools, etc.) that can be discerned and applied to systems at every level of nesting, and in every field for achieving optimized equifinality.” [The principle that in open systems a given end state can be reached by many potential means.]

Sources:
Case Study: Common Root Causes

Role: Developer

1. What Profound Knowledge is gained from this view?
2. What would you do with this insight?
3. What might be the results?

200 Developer personnel assigned to this project do not have the necessary experience.

205 Developer personnel assigned to this project do not have the necessary skill.

210 Developer personnel assigned to this project do not have the necessary training.

215 The developer exhibits immature software development behavior.

220 There are no other qualified sources for providing support to developer personnel assigned to the project.

225 Developer personnel are not well prepared to accomplish their assigned project responsibilities.

230 Senior management does not eliminate the root causes.

235 The developer must rely on the capabilities of assigned personnel for project success.
2. Knowledge about Variation

Example: Schedule Predictability and Reliability

![Diagram showing Monte Carlo Simulation Setup and a project timeline with random numbers within statistical ranges for the first iteration.]

- Milestone X (Soft)
- Milestone Y (Hard)

$t = 5.8$, $t = 8.0$, $t = 9.6$, $t = 3.0$, $t = 16.5$, $t = 5.5$, $t = 3.3$, $t = ??$, $t = 3.6$

$r_1 = \text{random number within each activities statistical range for the first iteration}$
Monte Carlo Simulation

Date: 3/20/09 12:47:23 PM
Number of Samples: 200
Unique ID: 1
Name: Sample Project (Risk)

Completion Std Deviation: 3.7d
95% Confidence Interval: 0.5d
Each bar represents 1d.

Completion Probability Table

<table>
<thead>
<tr>
<th>Prob</th>
<th>Date</th>
<th>Prob</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.05</td>
<td>3/26/09</td>
<td>0.66</td>
<td>4/7/09</td>
</tr>
<tr>
<td>0.10</td>
<td>3/28/09</td>
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<td>4/10/09</td>
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<td>4/3/09</td>
<td>0.70</td>
<td>4/10/09</td>
</tr>
<tr>
<td>0.25</td>
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<td>4/6/09</td>
<td>1.00</td>
<td>4/20/09</td>
</tr>
</tbody>
</table>

Only a 20% probability of completing the project as expected on 4/3/09
Variation by Modeling and Simulation

Modeling
- The technique of a building a model of a real or proposed system so that the behavior of the system under specific conditions may be studied.

Simulation
- “The technique of imitating the behavior of some situation or system (economic, mechanical, etc.) by means of an analogous model, situation, or apparatus, either to gain information more conveniently or to train personnel.” (Oxford English Dictionary)

Power of Simulation:
- Accurate (as possible) depiction of reality to make more accurate decisions/solutions
- Systems: Important to understand; complex, meaningfully represent randomness (reality)
- Advanced Optimization: Test multiple experiments and behaviors
- Insightful systems evaluations at real time or compressed time
- Animation: Visual model for verification and training
Current vs Future | Static vs Dynamic

- **Static Current State VSM**
  - “Boring!”
  - Unable to assess, verify, make adjustments quickly
  - Unable to envision and consider more useful Future State

- **Static Future State VSM**
  - “That’s fine, but…”
  - Unable to check basic validity of ideas
  - Buy-in reduced

Versus
System Simulation: Profound Knowledge

Enterprise Aircraft

Routed Parts (Back shop)

Wings and Flight Controls

Refurbishment
Benefits: Modeling and Simulation

Modeling

- Ability to consider the future of the future by stepping into the future
- Highlight potential problems that may occur during the transition from current to future state
- Provided a forum for thorough debate and hence a quicker resolution of key issues

Simulation

- “The technique of imitating the behavior of some situation or system (economic, mechanical, etc.) by means of an analogous model, situation, or apparatus, either to gain information more conveniently or to train personnel.” (Oxford English Dictionary)

Power of Simulation:

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- Animation: Visual model for verification and training
3. Theory of Knowledge

Knowledge of Individuals | Teams | Programs

Core: “Importance of understanding how people think—and act—based on what they believe they know to be true.”

1. What do we know that isn’t so?
2. How can we avoid the mistakes we are in danger of making in our thinking?
3. How can we improve the learning process?
4. How does the source of an idea affect my evaluation of the idea?
5. Are my judgments clouded by unimportant factors?

Other Issues:

- Confirmation Bias: Seize on what evidence we believe, like, or supports us; reject or ignore evidence that does not support us
- Experiment: Plan-Do-Check-Act
- Prediction: Learn more from thinking deeply about system, etc. (Risk Analysis)
- Misunderstandings and Misinterpretations
- Value Judgments: Operational definitions and data

Knowledge of Individuals

Myers-Briggs Type Indicator (MBTI) Indices

- **Extraversion**
  - Source of Energy
  - **Introversion**
  - *Attitude*

- **Sensing**
  - Data Gathering
  - **INtuition**
  - *Irrational Function*

- **Thinking**
  - Decision Making
  - **Feeling**
  - *Rational Function*

- **Judging**
  - Lifestyle or Orientation
  - **Perceiving**
  - *Attitude*

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## Knowledge of Individuals (on Teams)

### Case Study: MBTI Preferences

**Team Size:** 16 members  
**Group Type:** INTJ

<table>
<thead>
<tr>
<th>ISTJ</th>
<th>ISFJ</th>
<th>INFJ</th>
<th>INTJ</th>
</tr>
</thead>
</table>
| Contracts Manager (F)  
Team Lead (F)  
Programmer-Technician (M) |  
| Hardware Support (M)  
Systems Analyst (M) |  
Project Manager (M)  
Quality Assurance (M)  
Systems Analyst (M) |

<table>
<thead>
<tr>
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<th>ISFP</th>
<th>INFP</th>
<th>INTP</th>
</tr>
</thead>
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<tr>
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</tbody>
</table>
Programmer-Technician (M) |  
|  
|  
Programmer-Technician (M) |  
|

<table>
<thead>
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<th>ESTP</th>
<th>ESFP</th>
<th>ENFP</th>
<th>ENTP</th>
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</thead>
<tbody>
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<td>Programmer-Technician (F)</td>
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</tr>
</tbody>
</table>
Programmer-Technician (M) |  
|

<table>
<thead>
<tr>
<th>ESTJ</th>
<th>ESFJ</th>
<th>ENFJ</th>
<th>ENTJ</th>
</tr>
</thead>
</table>
| Senior Project Manager (M)  
Programmer-Technician (M) |  
|  
Team Lead (M)  
Programmer-Technician (M)  
Systems Analyst (M) |  
|

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Knowledge of Teams

Drexler-Sibbet Team Performance™ Model

CASE Study A

What is the highest level you have experienced?

1. Orientation
   WHY are you here?

2. Trust Building
   WHO are you?

3. Goal/Role Clarification
   WHAT are we doing?

4. Commitment
   HOW will we do it?

5. Implementation
   WHO does WHAT, WHEN, WHERE?

6. High Performance
   WOW!

7. Renewal
   WHY continue?

Knowledge of Teams (of Individuals)
Drexler-Sibbet Team Performance™ Model

CASE Study A

1. Orientation
   WHY are you here?

2. Trust Building
   WHO are you?

3. Goal/Role Clarification
   WHAT are we doing?

4. Commitment
   HOW will we do it?

5. Implementation
   WHO does WHAT, WHEN, WHERE?

6. High Performance
   wow!

7. Renewal
   WHY continue?

Let's Play to Win

- Managers (4)
- Team Members
- Actual Members (14*)

Knowledge of Programs

Case Study: Program Risk Assessment

Team Sprint Burn down Chart for Sprint 3

How’s the Product Development going?

Why such a high level of exposure?

How are we going to get insight and explain this?
# Knowledge of Programs

## Case Study: Program Risk Assessment

### Minimal (Negligible) vs. Very High (Catastrophic Grievous)

<table>
<thead>
<tr>
<th>Minimal</th>
<th>Low (Marginal)</th>
<th>Medium (Moderate)</th>
<th>High (Significant Critical)</th>
<th>Very High (Catastrophic Grievous)</th>
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<tbody>
<tr>
<td>100%</td>
<td>90%</td>
<td>80%</td>
<td>70%</td>
<td>60%</td>
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</tbody>
</table>

### Probability & Timeframe Matrix

<table>
<thead>
<tr>
<th>Probability</th>
<th>Timeframe</th>
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<tr>
<td>90%</td>
<td>8</td>
</tr>
<tr>
<td>80%</td>
<td>6</td>
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<td>4</td>
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<td>40%</td>
<td>1</td>
</tr>
<tr>
<td>30%</td>
<td>1</td>
</tr>
<tr>
<td>20%</td>
<td>1</td>
</tr>
<tr>
<td>10%</td>
<td>1</td>
</tr>
</tbody>
</table>

### Impact Levels

- **Red [A]**: Greater than or equal to 6.0
- **Yellow [B]**: Greater than 2.0 and less than 6.0 (if greater than 4.0 complete a mitigation plan)
- **Green [C]**: Greater than 0.1 and less than 2.0

**Shown in "orange"**
# Knowledge of Programs

## Risk Assessment: Results for Open Discussion

<table>
<thead>
<tr>
<th>Risk ID</th>
<th>Condition</th>
<th>Consequence</th>
<th>Current Probability (Likelihood)</th>
<th>Current Impact (Severity)</th>
<th>Risk Rating (Current)</th>
<th>Action to Mitigate</th>
<th>POC</th>
<th>Risk Category</th>
<th>Mitigation Due</th>
<th>$</th>
<th>Context and Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>C014</td>
<td>If funding is not received with enough lead time to allow for contract/mod award before current funding runs out;</td>
<td>Then the schedule will be delayed and key individuals will be lost requiring effort to be spent on the hiring and assimilation processes.</td>
<td>90%</td>
<td>10</td>
<td><strong>9.0</strong></td>
<td>In the short term, work to resolve the immediate funding shortfall. Note: [Blank] is working at the [Blank] level both [Blank] to provide funding in increments until [Blank] is established in PB.</td>
<td>Funding</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C015</td>
<td>If operational requirements continue to change with only partial agreement by key signatories;</td>
<td>Then the delivery date will continue to be delayed.</td>
<td>90%</td>
<td>9</td>
<td><strong>8.1</strong></td>
<td>Create a [Blank] where any proposed changes must go through the [Blank] and be agreed upon by the [Blank] before a [Blank] will be considered.</td>
<td>Requirenments</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>E001</td>
<td>If the [Blank] product development and testing team does not include a Subject Matter Expert (SME) from each service or using community;</td>
<td>Then the user interface will not be validated, operational usability will not be acceptable, [Blank] will not recommend it and [Blank] will be suspect as a beneficial tool,</td>
<td>80%</td>
<td>10</td>
<td><strong>8.0</strong></td>
<td>Place Subject Matter Experts (SMEs) on the development team as soon as possible. [Blank] to request [Blank] via [Blank].</td>
<td>Resources</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>E010</td>
<td>If a 24/7 Help Desk is not available for the user community (whether the user understands the product and its purpose or not);</td>
<td>Then [Blank] the user community will increase until the product is not considered worthwhile.</td>
<td>80%</td>
<td>10</td>
<td><strong>8.0</strong></td>
<td>Coordinate a Help Desk requirement with the funding sponsor and the user community.</td>
<td>Support</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Influence
Whatever I “do” on the surface, people respond to who I am being when I am doing it.
Way be being determines influence.

(The Choice, §§ 5, Arbinger Institute)

Knowledge of Psychology

Influencing Relationships

What kind of influence am I likely to have on someone I’m seeing as:

- a Vehicle?
- an Obstacle?
- an Irrelevancy?
### Characteristics of an Admired Leader

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Group Tally</th>
<th>Percentage</th>
<th>Norm</th>
<th>Difference</th>
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<tbody>
<tr>
<td>Ambitious</td>
<td>39</td>
<td>26%</td>
<td>21%</td>
<td>5%</td>
</tr>
<tr>
<td>Broad-minded</td>
<td>43</td>
<td>28%</td>
<td>40%</td>
<td>-12%</td>
</tr>
<tr>
<td>Caring</td>
<td>45</td>
<td>30%</td>
<td>20%</td>
<td>10%</td>
</tr>
<tr>
<td>Competent</td>
<td>93</td>
<td>61%</td>
<td>66%</td>
<td>-5%</td>
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<tr>
<td>Cooperative</td>
<td>24</td>
<td>16%</td>
<td>28%</td>
<td>-12%</td>
</tr>
<tr>
<td>Courageous</td>
<td>24</td>
<td>16%</td>
<td>20%</td>
<td>-4%</td>
</tr>
<tr>
<td>Dependable</td>
<td>79</td>
<td>52%</td>
<td>33%</td>
<td>19%</td>
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<tr>
<td>Determined</td>
<td>19</td>
<td>13%</td>
<td>24%</td>
<td>-12%</td>
</tr>
<tr>
<td>Fair-minded</td>
<td>78</td>
<td>51%</td>
<td>42%</td>
<td>9%</td>
</tr>
<tr>
<td>Forward-looking</td>
<td>89</td>
<td>59%</td>
<td>71%</td>
<td>-12%</td>
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</table>

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Group Tally</th>
<th>Percentage</th>
<th>Norm</th>
<th>Difference</th>
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</thead>
<tbody>
<tr>
<td>Honest</td>
<td>140</td>
<td>92%</td>
<td>88%</td>
<td>4%</td>
</tr>
<tr>
<td>Imaginative</td>
<td>12</td>
<td>8%</td>
<td>23%</td>
<td>-15%</td>
</tr>
<tr>
<td>Independent</td>
<td>10</td>
<td>7%</td>
<td>60%</td>
<td>-53%</td>
</tr>
<tr>
<td>Inspiring</td>
<td>104</td>
<td>68%</td>
<td>65%</td>
<td>3%</td>
</tr>
<tr>
<td>Intelligent</td>
<td>46</td>
<td>30%</td>
<td>47%</td>
<td>-17%</td>
</tr>
<tr>
<td>Loyal</td>
<td>57</td>
<td>38%</td>
<td>14%</td>
<td>24%</td>
</tr>
<tr>
<td>Mature</td>
<td>23</td>
<td>15%</td>
<td>17%</td>
<td>-2%</td>
</tr>
<tr>
<td>Self-controlled</td>
<td>15</td>
<td>10%</td>
<td>8%</td>
<td>2%</td>
</tr>
<tr>
<td>Straightforward</td>
<td>43</td>
<td>28%</td>
<td>34%</td>
<td>-6%</td>
</tr>
<tr>
<td>Supportive</td>
<td>74</td>
<td>49%</td>
<td>35%</td>
<td>14%</td>
</tr>
</tbody>
</table>

5. Knowledge of Leadership

Leadership Practices

Model the Way
- Clarify values by finding your voice and affirming shared values
- Set the example by aligning actions with shared values

Inspire a Shared Vision
- Envision the future by imagining exciting and ennobling possibilities
- Enlist others in a common vision by appealing to shared aspirations

Challenge the Process
- Search for opportunities; seizing initiative; looking for innovative ways to improve
- Experiment, take risks, consistently generating small wins, learning from experience

Enable Others to Act
- Foster collaboration by building trust and facilitating relationships
- Strengthen others by increasing self-determination and developing competence

Encourage the Heart
- Recognize contributions by showing appreciation for individual excellence
- Celebrate the values and victories by creating a spirit of community

5. Knowledge of Leadership

Leadership Practice Inventory (LPI) - SELF

<table>
<thead>
<tr>
<th>Model the Way</th>
<th>Inspire a Shared Vision</th>
<th>Challenge the Process</th>
<th>Enable Others to Act</th>
<th>Encourage the Heart</th>
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<td>6.74</td>
<td>7.30</td>
<td>8.39</td>
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<tr>
<td>6</td>
<td>6.87</td>
<td>5.78</td>
<td>7.52</td>
<td>7.52</td>
</tr>
<tr>
<td>11</td>
<td>8.39</td>
<td>6.26</td>
<td>6.74</td>
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<td>16</td>
<td>6.91</td>
<td>5.43</td>
<td>6.74</td>
<td>7.70</td>
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<td>21</td>
<td>7.17</td>
<td>7.43</td>
<td>7.17</td>
<td>8.04</td>
</tr>
<tr>
<td>26</td>
<td>6.87</td>
<td>7.43</td>
<td>7.17</td>
<td>7.52</td>
</tr>
<tr>
<td>Tot</td>
<td>44.04</td>
<td>39.09</td>
<td>42.65</td>
<td>47.96</td>
</tr>
</tbody>
</table>

7.34 6.51 7.11 7.99 7.67
High 8.78 Low 5.43

Group 17:
23 participants

Where are their strengths?

Where are their opportunities?

Cumulative Total:
20 Groups
328 participants

Where do they need coaching?

Where do they need leadership?
Examples of Knowledge Capture

Assessment: Goals, Cause-Effect, Priorities, Metrics, etc.

**Large Team**
- Multiple Supervisors
- Multiple Team Leads
- Critical Product

**Medium Team**
- Support Services
- Known challenges (Morale, Training)
- New Leadership

**Small Team**
- New Team
- Establishing a new Program Management Office (PMO)
- Unproven approach for support

**Really Small Team**
- Software Support
- Complex System
- Move to Agile, Scrum, Reporting
What are we to do with our Profound Project Knowledge?

...Something Useful
- It is a waste unless we take action
- Can also be put towards lame and harmful means

Opportunities Abound
- Individuals | Teams | Projects | Systems | Customers

Teams
- What small adjustment would help us team better?
- What would help us be profoundly better?

Questions to Ask
- What new information will help us do [ ] better?
- If we discovered how to do [ ], what would that mean?
- If we understood [ ], how would we adjust?
- What is our core conflict? What is our core constraint?

What would be really profound for us?
- Hold a discussion
- Consider the experiment
- Start...Try it out
References