Implementing Measurement and Risk Management in CMMI

Fifth Annual PSM Users’ Group Conference

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What are TACOM ARDEC Improvement Efforts?

US Army TACOM-ARDEC

- **Pilot Site** for CMMI
- **Our Focus** – **Measurement and Analysis (M&A) and Risk Management** Process Areas
- **Describe Implementation of**
  - Process Areas
  - Lessons Learned
Transitioning to a New Software Enterprise

- **A Lot of Fast-paced Change**

- **Organizational Change** Combine the Software Missions Of:
  - Quality Engineering Directorate (QED),
  - 2) Lifecycle Support Engineering Center (LCSEC)

- **Implement Process Improvement**

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**ARDEC Organizational Structure**

[Diagram showing ARDEC's organizational structure with different centers and teams.]
Objective - Be Primary Source for Army Software Expertise.

- **Common Vision-Integrated Organizational Processes**
  Assuring Quality Products and Services to All Customers

- **Processes Go Beyond the Government and Into Our Business Partners**

**Process Implementation Model**

1. **Customer Requirements**
2. **Organizational Standard Process**
   - Policies
   - Organizational Level Management Procedures
   - Project Level Management Procedures
   - Training, Forms, Templates & Tools
3. **Customer**
4. **Develop Project Plan**
5. **Execute Project (Per Plan)**
6. **Tailor Standard Process**
7. **Measure & Assess Processes & Products**
8. **Customer Feedback**
9. **Deliverables (Products & Services)**
Practical Software and Systems Measurement

Short-Term Goal

• **Achieve CMMI Level 3 Within Next 6 Months to Be Consistent With DOD Directive**

• **Implement M&A and Risk Management Processes With Approved Plans on at Least 14 Projects of Various Types**
  
  o **Mission Software Development or Acquisition Support- E.G. Crusader, Paladin (8)**
  
  o **Infrastructure Support – CM, QA, PEG, LSM (4)**
  
  o **Technical Support – PSM, TAI (2)**
  
  o **Additional Upcoming New Starts/restarts (4)**
Constraints

- **Aggressive Implementation Schedule**
  - CMMI Audit Jan 01 – Assessed at Level 2 with 4 projects
  - Target CMMI Level 3 by end of FY 01 or early FY02

- **New Processes** are Just Being Implemented

- **Middle Management Support**

- **Cultural Change**

- **Previous Process Improvement Efforts Failed** in Parts of Organization
Assumptions

• **Clearly Defined Objectives and Tasks** for Each Project

• **Trained and Experienced Workforce** Capability

• **Workforce and Management** Buy-In
Proactive Approach to Risk and M&A Processes

Org Std Process
- Policy Procedures
  - Policies and Procedures Tailored to Project

Project Plan
- Task Definition
  - WBS, Schedule Process, Product Objectives

App A
- Risks
  - Context
    - Objectives (see Project Plan)
    - Assumptions, Constraints Risks / Problems / Obstacles (detailed profiles)

App B
- Measures
  - Information Needs
    - Project-Specific and Applicable Organizational Measures

Proactive – Integrated Approach to Risk Management and Measurement Planning Upfront, as Part of Project Planning
Established the Foundation

Performance Management Policy

- Risk Management Procedure
- Measurement and Analysis Procedure
- Estimation Procedure
Risk Management Procedure

• Complies with IEEE Standard 1540
• Requires Projects > 1 Staff Month of Effort

To:

- Identify Project Objectives, Constraints, and Assumptions
- Develop and Prioritize Risk Profiles
- Identify Measures to Monitor Risks
- Document in Risk Management Plan
- Link to Measurement Plan
Risk Management Plan

- Risk Management Plan is Appendix A of Project Plan

Link
- Project Objectives
- Constraints
- Assumptions
- Risks/Obstacles to achieving:
  - Project Objectives
  - Project Tasks
- Measurement & Analysis

Risk Plan Outline
- Contained in Risk Management Procedures
Measurement and Analysis Procedure

• *PSM is the Basis*

• *Requires Projects > 1 Staff Month of Effort to:*
  - Identify Project Specific Issues
  - Specify Measures
  - Consider Organizational Measures
  - Document in Measurement Plan and Measurement Specification
Measurement and Analysis Plan

- Measurement Plan is Appendix B of Project Plan

Identify
- Project Specific Issues and Link to Risks/Obstacles
- Consider Organizational Measures
- Specify Measures

- Measurement Plan Outline
  - Contained in Measurement Procedures
Practical Software and Systems Measurement

Estimation Procedure

• Extracted from PSM
• Plans for further development
Determined Multi-Level Measurement Requirements

Through Workshops at Executive and Project levels
Executive Level Workshop

- Organizational Objectives and Information Needs Identified
- Organizational Measures Identified and Prioritized
  - Started With Prioritized Common Measures
    - Cost
    - Schedule
    - Effort
    - Size
    - Defects
    - QA Audits
Organizational Measures

• Sample Organizational Measures
  o Sample Tailoring
  o Projects Tailor Measures to Their Type of Project

• Documented in Organizational Measurement Plan

• Collected in Organizational Measurement Repository
Project Level Workshop

Identified Project-specific information Needs, Issues and Risks

- Identified High Priority Process Elements and Products
- Integrated Organizational, Project, and Customer Information Needs
- Leveraged and Selected Applicable Organization-level Measures
Follow-on Support

- Provided **Training Sessions** in PSM and Procedures
- Conducted **Project Specific Workshops** and Discussions
- Provided **Tailoring and Implementation Guidance**
- **Peer Reviewed** Risk and Measurement Plans
Lessons Learned

Best Advice – Start By Thinking

- Identify What Your Job Is, Is Not
  - Technical tasks, activities, and WBS elements vs. go to meetings and answer the phone
  - Provides a starting point

- Identify Objectives, Constraints, Assumptions and Information Needs

- Identify Risks and Issues and Go From There

- Maintain the Link Among the Risks, Issues and Measures
Process Improvement Takes an Investment

**Time**
- Shortcuts Take Longer – Watch Out for Rework, Quality Suffers
- Watch Lag Time Between Defining Process on Paper and People Actually Doing the Work
- You Can’t Schedule a Culture Change

**Money/Effort**
- To Reap the Benefits, You Have to Invest First
- It’s Not Cheap
- Check-in-the-box Processes Without Thinking Doesn’t Work

**People**
- One-on-one Discussions and Face Time Get the Heart of the Matter
- All Levels of Management Need Face Time, Not Ghost Time

**Training**
- Focus on the Fundamentals, Core Knowledge
- Processes Don’t Mean Much Without the Core Knowledge
Check-in-the-Box Syndrome
Templates Work and Don’t Work

• They Identify What Needs to Be Done
• They May Save Time
• It’s Easy to Bypass the Thinking Behind Them
• Some People Felt Obligated to Use Prescribed Format Instead of Doing What Made Sense; Especially With Different Projects Types
• Focus Initially on the Project Level

Some People Were Confused With Tailoring

• Ended up Copying and Pasting the Procedure Instead of Making It Specific to Their Project
• People Were Getting Confused When Talking About Organizational Needs
• Put Benefits in Terms of What It Means for Your Job, Your Project
• Need the Workforce and Project-level Buy-in in Order to Get to the Organizational Level
Getting It To Work

Go Back to the PSM Basic Principles

- Issues and Objectives to Drive Measurement Requirements
- Measures Based on Technical and Management Processes
- Level of Detail Sufficient to Identify and Isolate Risks & Problems
- Independent Analysis Capability Implemented
- Systemic Analysis Process to Trace Measures to Decisions
- Measurement Results in Context of Other Project Information
- Measurement Integrated Throughout Life Cycle
- Measurement Process As a Basis for Objective Communications
- Focus Initially on Project Level Analysis
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