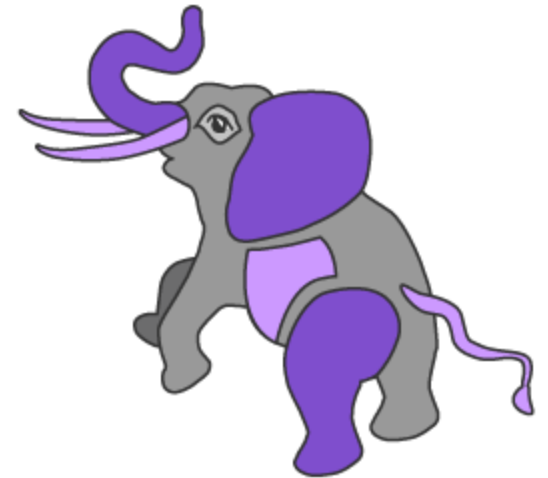


Measurement: the Elephant & the Blind Men (Misperceptions, Mistakes and Mitigation for Measurement Programs)



Topics

- The Measurement Problem
 - Tale of the Elephant & the Blind Men
- Measurement Success Factors
 - Why should you measure?
- Measurement Considerations:
 - Stakeholder Perceptions
 - Steps in the Measurement Life Cycle
 - Industry Model Guidance: the Capability Maturity Model Integration
 - Sample Measures by Stakeholder
- Summary.

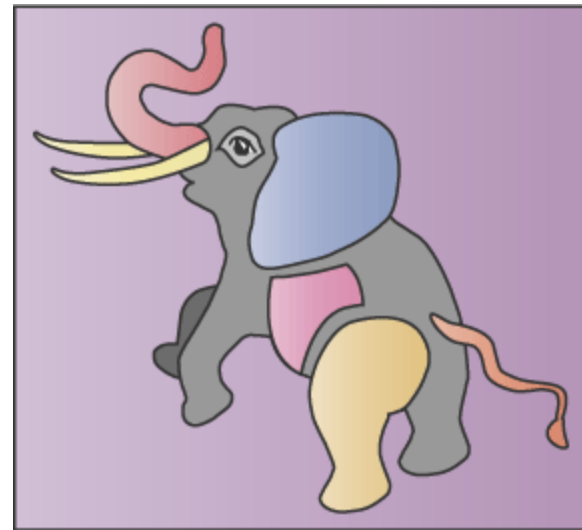
The Measurement Problem

- Struggles for effective measurement programs
 - What should we measure?
 - Do we have the infrastructure and tools to collect data?
 - Do we have the skills to analyze the data?
 - Can we transform the data into meaningful information?
 - Are resources allocated to maintain the measurement process?
 - Stakeholders ask, What do I do with the reports?
 - Is the information used appropriately to better the organization?
 - How do I evolve the ongoing measurement program?

Many programs fail for lacking clarity related to one or more of the above.

Tale: Elephant & the Blind Men

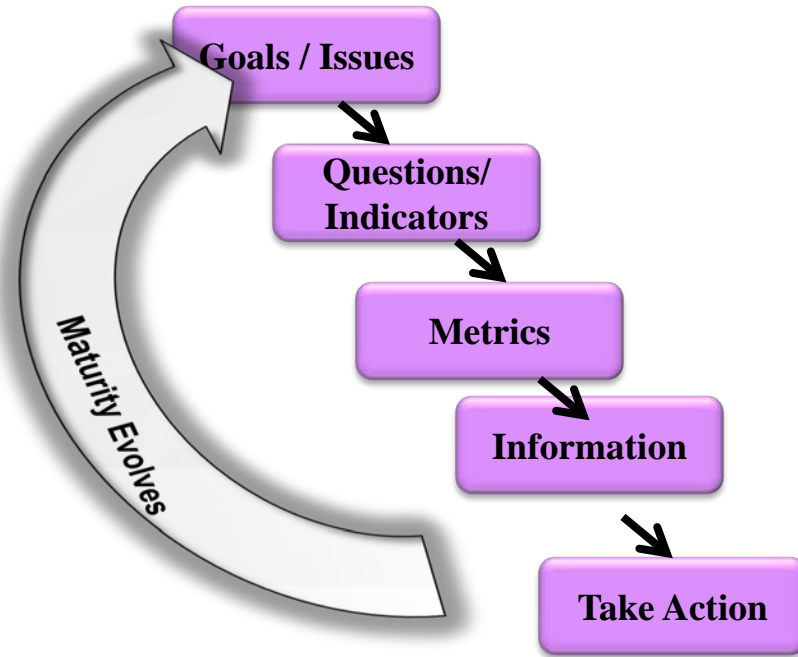
- The first man touched the leg, and said it was a pillar
- The second man touched the tail, and said it was a rope
- The third man touched the trunk, and said it was a tree branch
- The fourth man touched the ear, and said it was a fan
- The fifth man touched the belly, and said it was a wall
- The sixth man touched the tusk, and said it was a pipe.



Moral:

- **Everyone has a valid perspective**
- **Everyone wants input and needs an understanding of the bigger picture.**

Measurement Success Factors



Adapted from V.Basili, “The Goal Question Metric Paradigm”

- Obtain Sponsorship
 - Recognize key stakeholders
- Align IT priorities, decision making and measures with Business Goals.
 - Where are we today?
 - Where do we want to go?
 - What steps need to be taken?
 - Are we moving in the right direction?
- Develop a Measurement Plan
 - Ensure information collected is objective and adds value
 - Obtain resources and build the measurement infrastructure
 - Establish an ongoing measurement function.
- Obtain Measurement Expertise

Why should you measure?

- **Improve Portfolio & Project Management**
 - Provides objective visibility into the pipeline of projects and their progress
 - Enables more repeatable, predictable project results by leveraging historical data
 - Improves management decision making using objective data
- **Improve Product Quality**
 - Provides objective understanding of product quality and tradeoffs
 - Enables early identification of defects to save time and money
- **Improve Productivity**
 - Provides visibility into the software development process
 - Enables efficient processes to produce more work with the same resources
- **Recognize Improvement Opportunities**
 - Improves visibility into process issues to prioritize process improvement initiatives
 - Validates process improvements results
- **Improve Customer Relationships**
 - Allows objective understanding of needs and expectations
 - Increases product quality and customer confidence.



Senior Management Perception

Concerns:

- Am I meeting my shareholders' and customers' expectations?
- Can I deliver projects on time, within budget, scope and promised quality?
- What issues are getting in the way of delivery?

Misperceptions & Mistakes:

- Selecting measures is easy, just collect what is available.
- Missing expected information on the reports.
- Reports should be easy to get with limited effort.
- Once reports are produced, the job is done.

Mitigation:

- Obtain commitment to be involved in selecting measures that align with business goals and identifying reporting needs.
- Facilitate report requirements using a proven approach: G/Q/M.
- Obtain commitment to resources and the plan to build the infrastructure.
- Be prepared to educate how to use the reports – cultural change, plan for adoption and maintenance.

Project Manager & Team Perception

Concerns:

- Getting projects delivered on time, within budget, scope and promised quality
- Being recognized for doing a good job
- How the data will be used?

Misperceptions & Mistakes:

- Why do I need to provide all these measures?
- This is more work and I don't have time for it
- I didn't plan to collect the data and I don't have it.
- What am I getting out of the extra effort to provide the data?

Mitigation:

- Educate and communicate on:
 - The alignment of measures to organizational goals
 - Planning for data collection
 - Integrating the data collection into daily processes
 - Reviewing results for lessons learned, using the data to improve work products and to make your job easier.

Middle Management Perception

Concerns:

- Ensuring day to day operations are running smoothly and resolving issues
- What actions do I need to take from the reports?

Misperceptions & Mistakes:

- This is more work and I don't have time for it
- What do I do with this report?
- Using data to penalize individual performance.

Mitigation:

- Educate and communicate on:
 - The alignment of measures to organizational goals
 - Role expectations for data collection, use of reports, and process improvements
 - Using data to evaluate process improvement, not individual performance.

Steps in the Measurement Life Cycle

1. Measurement Planning

- Engage Senior Management in aligning metrics to informational needs
- Plan the Measurement Project: define, develop, pilot and integrate the metrics
- Establish a Measurement Framework that is visible to the organization

2. Measurement Design & Development

- Identify measures currently in use
- Recognize the gaps to be addressed
- Establish Metric Profiles: purpose, goal, data collection sources, & report prototypes
- Establish the tools to store & analyze the data
- Establish communication & training

3. Measurement Integration

- Communicate & train on measurement
- Collect and analyze the data
- Prepare the reports for various audiences including action steps
- Present reports to various stakeholders and obtain feedback

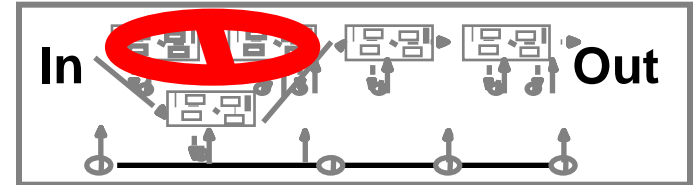
4. Repeat the Measurement Life Cycle

- Check the effectiveness of the measurement process
- Validate the measures with any changes to the goals.
- Enhance data collection and analysis through automation

CMMI Maturity Levels

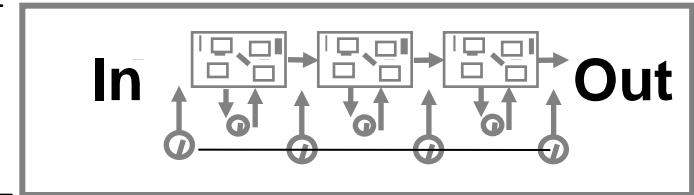
5 Optimizing
Focus on continuous quantitative improvement

Organizational Innovation and Deployment
Causal Analysis and Resolution



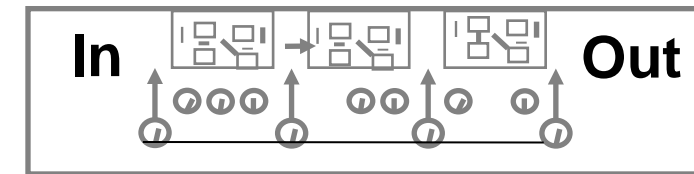
4 Quantitatively Managed
Process measured and statistically controlled

Organizational Process Performance
Quantitative Project Management



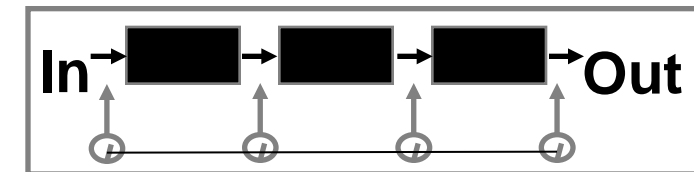
3 Defined
Organizational set of Standard processes

Requirements Development,
Technical Solution, Product Integration
Verification, Validation,
Org. Process Focus, Org. Process
Definition, Org. Training,
Integrated Project Management,
Risk Management,
Decision Analysis and Resolution

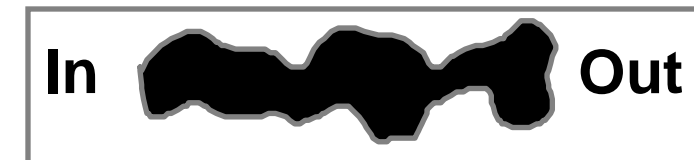


2 Managed
Basic Project Management

Requirements Management, Project
Planning, Project Monitoring and Control,
Supplier Agreement Management,
Measurement and Analysis,
Process and Product Quality Assurance,
Configuration Management



1 Performed
Process ad hoc, reactive



Industry Model Guidance: Capability Maturity Model Integrated (CMMI)

Level 2 – Managed Process

- Measurement & Analysis (MA)
 - SG 1.1 Align Measurement and Analysis Activities
 - SG 1.2 Provide Measurement Results
- GP 2.8 Monitor & Control the Process
- Focus is on project level data gathering for planning and performing work
 - Processes are planned and managed against the plan
 - Corrective action is taken when there is significant deviation from the plan
 - Project level counts, %'s, averages, and or trends
 - Sample Measures: planned vs. actual size, effort, cost, duration, # of requirements, # of changes, # of defects, etc.

Industry Model Guidance: Capability Maturity Model Integrated (CMMI)

Level 3 – Defined Process

- Project level data gathering and infrastructure is assumed
- GP 3.2 Collect Improvement Information
 - IPM SP 1.6 Contribute to the Organizational Process Assets (measures)
 - OPF SP 3.4 Incorporate Process-Related Experience into the Organizational Process Assets
 - OPD SP 1.4 Establish the Organization’s Measurement Repository
- Focus is on “Institutionalizing” standard measures across organization
 - Collect measures from planning and performing the process for future use and improvement recommendations for processes and assets
 - May require change to project measures to satisfy Organizational measures
 - Aggregate project and process measures for organizational analysis
 - Organizational level counts, %’s, averages, and or trends
 - Sample measures: Variance by project category in planned vs. actual, effort, cost, duration, Average # of requirements, # of changes, # of defects, etc.

Industry Model Guidance: Capability Maturity Model Integrated (CMMI)

Level 4 Quantitatively Managed Process

- Organizational Process Performance (OPP)
 - SG 1 Establish Performance Baselines and Models
- Quantitative Project Management (QPM)
 - SG 1 Quantitatively Manage the Project
 - SG 2 Statistically Manage Sub process Performance
- GP 4.1 Establish Quantitative Objectives for the Process
- GP 4.2 Stabilize Subprocess Performance
- Focus is on quantitatively managing processes to meet the quality and process performance objectives:
 - Select subprocesses that are significant contributors to the Quality and Process Performance Objectives
 - Identify special causes of variation to statistically managed performance
 - Provide insight to stakeholders for future decision making
 - Sample measures: Upper and lower control limits for significant processes such as project productivity, project quality, etc.

Industry Model Guidance: Capability Maturity Model Integrated (CMMI)

Level 5 Optimizing Process

- Organizational Innovation & Deployment (OID)
 - SG 1 Select Improvements
 - SG 2 Deploy Improvements
- Causal Analysis & Resolution (CAR)
 - SG 1 Determine Causes of Defects
 - SG 2 Address Causes of Defects
- GP 5.1 Ensure Continuous Process Improvement
- GP 5.2 Correct Root Causes of Problems
- Focus is on quantitative process improvement
 - Continual improvement by addressing common causes of process variation
 - Incremental and innovative technological improvements
 - Predict and assess the impact of change
 - Sample measures: Return on Investment, Measured change in project productivity, product quality, # of risks mitigated, etc.

Sample - Project Estimates

Level 2

- Generate basic project estimates such as size, effort, cost, and schedule
- Use historical data, simple estimating models and techniques (if available)
- Monitor “actuals-to-date” against the plan and initiate corrective action as needed

Level 3

- Use standard estimating methods and tools maintained by the organization
- Collect project data in a central repository for use in estimating future projects
- Analyze estimation trends and report results to stakeholders
- Incorporate lessons learned and other improvements to estimation methods and tools

Level 4

- Use process performance models to predict interim results and project outcomes
- Apply statistical methods to manage critical subprocesses
- Identify, address, and eliminate special causes of variation
- Apply quantitative techniques to manage the overall project

Level 5

- Factor future process and technology improvements into project estimates
- Improve process capability by identifying and addressing common causes of variation
- Calibrate process performance models with data that reflects improved performance.

Sample - Defects

Level 2

- Identify, collect and review defects during testing

Level 3

- Conduct Peer reviews to enable phase containment of defects
- Perform Verification and Validation activities throughout the project life cycle
- Store defect data in a central repository
- Conduct Trend analysis on defect data and share the results with stakeholders
- Identify and implement improvements based upon defect analysis results

Level 4

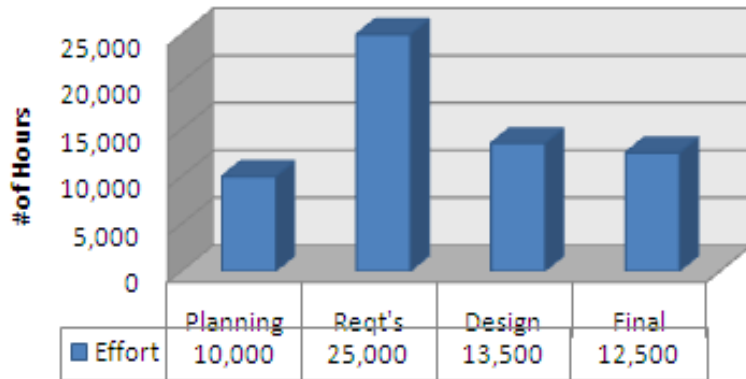
- Use Peer review and test-detected defects as a basis for statistical control
- Use Process performance models to predict customer satisfaction based on defect trends
- Identify, analyze and eliminate special causes of defect variation

Level 5

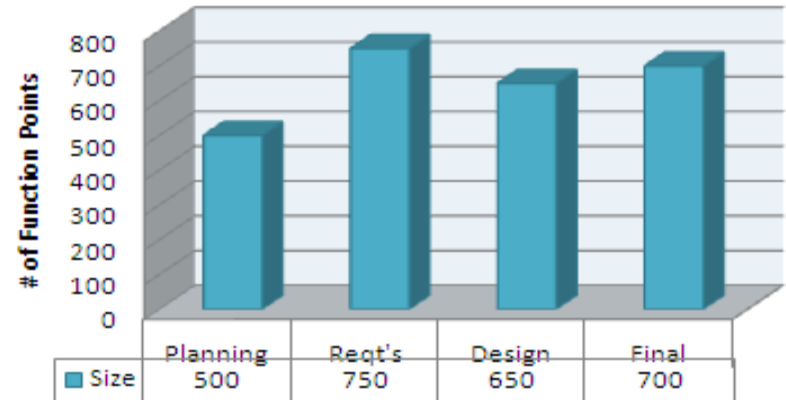
- Determine and eliminate the root causes of defects
- Introduce process and technology changes to lower the number of defects injected and to further improve the defect detection rate.

Sample View - Project

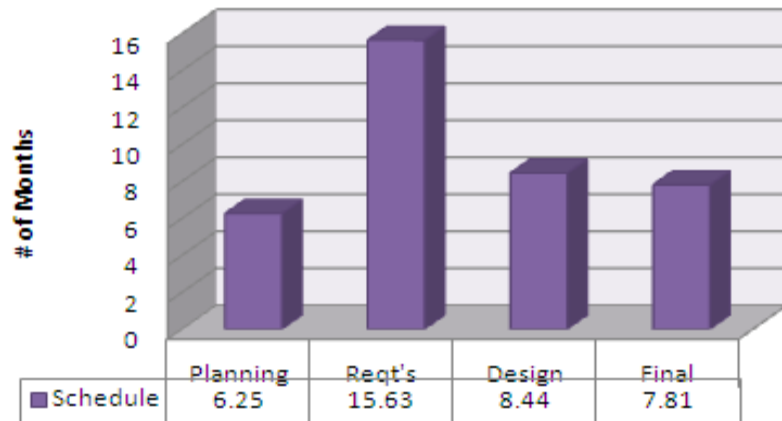
Project Life Cycle Effort



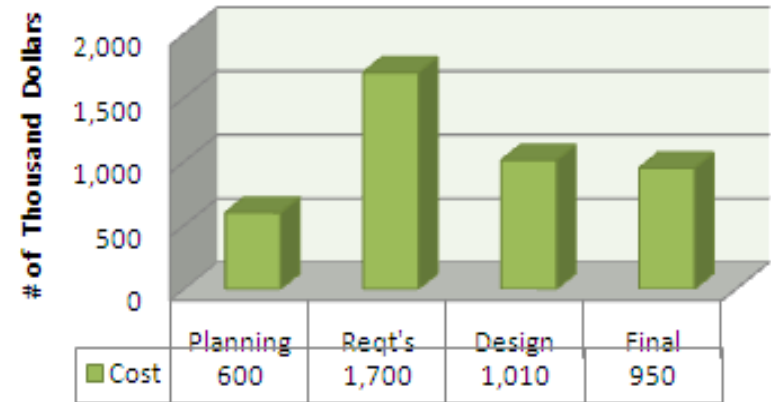
Project Life Cycle Size



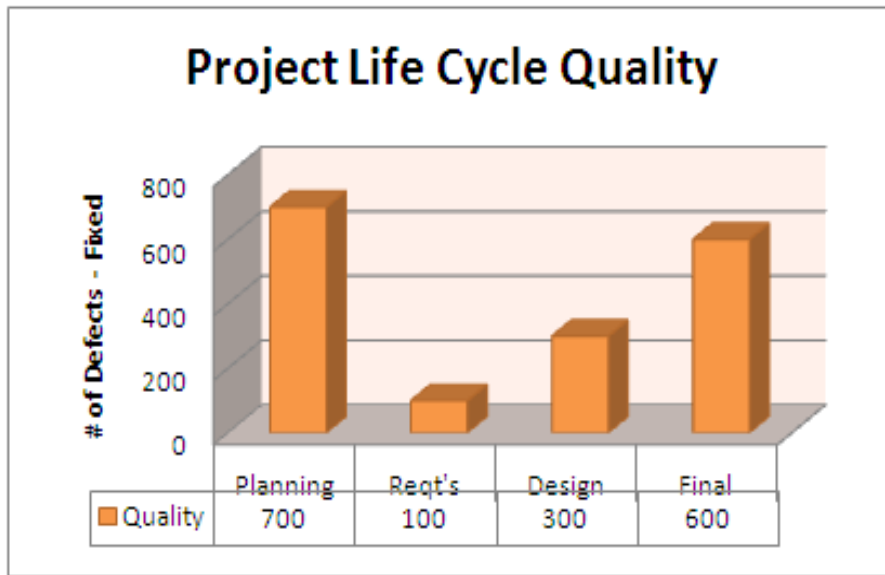
Project Life Cycle Schedule



Project Life Cycle Cost



Sample View – Project continued



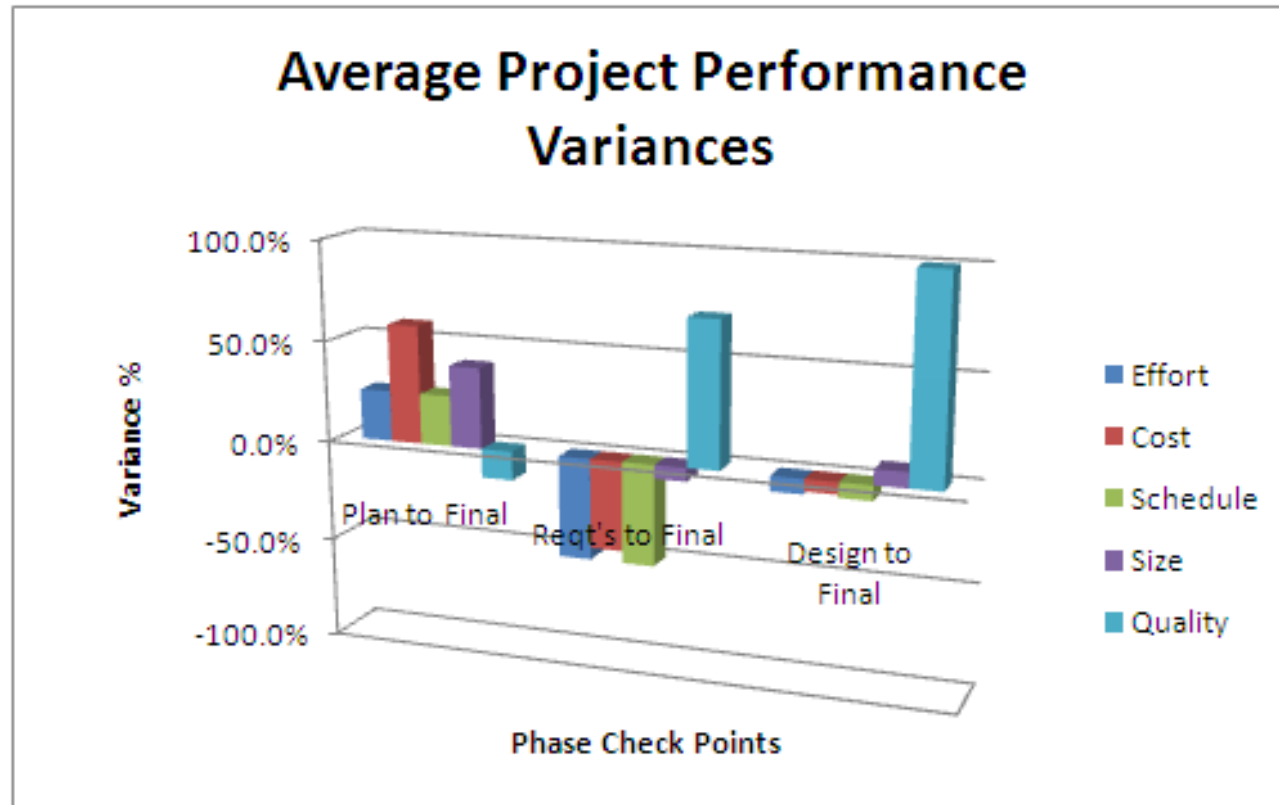
Some Questions to Consider:

- Are the right # of resources allocated?
- Can the promised functionality be delivered?
- Will the project meet the expected target date?
- Will the budget cover the project costs?
- What is the quality of the product and what risks are foreseen?
- What trade offs need to be made?
- At the end:
 - What did you learn?
 - What would you have done differently?

Goal:

- Use “all” pieces of information to understand the various aspects of the project: scope, effort, cost & quality
- Collect and analyze project data to manage trade-offs.
- Provide project data to be leveraged on future projects.

Sample View - Organizational



Sample View – Organizational continued

Some Questions to Consider:

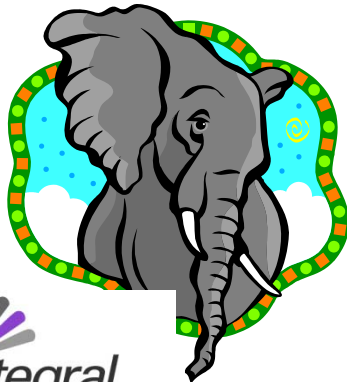
- Does the Portfolio allocation align with the goals?
- Are the staff focused in the right projects?
- Are we as productive as we could be?
- Are projects delivering on time, within budget, with promised functionality and desired quality?
- What trade offs need to be made?
- At the end:
 - What did you learn?
 - What changes need to occur?

Goal:

- **Use “all” pieces of information to understand the organizational picture of project and process health**
- **Collect and leverage project and process trends to improve predictions and better manage commitments.**

Summary

- Obtain sponsorship and identify stakeholders
 - Recognize perspectives and mitigate concerns
- Align metrics to informational needs and goals
- Develop and execute the measurement plan
 - Define, integrate and report information to stakeholders
 - Keep stakeholder needs in mind
 - Understand the industry best practices
- Obtain Measurement expertise to guide you to success
- Periodically, review the effectiveness of measures and alignment to business needs.



Moral:

- **Truth lies in an individual perspective**
- **Greater truth lies in a collective perspective.**

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About Us . . .

Mary DeFoe, CSQA, a Principal of Integral Process Solutions, has 24 years of information technology experience. The last 13 years have been in Management, Project Management, and leading PMO's, Process Improvement initiatives and Quality Assurance & Quality Control organizations.

Ms. DeFoe has multiple years of hands on experience in a variety of industries (Retail, Insurance, Financial, Legal). She has successfully managed and prepared organizations to achieve CMMI Levels 2 / 3 and is a CMMI enthusiast. In addition, she has successfully established infrastructures for PMO's, Quality Process Teams, Testing Center functions and Software Measurement Programs. Also, she has consulted and trained over 500 students on project management and quality principles.

Academically, Ms. DeFoe has a BA in Management Information Systems, a Masters in Project Management and is a Certified Software Quality Analyst. She is also a member of the Software Engineering Institute, the Project Management Institute, and the MN Twin Spin.

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