The views expressed are my own, and do not represent the official policy or position of any of my current or previous employers or clients.

All references in this presentation have been properly cited.

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About the Presenter

Publications: Willis H. Thomas, PhD, PMP, CPT

In 2012, I chaired an international conference in CA for the Institute of Validation Technology (IVT). I delivered a keynote presentation on “Measuring Return on Quality.” Thereafter, I published in their Journal of Validation Technology an article on Competencies.

My first book entitled “The Basics of Project Evaluation and Lessons Learned,” recognized as the Best of the Best – 2012 Cleland Award Winner by The Project Management Institute (PMI), is an extension of my doctoral dissertation completed in 2008 and represents 7 years of working with PMI to establish good business practices for evaluating projects. At the request of readers, a 2nd edition was published, Copyright 2015 includes three new chapters. Pfizer funded my doctorate and Dr. Michael Scriven, my dissertation Chair, is recognized as the top practitioner in evaluation with more than 400 publications.

My second book “The Basics of Achieving Professional Certification: Enhancing Your Credentials” was in response to key learnings over 10 years, working with professionals who were seeking professional certification. Moreover, it updated the perspective of my publisher Taylor and Francis, NY previous publication with the Society of Human Resource Management (SHRM) on the topic (1990s). I worked with credentialing agencies and certifying boards on this book and will have it available when we meet.

In December of 2012, I conducted a global webinar at the request of ASTD regarding the importance of project management for training and development professionals. I was requested by ASTD to write this publication to support best practices in training project management. My third book “Templates for Managing Training Projects” was reviewed internationally by SMEs and received an APEX Award for publication excellence.
Discussion

Q1 - WHAT: is an Impact Assessment and relationship to ROQ/ROI?

Q2 - WHO: should be engaged in performing an Impact Assessment?

Q3 - WHERE: can an Impact Assessment be performed?

Q4 - WHEN: is a good time to schedule an Impact Assessment?

Q5 - WHY: is collaboration essential for an Impact Assessment?

Q6 - HOW: does the process flow for an Impact Assessment?
Discussion Topics

Q1 - WHAT: is an Impact Assessment and Relationship to ROQ/ROI?
An **Impact Assessment** is an evaluation that:

- is a determination of merit (quality), worth (value) or importance (significance) of an evaluand (i.e., policies, processes and procedures) and to this end employs methods such as ROI and ROQ.
- involves the use of specific tools and techniques to support problem solving and decision making.
- can be viewed summatively (retrospectively) to look at risk in the past to determine accountability
- can be handled formatively (future thinking) to look at risk in terms of continuous improvement.
A1: Impact Assessment for Quality Risk Management

Risk is defined by the PMBOK® Guide 6th Edition (released 9/17) as an uncertain event, that if it occurred or will occur, has a positive or negative effect. An impact assessment helps us to understand the amount of, level of or degree of risk and its effects.

A Quality Risk Management (QRM) initiative is put in place to address to protect products and services and address uncertainties that may occur in projects or operations that impact key business functions:

• Policies
• Procedures
• Processes
Impact Assessments are to be SMART and CLEAR

Before you begin a project you must have SMART objectives and CLEAR communication.

To ensure this is the case, first step back and take a high level view of the project.

“Can’t see the forest for the trees.”
Impact Assessments are to be SMART and CLEAR

**S**pecific – who, what, where, when, which, and why.

**M**easurable – Create criteria that measures the success of a goal.

**A**ttainable – Identify the most important goals and what it will take to achieve them.

**R**ealistic – You should be willing and able to work toward a particular goal.

**T**imely – Create a timeframe to achieve the goal.

**C**oordinated – The objective should be organized and encourage team members to work together.

**L**imited – Should be in scope and include only the required work.

**E**xpert – Take full advantage of the team’s knowledge and skills.

**A**dvantageous – It is beneficial to the organization.

**R**eviewable – Able to be measured and evaluated.
Impact Assessment: Summative vs. Formative

Summative
Previous Projects
Impact
Accountability
Results

Done Right

Formative
Future Projects
Change
Continuity
Improvement

Could have been done differently
Done Wrong
Impact Assessments and ROQ

ROQ is a method to help determine “return on investment” in quality. It enables quality improvement expenditures to be evaluated as investments, on an equal footing with other financial investments.

- Cost of quality (COQ) allows an organization to determine the extent to which its resources are used for activities that prevent poor quality.
- Having such information allows an organization to determine the potential savings to be gained by implementing process improvements.

By increasing the numerator (quality) while maintaining the denominator (cost), the value will increase.
Different Perspectives on ROQ

Things to keep in mind regarding ROQ:
1. ROQ is an attempt to measure; whereas, ROI is a calculation.
2. ROQ can be more difficult to determine than ROI as it is not an exact science.
3. Quality is an investment.
4. Customers and stakeholders will operationally define “quality”.
5. Perceptions of quality can change over time due to competition.
6. Surveys and interviews can be great tools for ROQ.
7. Quality concepts must be embedded into the organization’s culture.
8. There is a cost associated with providing quality (COQ).
9. Quality efforts should be financially accountable.
10. Cost of poor quality (COPQ): Costs associated with poor quality products:
    • internal failure costs (defects found before customer receives product)
    • external failure costs (defects found after the customer receives product)
    • appraisal costs (costs incurred to determine the degree of conformance)
    • prevention costs (costs incurred to minimize failure and appraisal costs)

Supporting Publications on ROQ Approach

Highlights from Roland T. Rust’s book “Return on Quality”:

1. The ROQ software demonstration model (beginning on page 147) is a good attempt at using mathematical models to support ROQ financial analysis
2. He stresses the importance of voice of the customer to determine quality
3. The importance of using customer satisfaction surveys
4. The value of customer retention
5. The value of new customers
6. Strategic planning for ROQ
7. The cost of quality principles
8. Service oriented thinking – products as services
9. ROQ Case studies – Cumberland Hotels, Ace Bank
10. The Importance of an ROQ decision support system
Impact Assessments and ROI

ROI is economic evaluation that determines merit (quality), worth (value) or significance (importance). Projects are temporary, unique and for a specific purpose, i.e., Computer System Validation (CSV) and are easier to evaluate.

- Return on Investment (ROI) can be performed for quality risk management initiatives.
- ROI seeks to determine among other things resource utilization (effectiveness and efficiency).
- ROI represents financial value to the organization.

\[
ROI = \frac{(Benefits - Costs)}{Costs}
\]
Different Perspectives on ROI

Benefits of Training \[ \times 100 = \text{ROI} \]
Cost of Training

ROI = \( \frac{\text{PROFIT}}{\text{INVESTMENT}} \times 100 \)

**HOW TO CALCULATE ROI?**

\[ \text{ROI} = \frac{\text{PROFIT} - \text{INVESTMENT}}{\text{INVESTMENT}} \times 100 \]

**ROI**

AKA Return On Investment. A way of measuring whether advertising (or anything) brings in more money than it costs. Can be used to compare different investments.

Measuring your human capital's ROI

Total Organization Profits
\[ \frac{\text{Investments on Human Capital}}{\text{ROI}} = \left( \frac{\text{benefits} - \text{costs}}{\text{costs}} \right) \]
There are many types of returns that attempt to capture performance or productivity:

- Return on Investment (ROI)
- Return on Influence (considered the “new ROI”)
- Return on Quality (ROQ)
- Return on Assets (ROA)
- Return on Equity (ROE)
- Return on Sales (ROS)
- Return on Capital Employed (ROCE)
- Time value of money
Q2 - WHO: should be involved in conducting an impact assessment?
Q2: Who Should be Engaged in an Impact Assessment?

- Information Technology
- Database Administrator
- Data Analyst
- Data Governance Committee
- Quality Assurance
- Internal Audit
- End Users
- Quality Control
- Trainer
A1: Champions Engaged Who Promote Quality Culture

Engaged employees must adhere to **Quality Policies and Standards:**
- CAPA (corrective action – preventative action) that enforce quality standards.

A well-functioning **Quality System:**
- **QPIs (Quality Performance Indicators)** should be in alignment with Quality Culture Indicators (QCIs) as stressed by Ian Thrussel at a Quality Systems/ICH Q10 conference in Arlington, VA in October 2011
- **QSPs (Quality System Policies)** should be championed by senior management
- **Quality Culture** (thorough, attentive, integrated) should be part of the organization’s mission – vision or values.

According to qualitydigest.com, “more than ½ million organizations have a quality standard based on ISO9000.
- Many quality indicators are not expressed in common financial terms.
  - For this reason, executive managers often find it difficult to evaluate quality-related performance”
• **Quality Performance Indicators (QPIs)** are the established criteria an organization uses to identify the current status of quality as it relates to specific items. QPIs continuously run and may be presented on a dashboard, such as Red – Yellow – Green stoplight that is capable of giving up-to-date feedback on an organization’s quality metrics. QPIs include items such as number of recalls or investigations.

• **Key Quality Indicators (KQI)** are a subset of defined criteria (or QPIs) that identify when specific quality variables are being met. KQIs are the primary factors that determine the health quality of an organization. KQIs include successful results of internal audits, successful results of regulatory audits, organization-wide training compliance, or level of job satisfaction based upon an employee engagement survey.
## A2: Champions Should Have Desired Competencies

<table>
<thead>
<tr>
<th>TECHNICAL</th>
<th>BEHAVIORAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Email Etiquette</td>
<td>Effective Listening</td>
</tr>
<tr>
<td>Technical Writing</td>
<td>Appropriate Non-verbal Communication</td>
</tr>
<tr>
<td>Presentations Skills</td>
<td>Conflict Resolution</td>
</tr>
<tr>
<td>Meeting Facilitation</td>
<td>High Emotional Intelligence</td>
</tr>
<tr>
<td>Measurement</td>
<td>Assertiveness</td>
</tr>
<tr>
<td>Time Management</td>
<td>Flexibility</td>
</tr>
<tr>
<td>Technical Writing</td>
<td>Negotiation</td>
</tr>
<tr>
<td>Business Acumen</td>
<td>Influencing</td>
</tr>
<tr>
<td>Project Management</td>
<td>Collaboration</td>
</tr>
<tr>
<td>Evaluation</td>
<td>Influential</td>
</tr>
<tr>
<td>Problem Solving</td>
<td>Discipline/Integrity</td>
</tr>
<tr>
<td>Decision Making</td>
<td>Transparency</td>
</tr>
<tr>
<td>Root Cause Analysis</td>
<td>Empathy</td>
</tr>
<tr>
<td>Information Graphics</td>
<td>Patience</td>
</tr>
<tr>
<td>Analytics/Metrics</td>
<td>Honesty</td>
</tr>
<tr>
<td>Research</td>
<td>Multi-tasking</td>
</tr>
</tbody>
</table>
Discussion Topics

Q3 - WHERE: can an Impact Assessment be performed?
Q3: Where Can an Impact Assessment be Performed?

<table>
<thead>
<tr>
<th>Item</th>
<th>Example</th>
<th>ROQ</th>
<th>ROI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Packaging Operator Training</td>
<td>Packaging operators are increasing productivity by 5% after training</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Validation Engineer Training</td>
<td>CSV can be performed by internal personnel saving $300K</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sales Representative Training</td>
<td>An increase in sales orders by 3% after a new selling program</td>
<td></td>
<td></td>
</tr>
<tr>
<td>New Procedures Template</td>
<td>1000 Procedures are revised into new template for readability</td>
<td></td>
<td></td>
</tr>
<tr>
<td>New SharePoint Site</td>
<td>$150K investment in SharePoint intended to reduce printing by 10%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>New CAPA Software</td>
<td>Annual enterprise system license is $500K is anticipated to eliminate a future warning letter in specific area. Previous fines were $1M.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Global LMS</td>
<td>LMS to support 2,000 users at an annual cost of $200K for software</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Document Management</td>
<td>New document management system that costs $100K per year will decrease workflow turn around time in revising procedures by 50%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Safety Bulletins and Signs</td>
<td>$10K investment in safety signage and posters reduces reported workplace injuries by 20%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electronic Lab Notebooks</td>
<td>New ELNs costed $50,000 will replace paper notebooks as 1 was lost</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Two Coffee Machine</td>
<td>Two new coffee machines cost $10K. Brew better coffee 10% faster</td>
<td></td>
<td></td>
</tr>
<tr>
<td>New Mission &amp; Vision</td>
<td>New mission and vision statement $100K for branding and collateral</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Annual Ethics Training</td>
<td>Program focused on ethics for all employee population</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pizza Luncheon</td>
<td>Employee appreciation for 50 employees at a cost of $300</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Annual Sales Training</td>
<td>50 sales reps. meet for two days at a resort in Florida $50K</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Change in Dress Policy</td>
<td>Company changes to a casual dress policy allowing for flexibility</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Q3: Where Can an Impact Assessment be Performed?

The 10 “P’s” can be measured when they have value to the organization:

1. Products
2. Policies
3. Processes
4. Procedures
5. Programs
6. Performance
7. People
8. Price
9. Places
10. Profit
A3: Where Can an Impact Assessment be Performed?

- **Information Technology**: Use of deployed system, i.e., SharePoint
- **Finance/Accounting**: Expense reporting and cost reduction
- **Human Resources**: Training costs
- **Regulatory**: Prevention of internal audit observation
- **Manufacturing**: Returned goods current goods vs. previous year
- **Research and Development**: Electronic lab notebooks
- **Legal/Compliance**: % of reduction in complaints in legal cases
- **Operations**: Virtual meetings reducing cost expenditure
- **Sales**: Product sample effectiveness in obtaining new clients
- **Marketing**: Social media initiative
- **Customer Service**: Reduction in number of complaints
- **Warehouse**: Reduction in workplace injuries
A3: Where Can an Impact Assessment be Performed?

- Information Technology
- Finance/Accounting
- Human Resources
- Regulatory
- Manufacturing
- Research and Development
- Legal/Compliance
- Operations
- Sales
- Marketing
- Customer Service
- Warehouse

- Vendors
- Suppliers
- Contractors
- Contract Employees
- Temporary
- Consultants
- Contract Manufacturers
- Service Providers
- Customers
- Regulatory Agencies
- Auditors
- Other Stakeholders
Q4 - WHEN: is a good time to schedule an Impact Assessment?
Q4: When is a Good Time for the Impact Assessment?

Looking at the cost of CSV over the project life cycle with respect to the activities that are performed can yield accurate results.

Ten knowledge areas impacting CSV across the project life cycle include:

1. Communications
2. Cost
3. Resources
4. Integration
5. Procurement
6. **Quality**
7. Risk
8. Scope
9. Stakeholder
10. Time

An effective quality system is critically important to organizational success!

Typical Project Lifecycle
Q4: When is a Good Time for the Impact Assessment?

Looking at the cost of CSV over the project life cycle with respect to the activities that are performed can yield accurate results.

Ten knowledge areas impacting CSV across the project life cycle include:

1. Communications
2. Cost
3. Resources
4. Integration
5. Procurement
6. Quality
7. Risk
8. Scope
9. Stakeholder
10. Time

An effective quality system is critically important to organizational success!

Common Agile Project Lifecycle
Q5 - WHY: is collaboration essential for an Impact Assessment?
Q1: Why is Collaboration Essential?

What collaboration will help ensure:

1. There will be a sponsor or champion to support the impact assessment.
2. If the approach should be summative and/or formative.
3. The best team members are selected to participate in the impact assessment.
4. The impact assessment will have value to the organization.
5. Stakeholder and team dynamics remain positive.
Impact Assessments and Stakeholder Relationships

1 - Dormant Stakeholder
2 - Discretionary Stakeholder
3 - Demanding Stakeholder
4 - Dominant Stakeholder
5 - Dangerous Stakeholder
6 - Dependent Stakeholder
7 - Definitive Stakeholder

# Stakeholder Engagement Assessment Matrix

<table>
<thead>
<tr>
<th>Stakeholder</th>
<th>Unaware</th>
<th>Resistant</th>
<th>Neutral</th>
<th>Supportive</th>
<th>Leading</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stakeholder A</td>
<td></td>
<td></td>
<td></td>
<td>D, C</td>
<td></td>
</tr>
<tr>
<td>Stakeholder B</td>
<td>C</td>
<td></td>
<td></td>
<td>D</td>
<td></td>
</tr>
<tr>
<td>Stakeholder C</td>
<td></td>
<td>C</td>
<td></td>
<td></td>
<td>D</td>
</tr>
</tbody>
</table>

C – Current attitude toward project  
D – Desired attitude needed on the project

Adapted from *PMBOK® Guide* – Fifth Edition, Figure 13-7, p. 403
## Stakeholder Register

### Style 1

<table>
<thead>
<tr>
<th>Stakeholder</th>
<th>Reports to</th>
<th>Contact Number</th>
<th>Level of Power</th>
<th>Interest in the Project</th>
<th>Style of Communicating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stakeholder A</td>
<td>CEO</td>
<td>X5543</td>
<td>High</td>
<td>Sponsor</td>
<td>High interest in what affects staff. Very people oriented</td>
</tr>
<tr>
<td>Stakeholder B</td>
<td>Mkting Mgr</td>
<td>X5523</td>
<td>Mod</td>
<td>News-letter</td>
<td>Prefers to have everything in a memo</td>
</tr>
<tr>
<td>Stakeholder C</td>
<td>Eng. Dept.</td>
<td>X5578</td>
<td>High</td>
<td>Will be affected neg.</td>
<td>Likes numerical analysis to support decisions</td>
</tr>
</tbody>
</table>

### Style 2

<table>
<thead>
<tr>
<th>Stakeholder</th>
<th>Stakeholder Interest(s) in the Project</th>
<th>Assessment of Impact</th>
<th>Potential Strategies for Gaining Support or Reducing Obstacles</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td></td>
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</tr>
</tbody>
</table>
Q6 - **HOW:** does the process flow for an Impact Assessment?
Q6: How Does the Impact Assessment Process Flow?

**Impact Assessment Project Plan:**
1.0 Introduction
   1.1 Purpose
   1.2 Scope
   1.3 Resources
   1.4 Roles and Responsibilities
   1.5 Risk
   1.6 Budget
   1.7 Quality
   1.7 Timeline

2.0 Methodology
   2.1 Summative
   2.2 Formative

2.1. Approach
   2.2 Return on Quality
   2.3 Return on Investment
   2.4 Other (specify)

3.0 Evaluative Conclusions

4.0 References

**Impact Assessment Project Plan:**
Determine Agile Approach to Support Rapid Implementation

**ROI:**
- Calculate number of employee hours saved, specified dept., (i.e., in QA) and calculate by wage to determine ROI.

**ROQ:**
- How many employees will the CAPA system impact positively (i.e., 10 People in the QA Dept. indicate an improvement in CAPA traceability).
- Factor to be used to determine ROQ:
  - Major Benefit
  - Moderate Benefit
  - Minor Benefit
  - No Benefit
  - Other

**Termination**
- List of factor(s) to be evaluated and then categorize factors

- Approval
- Submit request to Impact Assessment Project Team
- Identify need for Impact Assessment
- Start
A6: Impact Assessment for CAPA System

The organization is considering a new CAPA system for implementation to replace a paper-based file system. The estimated cost is $1 million and 12 months to implement. An impact assessment will help the organization consider “what else: could be effected and change management:

• There will need to be an annual budget for the CAPA system
• The CAPA system will need to be properly configured with modules
• The CAPA system will require validation and release testing
• End users will need to be trained on the CAPA system
• Policies and procedures will need to be written for the CAPA system
• CAPA historical information will need to be imported and archived
• Integration will need to be considered between the document management and learning management system
A6: Impact Assessment for CAPA System

What is the ROI of a CAPA Management Solution?

ROQ

- Will it add scalability to the overall business?
- How many employees will it affect positively?
- Does it add value to the business?
- Will it result in employees being more productive?
- How will the CAPA management solution ensure regulatory compliance and success in external audits?
- What are the benefits of a shorter CAPA cycle time?
- How valuable is the quick and easy accessibility to enterprise wide nonconformance and CAPA data?
- How much will improvements in CAPA process improve product quality and reduce risk exposure?
- Can we really afford to not implement a CAPA management solution and continue with the current systems?

Source: https://www.metricstream.com/insights/capa_ROI.htm
A6: Impact Assessment for CAPA System

What is the ROI of a CAPA Management Solution?

ROI
• How much will this project cost?
• What can the company expect to gain in return?
• How many man-hours will it save?
• Where will the process improve?
• What will be the quantifiable cost reductions?
• How will it impact the company's bottom line?

Source: https://www.metricstream.com/insights/capa_ROI.htm
### Benefits of an NCM-CAPA Management System

<table>
<thead>
<tr>
<th>Activities and Processes</th>
<th>Improvement Estimates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initiating Nonconformance</td>
<td>60%</td>
</tr>
<tr>
<td>Nonconformance Review</td>
<td>30%</td>
</tr>
<tr>
<td>Nonconformance Disposition</td>
<td>40%</td>
</tr>
<tr>
<td>Initiating CAPA</td>
<td>60%</td>
</tr>
<tr>
<td>Root Cause Analysis and Action Plan Development</td>
<td>40%</td>
</tr>
<tr>
<td>CAPA Action Plan Approval</td>
<td>60%</td>
</tr>
<tr>
<td>CAPA Action Plan Execution and Closure</td>
<td>30%</td>
</tr>
<tr>
<td>Analysis and Reporting</td>
<td>65%</td>
</tr>
<tr>
<td>CAPA Implementation Follow Through</td>
<td>90%</td>
</tr>
<tr>
<td>CAPA Implementation Schedule</td>
<td>50%</td>
</tr>
<tr>
<td>CAPA Implementation Delays</td>
<td>50%</td>
</tr>
</tbody>
</table>

### Payback Calculation

<table>
<thead>
<tr>
<th>Month</th>
<th>Cumulative Savings</th>
<th>Cumulative Cost</th>
<th>Payback</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>$0</td>
<td>$230,000</td>
<td>-$230,000</td>
</tr>
<tr>
<td>1</td>
<td>$38,600</td>
<td>$230,000</td>
<td>-$191,400</td>
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<tr>
<td>2</td>
<td>$77,200</td>
<td>$230,000</td>
<td>-$152,800</td>
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<tr>
<td>3</td>
<td>$115,800</td>
<td>$230,000</td>
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<td>4</td>
<td>$154,400</td>
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<tr>
<td>12</td>
<td>$463,200</td>
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<td>$233,200</td>
</tr>
</tbody>
</table>

Source: https://www.metricstream.com/insights/capa_ROI.htm
A6: How Does the Impact Assessment Process Flow?

How many employees will the CAPA system affect positively?

10 People in the QA Dept. indicated increased positive morale due to records traceability.

How many employee hours saved?

10 People in the QA Dept. currently using paper methods.

Source: https://www.metricstream.com/insights/capa_ROI.htm
# Project Management Formulas

## Project Management Cost Analysis Worksheet

<table>
<thead>
<tr>
<th>NAME</th>
<th>TERM</th>
<th>INTERPRETATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>(AKA) 6CWS</td>
<td>Planned Value (aka) Budgeted Cost of Work Scheduled</td>
<td>What is the estimated value of the work planned to be done? The 50/50 rule states when beginning a task, charge 50% of the PV to its account, (the other 50% upon completion).</td>
</tr>
<tr>
<td>(AKA) 6CGW</td>
<td>Earned Value (aka) Actual Cost of Work Performed</td>
<td>What is the estimated value of the work actually accomplished?</td>
</tr>
<tr>
<td>(AKA) 6CWP</td>
<td>Actual Cost</td>
<td>What is the actual cost incurred?</td>
</tr>
<tr>
<td>(AKA) 6CWP</td>
<td>Budget at Completion</td>
<td>How much did we BUDGET for the TOTAL JOB?</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>NAME</th>
<th>FORMULA</th>
<th>INTERPRETATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost Variance (CV)</td>
<td>EV-AC</td>
<td>NEGATIVE is over budget, POSITIVE is under budget</td>
</tr>
<tr>
<td>Schedule Variance (SV)</td>
<td>EV-AC</td>
<td>NEGATIVE is behind schedule, POSITIVE is ahead of schedule</td>
</tr>
<tr>
<td>Cost Performance Index (CPI)</td>
<td>EV/AC</td>
<td>We are getting $1 out of every $1. Cumulative CPI refers to the sum of all individual EVs divided by the sum of all individual ACs. It is used to forecast project cost at completion</td>
</tr>
<tr>
<td>Schedule Performance Index (SPI)</td>
<td>EV/PV</td>
<td>We are [only] progressing at x% of the rate originally planned</td>
</tr>
</tbody>
</table>

**Note:** There are four ways to calculate EAC. The first formula on the right is most often asked on the exam.

<table>
<thead>
<tr>
<th>Name</th>
<th>Latest Revised Estimate (LRE)</th>
<th>Latest Start (LS) - Early Start (ES)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>(aka) Latest Revised Estimate (LRE)</td>
<td>Total Float is calculated by subtracting ES from LS. Free float is defined as the amount of time an activity can be delayed without delaying the start of any immediately following activities.</td>
</tr>
<tr>
<td>2</td>
<td>AC + ETC</td>
<td>Costs and times remain the same, regardless of whether they are crashed or normal, the activity can not be expedited</td>
</tr>
<tr>
<td>3</td>
<td>AC + BAC - EV</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>BAC - EAC</td>
<td>How much over budget will be at the end of the project</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>NAME</th>
<th>DESCRIPTION</th>
<th>INTERPRETATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lines of Communication</td>
<td>N x (N-1) or N^2-1</td>
<td>Number of participants multiplied by the number of participants less one divided by two</td>
</tr>
<tr>
<td>Float (Slack)</td>
<td>Late Finish (LF) - Early Finish (EF)</td>
<td></td>
</tr>
<tr>
<td>Slope</td>
<td>Crash Time - Normal Time</td>
<td></td>
</tr>
<tr>
<td>Benefit Cost Ratio (BCR)</td>
<td>When are they equal</td>
<td>The rate (interest rate) at which the project inflows (revenues) and project outflows are equal</td>
</tr>
<tr>
<td>Activity Duration (AD)</td>
<td>Work Quantity</td>
<td>Production Rate</td>
</tr>
<tr>
<td>PERT Standard Deviation</td>
<td>P + Q + (4x most likely)</td>
<td>Pessimistic minus optimistic divided by 6</td>
</tr>
<tr>
<td>Efficiency</td>
<td>Using PERT</td>
<td>Optimistic plus pessimistic plus 4 multiplied by the most likely, then divided by 6</td>
</tr>
<tr>
<td>Variance of Task</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Sigma = Standard Deviation</td>
<td>3 levels of accuracy</td>
<td></td>
</tr>
<tr>
<td>Ex: Misspelled words -</td>
<td>Order of magnitude is equal to 1% of 90% to +75% from actual, budget estimate (planning) -10% to +25% from actual, definitive estimate (planning)</td>
<td></td>
</tr>
<tr>
<td>Accuracy of Estimates</td>
<td>3 levels of accuracy</td>
<td></td>
</tr>
<tr>
<td>Marginal Analysis</td>
<td>Optimal quality level is reached at the point where incremental revenue from product improvement equals the incremental cost to secure it.</td>
<td></td>
</tr>
<tr>
<td>Opportunity Cost</td>
<td>Requires overall analysis</td>
<td>May incorporate NPy, RRR, Payback Period and or/and BCR and require judgment</td>
</tr>
<tr>
<td>Present Value (PV)</td>
<td>(FV + (1 + r)^t) / (1 + r)^t or PV = (Mr / (1 + r)^t)</td>
<td></td>
</tr>
<tr>
<td>Net Present Value (NPV)</td>
<td>Present value of total benefits - costs</td>
<td>Value of the total benefits (income or revenue) less the costs</td>
</tr>
</tbody>
</table>

## Life Cycle Costing (LCC)

LCC = C + M_w + E_w + P_w + S_w - Sp

Consider operation and maintenance costs in making project decisions. Life cycle costing is a methodology for calculating the whole cost of a system from inception to disposal.

- Capital cost (C): Maintenance, (M) Energy cost (E) Replacement cost (R) Salvage value (S): The pv subscript indicates the present worth of each factor.
VALIDATION ROI: AN HPT CASE STUDY FROM THE MEDICAL DEVICE INDUSTRY

Sue Czeropski, CPT | Donovan Le, MS

Validation is both a process and a function within Company ABC. Using the human performance technology (HPT) process, interventions were prescribed to address identified performance gaps. Forecasting an annual return on investment (ROI) based on goals yielded a ROI of 168%. Data collected for the first quarter of 2009 yielded a calculated ROI of 326%. This study discusses the HPT process and what was done to achieve the results.
Value Equation And Feature Use

This means, the company took time, spent money and accepted additional risk to develop a feature that the customer will never use. The cost incurred to develop features that are not used, must be covered by the product features used. A simple equation for value is demonstrated below:

\[
Value = \frac{Perceived\text{Benefits}}{Cost}
\]

Rudimentary Value Calculation

We see as the customer’s perceived benefits are based upon the feature content or how well the product meets their needs. The cost is the product cost. The product cost is based upon the material and labor cost, but also on the profit margins on the product the company must make to remain viable. Features not used by the customer, are not valued by the customer and do not add to the equation. However, the portion of the equation goes up based upon the money spent on developing additional features. So the development of additional features is pointless and adds cost that the value proposition to the customer will not desire to support, thereby lowering the equation for the product.

Conclusion: Value, Features, And ROI

Using the ROI calculation to prioritize the individual features, whether for agile or for conventional projects is important as this streamlines the value proposition ensuring the best value to the customer and return on the investment for the company doing the development work. As we can see, adding and paying for features not used erodes the value equation and that is not in the best interest of the customer or the company.

Source: https://www.valuetransform.com/features-roi/
**HUMAN CAPTIAL ROI MODEL EXAMPLE**

Training cost per participant: $3,100
Average fully loaded salary of participant: $150,000

*Estimate in performance improvement, including training: 30%
**Isolate performance improvement due to training: 60% of the 30% above
***Isolate performance relative to time spent performing those skills on the job: 20%
Adjust for bias, confidence, conservatism: 65%

Training impact on performance improvement, adjusted for bias: 30% x 60% x 20% x 65% = 2.34%

Calculate monetized benefit $150,000 x 2.34% = $3,510
Calculate ROI $3,510 - $3,100 = $410
Calculate Benefit to Cost Ratio $3,510 / $3,100 = 1.13

This could also be interpreted as a 13% improvement

In order to determine the measurement above, the questions need to formulated like this or similar.
* Given all factors including this training, estimate how much your job performance related to the course subject matter will improve. 10%, 20% 30%, 40%, 50%, 60%, 70%, 80%, 90%, 100%

** Based upon your response to the prior question, estimate how much of the improvement will be a direct result of this training. (For example, if you feel that half of your improvement is a direct result of the training, indicate 50% here). 10%, 20% 30%, 40%, 50%, 60%, 70%, 80%, 90%, 100%

*** What percent of your total work time requires knowledge and skills presented in this training. 10%, 20% 30%, 40%, 50%, 60%, 70%, 80%, 90%, 100%
### Training Return on Investment: IVT Conference Example

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compensation level of trainee</td>
<td>$ 104,000</td>
</tr>
<tr>
<td>Training Course Cost (including travel)</td>
<td>$ 3,000</td>
</tr>
<tr>
<td>Trainee loss in work performed as a result of attending training</td>
<td>$ 2,000</td>
</tr>
<tr>
<td>Compensation level for one week (104K ÷ 52 weeks)</td>
<td>$ 2,000</td>
</tr>
<tr>
<td>Costs to back-fill (hire temporary or transfer others to perform trainee’s work). Note: some jobs require multiple back-fills.</td>
<td>$ 2,000 (up to / more than)</td>
</tr>
<tr>
<td><strong>Total estimated training investment</strong></td>
<td><strong>$ 7,000</strong></td>
</tr>
<tr>
<td>Level of financial benefit that the training can have, i.e., preventing an FDA 483</td>
<td>$1,000,000</td>
</tr>
<tr>
<td>Estimation of improved performance as a result of training (calculated by new knowledge received by attending conference sessions)</td>
<td>10%</td>
</tr>
<tr>
<td>Level of non-financial benefit the training can have using a scale from “not improved to greatly improved”</td>
<td>Greatly improved</td>
</tr>
<tr>
<td>Level of residual impact the training has by improving best practices using a scale from “not improved to greatly improved”</td>
<td>Somewhat improved</td>
</tr>
<tr>
<td>What is the Return on Investment? Does it always need to be computed as a number?</td>
<td>GREAT</td>
</tr>
</tbody>
</table>
References


Dijicks, Jean-Pierre KPIs or KQIs By Apr 14, 2008. Retrieved from http://blogs.oracle.com/warehousebuilder/entry/kpis_or_kqis


The contents of this presentation are based upon literature reviews, academic research, interviews with authors and subject matter experts. The content contained herein does not represent the views of Pfizer.
Thank You for Attending Today’s Presentation!

By Willis H. Thomas, PhD, PMP, CPT