Enjoying the Scenery on the Road to High Maturity

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Agenda

• Background
• Goals
• Changes in Emphasis
• Software Engineering Process
  – Things we did well
  – PPQA Activities
• High Maturity Processes & Six Sigma
• DMAIC
• Variation in the data
• Ah Ha moments along the way
• Questions
Who are we?

• Small IT organization in a Federal agency
• Began applying Lean in 2005 and Six Sigma in 2007
• CMMI Assessments:
  – CMMI (Dev) ML 2 & CL 3 in 9 PAs – May 2007
  – CMMI (Dev) ML 3 – May 2008
Goals

• Working toward CMMI Levels 4 and 5
• Utilizing Lean Six Sigma Tools
• Incorporating Lean and Agile, ITIL Services Model
A Change in Emphasis

**From:**
- Employees are the problem
- Doing my job
- Understanding my job
- Measuring individuals
- Change the person
- Correct errors
- Who made the error?

**To:**
- The Process is the problem
- Helping to get things done
- Knowing how my job fits in the process
- Measuring performance
- Change the process
- Reduce variation
- What allowed the error to occur?
Software Engineering Process (SEP)

GOAL
105 days

Loop 0
Reqmts

Loop 1
Plans

Loop 2
Design/Dev

Loop 3
Test/Impl
Things we did well

• Clearly defined business goals
• Tied metrics to those goals
• Established standard processes
• Business Goal Example: Productivity
  – Measure lead time
  – Goal to deliver small iterations in 105 days
• Implemented Software Process Improvement Program (SPIP)
  – Empowered workforce to recommend changes to process and tools
PPQA Activities

- Quality Assurance/Tester part of the Product Team
- Real time audits and the end of each Loop
- Quality Assurance Closeout Review (QACR) documenting non-compliances and opportunities to improve
Fewer Process Compliance Defects…
This is good, right?
High Maturity & Six Sigma

• Expect you to look deeper into the data
• Metrics become even more important
• Are processes consistent?
• Are operators consistent?
• Are there stable trends (predictable)?
• What is the variability?
• Identify sub-processes that should be statistically managed
• Identify improvement opportunities
DMAIC Methodology

Define
ID Problem
Scope
Set Goals
Charter

Measure
Observe
Measures
Evaluate
Gather Data

Analyze
Patterns
Root Cause
Critical Factors

Improve
Criteria
Make Change
Pilot
Plan/
Implement

Control
Control Plan
Document
Process
Train
Implement

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FY08 Lead Time

I-MR Chart of G6 LT FY08

- UCL = 417.5
- X̄ = 175.8
- LCL = -65.9

- UCL = 296.9
- MR = 90.9
- LCL = 0
FY09 Lead Time

I-MR Chart of G6 LT FY09

- Individual Value
- Moving Range

Observation

UCL = 590.9
\( \overline{X} = 263.8 \)
LCL = -63.3

UCL = 401.9
\( \overline{MR} = 123 \)
LCL = 0
More Data

Larger jobs but Loop 3 stayed close to spec even though job size and LT increased.
Variation Among Teams
Now What?

- Root Cause Analysis – Fishbone
- Identified need for Requirements Standards and consistency across Team Leaders (TL)
- Suggestion made to review data by TL for standardization opportunities
Fishbone Diagram

Critical Xs That are Causing the Y (Effect)

External Factors
- LMP
- DOIM vs G6TSC
- Event Driven Delivery
- Security
- Vendor Releases

Tools & Technology
- SEP Downtime
- Learning Curve new tech
- Release Mgt (IAVA, Ora)
- Interface btwn products
- Poor Data Metrics
- Technology chosen skills

Resources
- Lack of urgency
- Need people data
- Lose people
- Moving priorities (licenses & people)

Process
- No COTS process
- Job complexity (reqmts)
- Reports definition
- Customer Tradeoff
- Flexibility for small jobs

Changing Policies and Requirements
- Security
- Scope creep
- No Reqmts Standards
- Changing Reqmts

Changing Policies and Requirements
- Customer
- G6 Mgt
- Vendors/upgrade
- Deadlines

Variation In Lead Time

External Factors
- No defined protocol
- Changes to PT/DT (esp for SCRs)
- Large Scale Implementation
- SA/DBA (who does what)

Tools & Technology
- Excessive tasks
- Unbalanced
- Org Structure
- Based on functions
- Rework

Resources
- Lack of dev skills
- Impact to sched
- Timelines
- No sand box
- LMP
- Non-gov SEP savvy (balance)
- Lack of nec tng

Process
- Waiting for approval
- Change requirements
- Availability
- Turnover/unstable
- Uncooperative

Training/Skills
- Customer

Priorities
Reality

• Mean is out of control!
• Need to reduce the variation in the Requirements Development sub-process
• Requirements Complexities are inconsistent
Next Steps

• Conducted Rapid Improvement Event
  – Defined new requirements standard
  – Defined new criteria for requirements complexity
  – Established Technical Specification for improved design

• Pilot Changes
Ah Ha! Results

- Identified key sub processes to control
- Identified root causes which became improvement opportunities
- Created new requirements standards
- Improved process for identifying complexities
- Piloting changes
  - Teams predict faster cycle time
  - Improved testing
  - Better quality software
Summary

• CMMI and Six Sigma work well together
• We are using the model and methodology for the right reasons
  – Tied to business goals
  – Continuous Process Improvement
• Higher Maturity is worth the effort
  – Improved data based decision making
  – Reduced variation
  – Improved quality
Questions?