Applying CMMI High Maturity Practices and Leveraging LEAN Six Sigma

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History

- April 02
  - We achieved CMM level 4 rating
- January 03
  - We achieved CMM Level 5
- June 04
  - We achieved CMMI Level 5
Wow weren’t we something?
Moving to CMMI Level 4

- At Level 3 we began gathering lots of data
  - Cost
  - Schedule
  - Estimation
  - Defect...
- At Level 3 we began using control charts
- At Level 3 we began using and building models built on industry and project data
We are Process Improvement Professionals

We have lots of experience
  – Creating process documentation
  – Developing flow-charts
  – Developing IDEF charts
  – Conducting process evaluations
  – Software and Systems Engineering
We Have Support

- Senior Management backs activities and decision making
- SE and SW Functional managers are proponents and participants
- We have several years worth of data
- We have consulting support
What’s Wrong With This Picture?

We are dissatisfied with our efforts

“…I see the data but I don’t know what it means…”

“…I can’t ask a project to change behavior when we only have a few data-points…”
We Could Do Things Different

– Six Sigma and the Lean Enterprise
  – Value Stream Mapping
    – Current and future states
    – Instrumented
    – Provides simple model of process
What is Value Stream Mapping (VSM)

- Identify steps in process selected for improvement
- Understand process flow
- Understand bottlenecks
- Brainstorm ways to reduce bottlenecks
- Make process change
Consider Engineering Process

High-Level Engineering VSM Current State

Analyze Requirements
Allocate Requirements
Preliminary Design
Detail Design
Design Implementation
Product Testing

Peer Review
Peer Review
Peer Review
Peer Review

Perceived Bottleneck
Analyze Perceived Bottleneck

High-Level Peer Review VSM

- Plan
  - Measure: Time Spent
- Inspect
  - Measure: Time Spent
- Report Back
  - Measure: Time Spent
- Rework Resolve Issues
  - Measure: Time Spent
- Analyze Data
  - QPM OPP

- Defects
- Count
- Class
- Category
Understand Process

- Measurement and Analysis
  - VSM current process
    - Document time spent
    - Document # of individuals involved
    - Document size of product reviewed…

- Quantitative Management
  - Six Sigma/Statistical Analysis
    - Control Charts
    - Pareto and Histogram
    - Regression Analysis…
Analyze Outcome of Process Implementation

Organization Process Performance
– More Six Sigma
  – Regression analysis
  – Monte Carlo simulation
  – Histogram
PR Data Modeled

Control Factors/User Input
- Product type and size
- # Reviewers

Model Output
- Predicted Defect Escapes
- Predicted Defect Density
Establish parameters for application of peer reviews based on available resources, schedule and willingness to accept risk

- defects escaped is less than or equal to ‘x’, y% of the time
- expected cost of peer reviews
High-Level Engineering VSM Future State

- Organization Process Performance
  - Model of what will happen if changes are made
- VSM stays the same but time and cost can be altered
- Peer reviews necessary but time and effort can be modified to increase flow or meet quality needs
Analyze New Current State

- Project collects same measures
- Organization analyzes actual results
- Modeling helps to identify areas for improvement
Different Views

- OPP stuff is big and scary, requires lots of knowledge about data analysis and statistics
- Model to monitor and react
  - Identify areas for process improvement
- Model to test possible changes
We’re Beginning to Get it

– Six Sigma and Lean Enterprise pair well with CMMI
  – Help understand current process implementation and identify areas for improvement

– KISS
  – Keep it simple silly

– Don’t let the theory get in the way of the implementation

– The more we know the more we need to do