A Framework for Project Metrics

Deciding what to measure and how to measure it

August 13, 2007

Dr. Gary J. Evans, PMP

CVR/IT Consulting LLC

www.cvr-it.com
Welcome!

Focus of this workshop:

Project Metrics

With special attention to:

An effective way to select the metrics you need
• Why we use project metrics
• Where project metrics come from
• How we usually choose them
• A different approach to metrics selection
• What we can hope to gain
You walk away with:

- **An approach**: “Ask the question first, then select the measure”
- **A structure**: for management of metrics selection and usage
Project Metrics - Introduction

- What are project metrics?
  - Objectively measurable attributes of interesting project features
  - We use measurements of metrics to provide information about the health of a project
  - A source of important data for project control
  - A means by which we measure the project’s final deliverable
Project Metrics - Introduction

• We generally understand that metrics require a:
  • Purpose
  • Baseline of reference
  • Means of measurement
  • Method for analysis
  • Reporting mechanism
Project Metrics

• What are the circumstances where project metrics become important?

  • Have you ever wrestled with how to measure progress in your project?
    • Or
  • Have you ever been asked to develop metrics for a project?
Reasons for using project metrics

- Evaluate project progress / project health
- Contribute to project control
- Risk mitigation
- Resolve a crisis
- Manage team performance
- Understand level of customer satisfaction
- Mandated by organization (e.g. PMO)
  - Feedback to Project Portfolio
Project Metrics - Introduction

- Whenever we consider project metrics we are faced with some very basic questions:
  - What should we measure?
  - What is the best way to measure it?
  - When should measurements be taken?
  - How do we use them?
  - How do we communicate them?
Project Metrics - Exercise

• Project metrics in use today
  • Name some project metrics that you have used
  • How did you choose those particular metrics?
Reasons for using project metrics

• This is important!
  • The metrics we use depend entirely on what we are trying to do
  • There are many more reasons for using project metrics that are generally appreciated
Project Metrics – Effective Use

• Before we can effectively use project metrics we must:
  • Understand our objectives
  • Be able to clearly articulate what we need to know
  • Know what we want to measure in order to get the answer
  • Have the ability to get the data
  • Be clear on how we will use the data
Project Metrics – Effective Use

• The objective we have in mind will determine which set of metrics we will choose from
  • The metrics required to resolve a crisis will probably be very different from those needed to measure project progress
Choosing the Right Metrics

- With our objectives clear, we must then clearly state the question we need to have answered.
  - Only with these questions in mind will we choose the right metrics.
  - Selecting a metric because it is commonly used may or may not provide us with the data we need.
  - If we ask the question first, then we are much more likely to select the metric(s) that we need.
Confusion about metrics

• From a company that specializes in Information Dashboards, we have these recommended project metrics (for a PMO):
  • Percent of projects completed on time
  • Percent of projects completed on budget
  • Earned value variance
  • Did the project meet customer expectations?
  • Roles of project team and stakeholders were well understood
  • Change process was well identified and managed appropriately
Choosing the Right Metrics

- Once we have selected our metrics, we must be able to actually collect the data.
  - This will be possible if we have the appropriate reporting structures, tools, etc. in place
- Examples:
  - If we decide that we need to carefully monitor resource utilization, we need to have an effective time reporting system
  - If we want to use EV, we need a way to measure work completed
Choosing the Right Metrics

• Finally, once we start measuring the data it is necessary to have a means of interpreting it, as well as a mechanism that will use it. Example:

  • We might choose to measure schedule variance of tasks on the critical path.
    • How much variance matters?
    • Who will decide what actions to take if thresholds are exceeded?
    • Who is tracking what the critical path is (it can change over time)?
Choosing the Right Metrics

- In thinking about project metrics, it would be helpful if we had a structure with which to categorize them (e.g. Cost, Time)

  - A given project objective will likely only be concerned with specific metrics categories. This would help streamline the selection process
  - The categories themselves could serve to help define objectives.
Project Metrics - Categories

- The majority of high-value metrics are derived from key questions that focus on specific aspects of the project.
- We can articulate these questions by focusing on:
  - Project Phase
  - Project Risk
  - Project Success Criteria
  - PMBOK® Knowledge Areas
Project Metrics - Categories

• Today we will focus on questions derived from consideration of the PMBOK® Knowledge Areas
  • The PMBOK® provides a very convenient structure with which to build categories of metrics.
  • Some key project questions and their Knowledge Area counterparts are shown in the following slides.
# Project Metrics - Categories

<table>
<thead>
<tr>
<th>Category</th>
<th>Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost</td>
<td>Will the project meet the budget?</td>
</tr>
<tr>
<td>Time</td>
<td>Will the project meet the schedule?</td>
</tr>
<tr>
<td>Scope</td>
<td>Will the project deliver planned scope? Are scope changes in line with expectations?</td>
</tr>
<tr>
<td>Quality</td>
<td>Is the customer happy (i.e. are quality targets being met)?</td>
</tr>
<tr>
<td>Risk</td>
<td>Are we effectively anticipating and managing risk events relevant to this project?</td>
</tr>
</tbody>
</table>
# Project Metrics - Categories

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Communications</td>
<td>Are stakeholders getting the information they need? Are project results being reported accurately?</td>
</tr>
<tr>
<td>Procurement</td>
<td>Are we on track in the planned acquisition and management of goods and services?</td>
</tr>
<tr>
<td>HR - Issues &amp; Actions</td>
<td>Are there significant, unresolved issues and action items? Have they seriously affected the project?</td>
</tr>
<tr>
<td>HR - Resources</td>
<td>Are we using the planned number of labor hours and other resources?</td>
</tr>
</tbody>
</table>
Project Metrics - Categories

- Each of the Knowledge Areas listed above is associated with many more potentially useful questions than are shown. The next slide shows some questions related to Time Management.
Project Metrics - Categories

- *Time Management*
  - Are project milestones being completed on schedule?
  - If not:
    - What Activities are affected?
    - What is the impact on the overall schedule?
    - Are we doing better or worse than last quarter?
Project Metrics - Categories

- Each of these questions can be answered by measurement of the appropriate metric. For example:
  - List of milestones with days early / late
  - List of impacted activities
  - Schedule Performance Index (SPI)
  - SPI trend over time
Project Metrics - Categories

- These metrics can give us insight into the health of the project and warning about factors that need attention.
- One could argue that if we have a good list of metrics categorized by Knowledge Area and associated with key questions, our job of selecting metrics for our projects would be much easier.
- The remainder of this talk will look at such a structure.
Project Metrics - Categories

• Note #1: Metrics are important and useful, but they are only one part of the puzzle.
  • Knowing that a project is off track does not tell you if there is any hope of bringing it back.
  • Full communication with the project team and delivery of full and accurate information by the team is essential to obtain a full picture of a project’s health
Project Metrics - Categories

• Note #2: By stating clearly how the project will be measured, we also give the project team guidance on where they should put their efforts. So for example:
  • If we ask “have we been effective at finding cost-saving opportunities during contract negotiations”, the project team is more likely to make this a focus of their contract work. Cost reductions may result.
  • Making public the questions that underlie our metrics can have positive impact on the project.
Framework for Project Metrics
Cost Metrics - Exercise

- What are the most important metrics related to Project Cost?
- What are the most important questions related to Project Cost?

- It is much easier to use metrics if we focus on the underlying questions
- The questions of greatest importance may change over time
### Cost Variance from Plan

<table>
<thead>
<tr>
<th>Question</th>
<th>Formula Used to Calculate It</th>
</tr>
</thead>
<tbody>
<tr>
<td>Did the project meet its cost targets in the most recent reporting period?</td>
<td>% under or over budget for the past reporting period</td>
</tr>
<tr>
<td>Is the project as a whole meeting its cost targets to date?</td>
<td>% under or over budget for the project to current date</td>
</tr>
<tr>
<td>Will the remainder of the project cost what we planned?</td>
<td>% by which Estimate To Complete varies from plan (and formula used to calculate it)</td>
</tr>
<tr>
<td>(Is the method used to determine this reasonable?)</td>
<td>Note: (ETC = cost to complete remainder of project)</td>
</tr>
<tr>
<td>When the project is done, will it cost what we planned?</td>
<td>% by which Estimate At Completion varies from plan (and formula used to calculate it)</td>
</tr>
<tr>
<td>(Is the method used to determine this reasonable?)</td>
<td>Note: (EAC = total cost when project is done)</td>
</tr>
</tbody>
</table>
### Earned Value Measures

<table>
<thead>
<tr>
<th>Question</th>
<th>Formula/Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>How much had we planned to spend on the work products that we have actually produced to date?</td>
<td>Earned Value (EV = budgeted cost of work completed)</td>
</tr>
<tr>
<td>Have the work products that we have produced to date actually cost what we expected?</td>
<td>Cost Performance Index (CPI) plotted over time (CPI = EV/Actual Cost) [values &lt; 1 indicate higher than anticipated cost]</td>
</tr>
</tbody>
</table>
Time Metrics - Exercise

- What are the most important questions to ask about Project Schedule?
- What Schedule Metrics might you use to answer these questions?
- We will look at Milestones and Schedule
### Milestones

<table>
<thead>
<tr>
<th>Question</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Are project milestones being completed on schedule?</td>
<td>Days late</td>
</tr>
<tr>
<td>If not, what activities are affected?</td>
<td>List of subsequent activities impacted</td>
</tr>
<tr>
<td>And what is the impact on the overall schedule?</td>
<td>Impact on overall project schedule (days extended)</td>
</tr>
<tr>
<td>Question</td>
<td>Calculation</td>
</tr>
<tr>
<td>-----------------------------------------------------------------------</td>
<td>----------------------</td>
</tr>
<tr>
<td>Is the project currently on schedule?</td>
<td>SPI (SPI = EV/Planned Value) [values &lt; 1 indicate delays in the project]</td>
</tr>
<tr>
<td>Is the project schedule holding, getting better or slipping?</td>
<td>SPI plotted over time (SPI trend)</td>
</tr>
</tbody>
</table>
Scope Metrics - Exercise

• What are the most important questions to ask about Project Scope?
• What Scope Metrics might you use to answer these questions?
• We will look at Change Orders and Change Order Impact
<table>
<thead>
<tr>
<th>Change Orders</th>
</tr>
</thead>
</table>
| **Is project scope being effectively managed?** | - Number of project scope changes not captured in a Change Request (e.g. de-scoping) [may require an audit]  
- Number of baseline changes (legitimate changes to scope, schedule, cost or quality approved by the project Sponsor) |
<p>| <strong>Is product scope being effectively managed?</strong> | Number of primary requirements added or removed from Scope since the end of Planning Phase |
| <strong>Is this project following its plan?</strong> | Number / severity of scope forecast changes (acknowledged deviations from plan that do not change the baseline) |</p>
<table>
<thead>
<tr>
<th>Change Order Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Have Change Orders caused a significant change in the projected Project Cost?</td>
</tr>
<tr>
<td>Have Change Orders caused a significant change in projected Project Duration baseline?</td>
</tr>
<tr>
<td>Have Scope Changes materially affected the project’s estimated ROI? Is the project still worth doing?</td>
</tr>
</tbody>
</table>
Quality Metrics - Exercise

- What are the most important questions to ask about Project Quality?
- What Quality Metrics might you use to answer these questions?
- We will look at Defect Reports and Rework
## Defect Reports

<table>
<thead>
<tr>
<th>Question</th>
<th>Metric</th>
</tr>
</thead>
<tbody>
<tr>
<td>Is the production team meeting agreed upon quality standards?</td>
<td>Total number of milestones missed due to quality issues to date</td>
</tr>
<tr>
<td>Are we effectively fixing serious defects?</td>
<td>- Percent of serious defect fixes rejected by QA</td>
</tr>
<tr>
<td></td>
<td>- Percent of fixes to serious defects that result in regression</td>
</tr>
<tr>
<td>Are we finding the number of serious defects we expected at this point in the project?</td>
<td>Number of serious defects reported in the last reporting period versus projection</td>
</tr>
<tr>
<td>Are we fixing Stop-Ship defects fast enough to meet the planned ship date?</td>
<td>Forecast date versus Plan date on which number of Stop-Ship defects = 0</td>
</tr>
</tbody>
</table>
## Rework

<table>
<thead>
<tr>
<th>Question</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Is the project team meeting agreed-upon quality standards?</td>
<td>Number of deliverables rejected by customer for quality reasons in last reporting period and overall</td>
</tr>
<tr>
<td>If not, what impact is rework having on cost and schedule?</td>
<td>Hours and dollars spent doing rework in last reporting period and overall</td>
</tr>
</tbody>
</table>
Risk Metrics - Exercise

- What are the most important questions to ask about Project Risk?
- What Risk Metrics might you use to answer these questions?
<table>
<thead>
<tr>
<th>Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Has adequate risk planning been done for this project? Is this project’s risk profile adequately understood?</td>
</tr>
<tr>
<td>- Number of new serious risks that have been identified since the end of Planning Phase but which could have been identified earlier</td>
</tr>
<tr>
<td>- Number of serious issues (i.e. caused change in cost or schedule baseline) not anticipated in the Risk Register</td>
</tr>
<tr>
<td>Is the Risk Register adequate for the project?</td>
</tr>
<tr>
<td>- Number of risk events that occurred without warning</td>
</tr>
<tr>
<td>- Number of risk events for which the Risk Response Plan was inadequate</td>
</tr>
<tr>
<td>Is the project team dealing effectively with any inadequacies in the Risk Register?</td>
</tr>
<tr>
<td>Cost / Time impact of planned-for Risk Events over time</td>
</tr>
</tbody>
</table>
Issues Metrics - Exercise

• What are the most important questions to ask about Project Issues?
• What Issues Metrics might you use to answer these questions?
<table>
<thead>
<tr>
<th>Issues</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Is this project encountering more urgent issues that would be expected for its size and complexity?</td>
<td>Total number to date versus projected / historic number</td>
</tr>
<tr>
<td>Are Action Items being closed in a timely manner?</td>
<td>% of Action Items open for &lt; 30 days listed by urgency [100 is a good number]</td>
</tr>
<tr>
<td>Are there significant Action Items that the project team cannot bring to a close?</td>
<td>% of Action Items open for &gt; 30 days listed by urgency [0 is a good number]</td>
</tr>
<tr>
<td>Has adequate planning been done for this project?</td>
<td>Number of issues that cause a change in project baseline or forecast</td>
</tr>
</tbody>
</table>
Opportunity Metrics - Exercise

• What are the most important questions to ask about Project Opportunities?
• What Opportunity Metrics might you use to answer these questions?
# Opportunity Metrics

<table>
<thead>
<tr>
<th>Question</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Have we taken advantage of cost-saving opportunities during contract negotiations?</td>
<td>Instances of cost reduction (e.g. purchase price of goods was less than expected; project has incorporated a novel approach offered by the vendor)</td>
</tr>
<tr>
<td>Has the project team seized opportunities to use labor-saving techniques?</td>
<td>Instances of labor savings (e.g. different approach allowed the same endpoint to be reached with fewer than planned hours)</td>
</tr>
<tr>
<td>Does this project benefit from good teamwork?</td>
<td>Instances of good stakeholder relationships (e.g. stakeholders praise their good working relationship with the project team)</td>
</tr>
<tr>
<td>Does this project have effective communication channels?</td>
<td>Instances of good communication (e.g. stakeholder identifies a new urgent issue &amp; the project team immediately resolves it)</td>
</tr>
<tr>
<td>Has the project team been empowered to appropriately manage risk?</td>
<td>Instances of positive risk (e.g. project team takes advantage of an advance in technology to cut cost)</td>
</tr>
</tbody>
</table>
Project Metrics

• Summary
  – First ask the question, then determine the metric
  – Review the PMBOK® Knowledge Areas
  – Build a Questions to Metrics library for your organization
  – Only use metrics that you really need
  – Questions may change over time (project phase)
  – Use metrics to manage risk (e.g. trigger events)
  – Engage metrics that will directly measure your progress toward specific project success criteria
Beyond Project Metrics

Looking beyond the project

- Business Goals
  - Project metrics do not tell the whole story
- The successful Projects Portfolio
  - A Portfolio has its own Goals
- PM Maturity
  - OPM3® is a goldmine of maturity metrics
Project Metrics

• Q&A
A Framework for Project Metrics

Deciding what to measure and how to measure it

Dr. Gary J. Evans, PMP
CVR/IT Consulting LLC
gary@cvr-it.com
www.cvr-it.com

Copyright 2006 CVR/IT Consulting LLC. No parts of this work may be used without the author's express permission.
Links of Interest

• Measuring and Managing Success – Karen White

• Project Success and Failures – Max Wideman

• Project Metrics – Max Wideman
  – http://www.maxwideman.com/issacons/iac1008/sld001.htm

• Balanced Scorecard Approach To Metrics
  – http://www.isixsigma.com/library/content/c011008a.asp
Links of Interest

• Measuring Project Health - Neville Turbit

• How project metrics can keep you from flying blind – Project Auditors
  – http://www.projectauditors.com/Papers/Whitepprs/ProjectMetrics.pdf

• Navigating with project metrics: Are we there yet? - Gary Pollice