Debating the Tough Change Requests: Appraisal Perspectives

Software Engineering Process Group Conference
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Agenda

- **Organizational Background**
- **Challenges Solved**
  - Reducing SCAMPI A Costs
  - Dealing with Ambiguity in the CMMI Model
- **Remaining Challenges**

Northrop Grumman Mission Systems

- A leading integrator of complex, mission-enabling systems
- 2003 Sales - ~$4.1B
- 18,000 employees in 50 states and in 23 countries
- 1500 active contracts
- Deep, legacy domain expertise in priority, high-growth segments
- Premier provider of mission critical end-to-end solutions

Joint National Integration Center

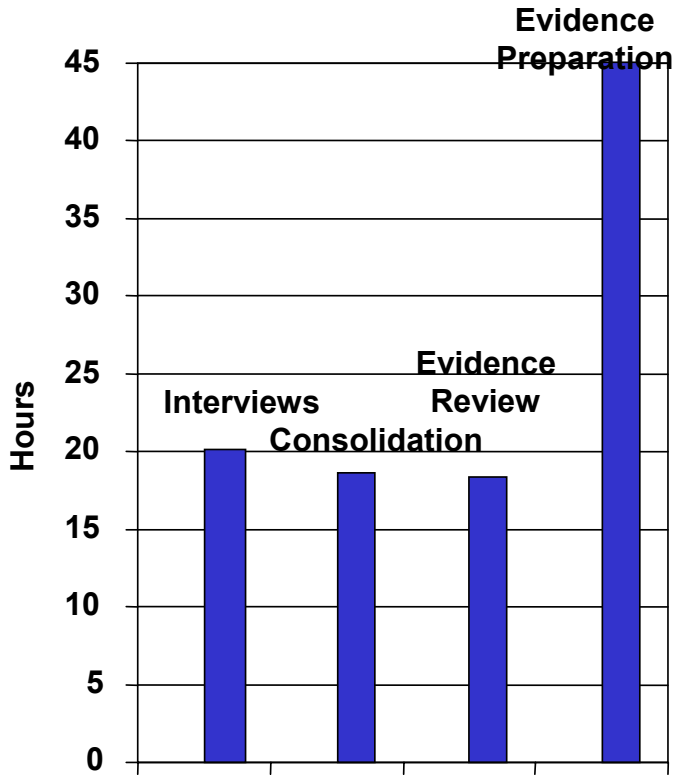
Intercontinental Ballistic Missile Program

Satellite Command & Control

Focused on program performance

Applying Six Sigma To Appraisals

- **Several Six Sigma projects were conducted to optimize the SCAMPI appraisal process**



"Minimizing SCAMPI Costs via Quantitative Methods, "
R. Hefner and Ron Ulrich, CMMI Technology Conference & User Group, 17-20 November 2003

- **Collected metrics on time spent on various appraisal activities, defects**
- **Used Pareto chart to identify bottlenecks, opportunities for improvement**
- **Used individuals charts to study variation in the appraisal process**
- **Used fishbone charts and other causal analysis methods to identify potential improvements**

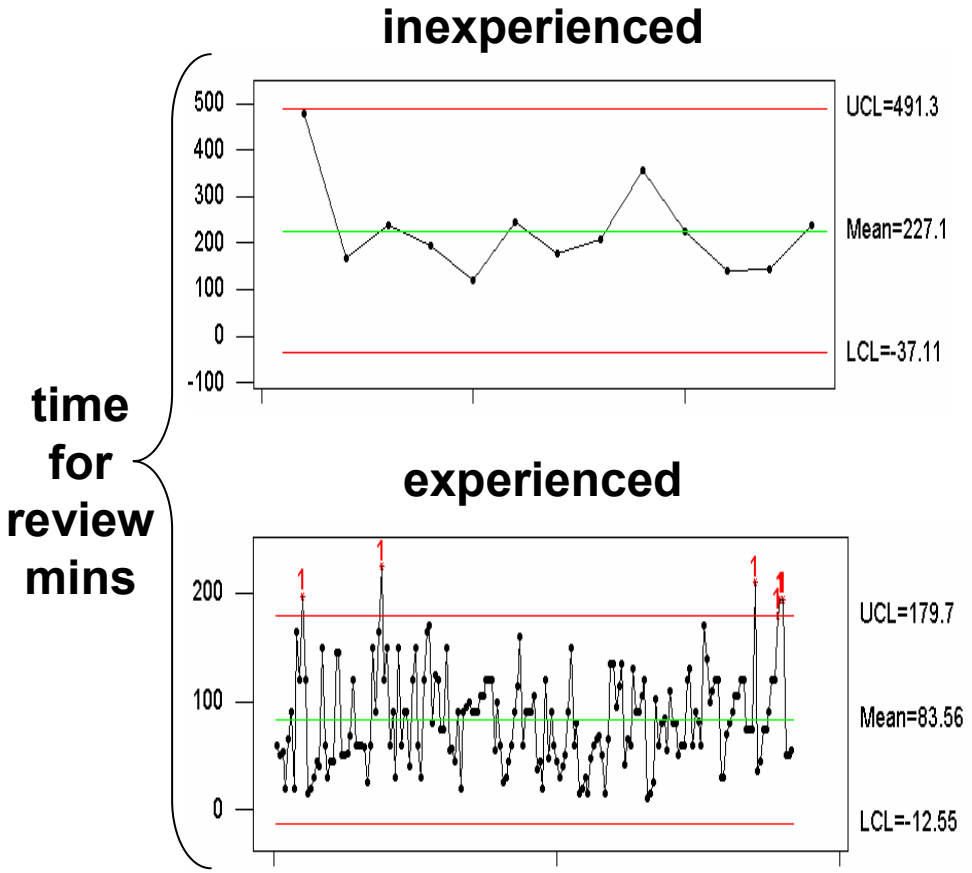
Reducing Appraisal Time by Better Preparation

Date:	1-Oct-03	© 2003 Northrop Grumman Space and Mission Systems	Software POCs	Last Name	First	Phone Number	Systems PC
Project:		SAT Version 4.3e	Project Manager:				Project M
Division:	Select a Division	CMMI_SAT_2K_V4_3e.xls	Project SAT POC:				Project SA

Tool Controls							LOE ◉ Hide ○ Show	Software Engineering						
	Levels	○ Level 2	○ Level 3	○ Level 4	○ Level 5		ORG ◉ Lock ○ Unlock							
	Scope	◉ All	○ Plan	○ No Plan	○ My Ans'r Area									
CMMI & ISO Ref		Export	Maturity Level		Import		Typical Evidence	Baseline Status	Current Status	Actual Evidence	Implementation Plan	Implementation Actual	Remarks	Baseline Status
Level 2 – Managed								Level 2 – Managed						
Requirements Management								Requirements Management						
	SG 1	G	Requirements are managed and inconsistencies with project plans and work products are identified.											
ReqM	SP 1.1	P	Does the project develop an understanding with the requirements providers on the meaning of the requirements?				meeting records, review records, an agreed to set of written requirements	No						
ReqM	SP 1.2	P	Does the project obtain commitment to the requirements from the project participants?				sign off	No						
ReqM	SP 1.3	P	Does the project manage changes to the requirements as they evolve during the project?				CM records, change requests, CCB records, sign off	No						
ReqM	SP 1.4	P	Does the project establish and maintain bi-directional traceability between the requirements and the project plans and work products?				requirements traceability matrix, requirements tracking system, test verification matrix	No						
ReqM	SP 1.5	P	Does the project identify inconsistencies between the project plans and work products and the requirements?				revision histories, change requests	No						
	GG 2	G	The process is institutionalized as a managed process.											
ReqM	GP 2.1a (CO 1)	S	Does the organization establish and maintain a policy for planning and performing the requirements management process?				organizational policy (e.g., Systems PRM 931 Requirements Development and Management)	No						
ReqM	GP 2.2 (AB 1)	P	Does the project establish and maintain the plan for performing the requirements management process?				project plans	No						

- **Most appraisal time is spent mapping evidence to CMMI practices**
- **A Self-Assessment Tool was created to organize the mapping**
  - Serves as the PIID
- **Can generate compliance statistics across any level of the organization**
- **Used to generate evidence review and interview worksheets for the appraisal team**

Reducing Variation in Evidence Review



- **The time is takes to review evidence is predictable**
  - Some variation by process area
- **The mean review time and variation is much higher among inexperienced appraisers**
  - At least half of the appraisers on the team should be experienced
- **Review time is driven by the clarity with which evidence is assembled and mapped to the CMMI practices**
  - Ensure thorough evidence scrub prior to on-site period
  - Bad evidence (“defects”) causes unexpected schedule overruns

Optimizing Interviews by Using SCAMPI Philosophy

- **To reduce cost:**
  - Used pre-scripted interview questions
  - Conducted interviews simultaneously in mini-teams
  - Scheduled one interview per practice & instantiation (no SCAMPI requirement for multiple interview sources like in CBA IPI)
- **Maintain appraisal accuracy by emphasis on direct evidence**
  - Interviews simply confirm that the evidence is “real”
  - Interviews are <u>not</u> a test of how well someone remembers the practice

Reducing Consolidation Time

Crafting observations

- **Voice of Customer data indicates organizations and projects simply want to know which practices they do not comply with**
  - Consistent with Verification mode
  - No need to wordsmith charts
- ✓ **Created an Appraisal Findings tool to capture the ratings at the instantiation level (every project, every practice)**
  - Simplifies data consolidation, team discussion

Reviewing as a team

- **Most of the time is spent arguing about how to interpret a few CMMI practices**
  - Especially Generic Practices
- ✓ **Created "CMMI Interpretation" training which clarifies how ambiguous practices will be evaluated**
  - Driven by areas where disagreement occurred
  - Useful in reaching team (and organizational) consensus

Ten Most Misinterpreted CMMI Practices

- **Requirements Management**
  SP 1.4 Maintain Bidirectional Traceability of Requirements
- **Project Planning**
  SP 1.2 Establish Estimates of Work Product and Task Attributes
- **Project Monitoring and Control**
  SP 1.1 Monitor Project Planning Parameters
- **Measurement and Analysis**
  SP 1.1 Establish Measurement Objectives
- **Configuration Management**
  SP 3.2 Perform Configuration Audits
- **Verification**
  SP 2.2 Conduct Peer Reviews
  SP 2.3 Analyze Peer Review Data
- **Risk Management**
  SP 1.1 Determine Risk Sources and Categories
  SP 1.3 Establish a Risk Management Strategy
- **Generic Practices**

"The 10 Most Commonly Misunderstood CMMI Practices, " R. Hefner, CMMI Technology Conference & User Group, 17-20 November 2003
"Applying CMMI® Generic Practices with Good Judgment, " R. Hefner and G. Draper, CMMI Technology Conference and User Group, 15-18 November 2004

Measured Success

- **We are typically conducting Level 5 SCAMPI appraisals in 5-6 days**
  - Based on over 30 SCAMPI A appraisals
  - 3-4 projects, 6-9 appraisers, 3 mini-teams, 10 hour days
  - Significant cost savings
- **Post-appraisal follow-up indicates >95% accuracy rate**
- **We are continuing to look at ways to decrease the preparation time**
  - Evidence notebook organization
  - On-line evidence

Remaining Challenges

- **Overcoming the industry perception that SCAMPI A's require 2-3 weeks of 16 hour days**
  - We've proven that 1 week of 10 hour days are possible, given training, tools, and experience
- **Establishing ethical industry standards for sampling projects**
  - We do not sample – we assess ALL projects
- **Educating the customer on how to evaluate appraisal results**
  - Customers should request and know how to read an Appraisal Disclosure Statement
  - B and C methods are not as accurate as SCAMPI A's