Consistency in Quality Assessments

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Harris Corporation
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Providing Value To Our Customers

Aviation electronics

Space and ground satellite communications systems

Intelligence, surveillance, and reconnaissance

Communications and information networks

Operations and support services

Situation

- Program showing signs of difficulties
- How to determine if the problem is:

Tip of the Iceberg or Blip on the Radar Screen

Use Process Compliance to help assess
Agenda

• Background
• Action
• Results
• Conclusion
• Suggestions
Background

• Harris policy requires compliance to Integrated Process Manual (IPM) as tailored by each program
• IPM specifies requirements for all required models, standards and best practices for program execution
• Harris monitors compliance to IPM using Process Compliance Monitor (PCM) tool
  – “What You Measure You Will Improve.”
    – author unknown
• IPM Compliance is a leading indicator for programs
• If a program is having trouble
  – is it the tip of an iceberg or
  – just a blip on the radar
• Need to find out, need to look at Process Compliance
Definitions

- **Process Requirements** – statements that explain what products or processes are expected for proper program execution of required processes
- **Process Baseline** – process requirements accepted or modified by program for their application of the process requirements, considered a tailored baseline
- **Process Compliance** – demonstrating implementation of required processes per tailored baseline

At Harris we capture a compliance score that represents the level of process compliance in the Process Compliance Monitor (PCM) tool by evaluating compliance with statements that identify the different requirements for each process area
Integrated Compliance Approach

CMMI® Model

Division

 Programs

Command Media

Organizational Learning

History Data

Best Practices

Example Assets

Improvement Requests

Submit

Reuse

Improve

Tailoring

Program’s Compliance Work Products

Program’s Compliance Metric

Consistency in Quality Assessments
Integrated Process Structure

Integrated Process Manual (IPM)

Program Management Processes
- Program Planning
- Estimation
- Program Monitoring and Control
- Supplier Acquisition & Management
- Change Management

Program Life-Cycle Processes
- Requirements Analysis
- System Architecting/Design
- Design
- Code and Unit Test
- Fabrication and Assembly
- Product Integration
- Verification
- Validation
- Production
- Field Support

Program Support Processes
- Requirements Management
- Risk Management
- Configuration and Data Management
- Program Metrics
- Decision Analysis and Resolution
- Peer Review
- Design Review
- Quality Assurance
- Integrated Logistics Support

Organizational Processes
- Process Improvement
- Training
- Division Metrics

Consistency in Quality Assessments
## Where are Work Products Required?

<table>
<thead>
<tr>
<th><strong>Overview</strong></th>
<th>A brief description of the process intent</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Entry Criteria</strong></td>
<td>State, Prerequisites, Criteria</td>
</tr>
<tr>
<td><strong>Exit Criteria</strong></td>
<td>State, Criteria</td>
</tr>
<tr>
<td><strong>Inputs</strong></td>
<td>Needed work products, resources</td>
</tr>
<tr>
<td><strong>Outputs</strong></td>
<td>Resulting work products</td>
</tr>
<tr>
<td><strong>Required Activities</strong></td>
<td>Mandatory tasks to implement the process</td>
</tr>
<tr>
<td><strong>Measures</strong></td>
<td>Process performance against plans</td>
</tr>
<tr>
<td><strong>Organizational Improvement Information</strong></td>
<td>Metrics, reusable work products</td>
</tr>
<tr>
<td><strong>Verification</strong></td>
<td>Process compliance oversight</td>
</tr>
<tr>
<td><strong>Tailoring Guidance</strong></td>
<td>Approved tailoring, process specific</td>
</tr>
<tr>
<td><strong>Implementation Guidance</strong></td>
<td>Common implementation descriptions</td>
</tr>
<tr>
<td><strong>Supporting Documentation and Assets</strong></td>
<td>Applicable organizational references</td>
</tr>
</tbody>
</table>

Program work products needed to demonstrate IPM process compliance.
### Process Compliance Color Scores

<table>
<thead>
<tr>
<th>Assessment Status Colors</th>
<th>Process Compliance Colors</th>
</tr>
</thead>
<tbody>
<tr>
<td>NY <strong>Not Yet</strong></td>
<td>Work Products are present and appropriate (Note 2)</td>
</tr>
<tr>
<td>NA <strong>Not Applicable</strong></td>
<td>Work Products are present and appropriate (Note 2)</td>
</tr>
<tr>
<td>NS <strong>Not Scored</strong></td>
<td>Work Products are present and appropriate (Note 2)</td>
</tr>
<tr>
<td>FI <strong>Fully Implemented</strong></td>
<td>Work Products are present and appropriate (Note 2)</td>
</tr>
<tr>
<td>LI <strong>Largely Implemented</strong></td>
<td>Work Products are missing in the initial scoring audit or Work Products are inadequate (Note 3)</td>
</tr>
<tr>
<td>PI <strong>Partially Implemented</strong></td>
<td>Work Products are missing for more than 30 days from the initial scoring audit.</td>
</tr>
<tr>
<td>NI <strong>Not Implemented</strong></td>
<td>Work Products are missing for more than 30 days from the initial scoring audit.</td>
</tr>
</tbody>
</table>

**Note 1:** A weakness ("gap") is considered if it is an impact to or risk of implementation of the process statement.

**Note 2:** An appropriate work product is the IPM Expected Work Product or equivalent that demonstrates implementation of the process statement.

**Note 3:** An inadequate work product does not demonstrate implementation of the process statement.
Process Compliance

- Represents overall process compliance score for program
- Based on lowest color score – harsh, but in keeping with CMMI standards

- Depicts scoring distribution over all process items
- More insight on overall project score

- Depicts score for each process executed or being executed by this program
- 3 columns identify categories of processes

{EXAMPLE PROJECT}
Baseline Revision: 102  IPM Version: IPM v0

Scoring
Distribution

<table>
<thead>
<tr>
<th>Program Management</th>
<th>Program Life Cycle</th>
<th>Program Support</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHG</td>
<td>CUT</td>
<td>CDM</td>
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<td>PR</td>
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<tr>
<td></td>
<td>FROD</td>
<td>PMET</td>
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<tr>
<td></td>
<td>RA</td>
<td>QA</td>
</tr>
<tr>
<td></td>
<td>SAD</td>
<td>REGM</td>
</tr>
<tr>
<td></td>
<td>VAL</td>
<td>RISK</td>
</tr>
</tbody>
</table>

Export Project Status
Program Issues

- Program claims IPM Compliance but is not being demonstrated in PCM (Red)
  - Work Products not entered into PCM
  - Statements not scored
- Program claims not enough time to work PCM, need to deliver products not show compliance
- Many Quality Engineers on program but all too busy
- Engineering Change Proposal (ECP) recently added development work to previously only production job
  - Need to re-tailor baseline to add other program life cycle process areas (SAD, CUT, FAB, PI, etc.)
Possible Solutions

1. Do nothing, leave PCM Red
2. Wave PCM monitoring
3. Provide additional support to verify compliance

• Management chose #3 - verify compliance
Management Action

- Management assigned Division Process Group (DPG) Point of Contact (POC) to assist program
  - Help with adding development process areas to PCM baseline for new ECP
  - Develop Return to Green Plan
  - Provide mentoring and training as needed
  - Coordinate QE efforts
    - Inside vault work products
    - Outside vault work products
    - External reviewer
February Progress

• DPG POC met with Program Manager
  – Drafted DPG Statement of Work
  – Established DPG roles and responsibilities
• Investigated ECP
  – Recommended PCM baseline changes
  – Added life cycle process areas that were tailored out
• Met with QEs
  – QEs all have full time work without PCM effort
  – QEs are not all equally experienced with PCM
• Developed Return to Green Plan
  • Estimated 10 statements scored per week per QE
6 Months to complete Process Compliance Effort - TOO LONG!
February Progress - continued -

- DPG POC met with Executive Management
  - Return to Green Plan time line unacceptable
  - Additional Quality Engineers assigned
  - Overtime authorized
- Updated Return to Green Plan
- Assessed PCM status
- Identified issues and needs
  - Training
  - Coordination
  - Encouragement
Updated Return to Green Plan

PCM Compliance Progress

3 Months to complete Process Compliance Effort - BETTER!
March Progress

- Provided additional training to QEs
  - PCM scoring standards and tool tips
    - Commenting
    - Valid through dates
    - Verification decomposition
    - Coordination (inside vs. outside)
- Identified external QE reviewer for Quality process area
- Provided additional training to program process owners
  - New process areas being added, new work products required
    - Standard directory structure reminder
    - Specific versus general work products and links
- PCM Scoring begins
PCM Scoring Example

QEs:
- Valid Through Dates
- Commenting
- Score

Process Owners:
- Descriptions
- Links
Evidence and Scoring
This page is used for evidence entry and scoring.

IPM Tree Sorting:
- FM
- Alpha
- Score
- Program Planning
- Estimation
- Program Monitoring and Control
- Supplier Acquisition Management
- Change Management
- Requirements Analysis
- System Architecting and Design
- Design
- Code and Unit Test
- Fabrication and Assembly
- Product Integration
- Verification
- Validation
- Production
- Requirements Management
- Risk Management
- Configuration and Data Management
- Program Metrics
- Decision Analysis and Resolution
- Peer Review
- Design Review
- Quality Assurance
- Integrated Logistics Support

Baseline Revision: 6
IPM Version: IPM v9

Scoring Distribution

Program Management | Program Life Cycle | Program Support
--- | --- | ---
CHO | CUT | CDM
EST | DSN | DAR
PMC | FAB | DR
PP | FIELD | IL3
SAM | PI | PR
PROD | PMET
RA | QA
SAD | REOM
VAL | RISK
VER |
April Progress

- More work products entered
- More statements scored
- Issues identified
- Issued worked
- Compliance demonstration improving
April PCM Status is Yellow

Baseline: Rev 6 - New IPM Baseline
Appraisal: 12 -
Data Valid Through: 4/22/2009 4:40:30 PM

All of ILS marked as Not Yet due to phase of the program.
April Tracking Status

PCM Compliance Progress

With more scoring you sometimes identify more issues!
May Progress

- Tracking progress
- Scoring statements
- Resolving issues
- Reporting status
Weekly meetings and up to date status helped to facilitate progress.
May PCM Status is Yellow

Baseline: Rev 7 - New IPM Baseline
Appraisal: 14 - Appraisal created due to new IPM Version {Open}

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Plans for ILS scored but many statements still Not Yet.
SUCCESS! PCM Green in June!

IPM Streamlining Effort completed
Conclusions

- Program was process compliant, only minor issues
- Program process compliance is verified in PCM
- Program problems not due to lack of proper process
- What could we have done differently?
  - Increase QE consistency and competency
  - Require less monitoring
    - Risk Based Monitoring
      - Evaluate program for Risk and establish PCM process verification requirements based on Risk level
    - Priority Based Monitoring
      - Track process verification for most important process areas only based on program type and phase
Risk Based Monitoring

- All programs required to comply with their tailored version of IPM, but how much process compliance verification is needed?
- Evaluate Program Readiness Level
- Evaluate Program Risk Level
- Determine process compliance verification level based on these inputs
Priority Based Monitoring

- All programs required to comply with their tailored version of IPM, but how much process compliance verification is needed?
- Determine Most Important Processes for Program Execution (MIPPEs)
- MIPPEs - different per program and change over time
- Require PCM process verification for MIPPEs only

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<th>MIPPES</th>
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<tbody>
<tr>
<td></td>
<td>Jan-10</td>
</tr>
<tr>
<td>PP</td>
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Pros and Cons of Less Monitoring

- **Pros**
  - **Cost Savings**
    - Less verification in PCM saves time and therefore dollars, allows the program team to concentrate on other tasks
  - Programs tend to follow best practices anyway

- **Cons**
  - **Higher Risk of Problem Programs**
    - Less verification in PCM increases risk of programs not following all the required processes
    - Less chance of finding and correcting process problems
  - **Higher Risk for SCAMPI Readiness**
    - Less verification in PCM increases risk of programs not being ready for SCAMPI
Lessons Learned

• QE consistency is desired by everyone
  – **Provide more training**, require and test for proficiency
    • Tool usage
    • Scoring competency
  – **Perform more cross checking**, functional leads facilitate
    • Between QEs
    • Across programs
    • Over time
  – **Present QE Forums**
    • Share information, changes, lessons learned and tips
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