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Information Technology

To PIID or Not to PIID: Lessons Learned in SCAMPI Evidence Preparation

Bill Nielsen
Linda Brammer
Eric Carson
Rafael Delgado
Dennis Scott
Randy Walters

Defense Mission Systems EPG

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Topics

- Background
- SCAMPI Evidence Collection Approach
- SCAMPI Evidence Tracking Approach
- Results and Lessons Learned

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Background

- Defense Mission Systems (DMS) is a business unit of Northrop Grumman Information Technology
  - Formed in June 2001 from 7 legacy organizations with different processes that were reformed using one Integrated Enterprise Process
  - Approximately 5,700 employees
  - In December 2001 DMS conducted a vendor-led CMM SCE that confirmed CMM Level 3
  - Began transitioning to the CMMI in 2001
  - Verified CMMI-SE/SW Level 3 via internal appraisals in December 2002
  - 2003 goal was to achieve CMMI-SE/SW Level 5
- A vendor-led SCAMPI planned for November 2003
  - Readiness review planned for September 2003
- Four geographically dispersed projects were selected to undergo this appraisal
- From mid-May to mid-September 2003 objective evidence (OE) was collected, reviewed, and organized by the projects and the EPG

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Key SCAMPI Dates and Objectives

CMMI SE/SW Scope	Readiness Review	Formal Appraisal	SCAMPI Team
Maturity Level 5	Sep 22 – Oct 3, 2003	Nov 3 – Nov 13, 2003	3 SCAMPI vendor 5 DMS EPG

- Readiness review
  - Objectives
    - Review and assess evidence for meeting ML5 CMMI goals
    - Output – Determine if formal appraisal should be conducted per plan
- Formal appraisal
  - Objectives
    - Formally evaluate evidence and perform staff interviews to formally assess whether or not CMMI goals are satisfied
    - Output – Assign Maturity Level rating

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Objective Evidence Collection Approach

DMS EPG Action	Project Response
Prepare Practice Implementation Indicator Descriptions (PIIDs) templates, and provide orientation on evidence requirements for each process area	▪ Locate best evidence ▪ Document evidence on PIID templates ▪ Provide evidence electronically
Review evidence and PIIDs for applicability to CMMI practices and provide comments back to projects	Respond to reviewer comments and update PIIDs/OE
Conduct re-reviews as needed until all evidence is satisfactory	Respond to reviewer comments and update PIIDs/OE

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Objective Evidence Collection Approach (cont.)

- Weekly one hour NetMeetings were held between EPG and projects to
  - Review progress
  - Orient projects in CMMI Process Areas (PAs) due the following week
- Projects initially assigned to complete PIIDs/OE for two CMMI PAs per week
- When this rate proved to be unachievable, a new schedule was prepared
  - One PA per week
  - Readiness review and formal appraisal were delayed by six weeks

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PIID Example

SPs for Configuration Management (CM) PA

Goal ID	CM SG 2 Changes to the work products under configuration management are tracked and controlled.		
Practice ID	CM SP 2.1-1 *Track change requests for the configuration items.*		
PII Type	Direct Artifacts	Indirect Artifacts	Affirmations
Example Evidence Look Fors / Listen Fors	[1. Change requests] • Change request tracking products (e.g., change request database, reports, logs, closure status, metrics) • Recorded evaluation and disposition of change requests (e.g., review, authorization, approval of changes)	• Change request impact analyses • Change request lifecycle or workflow descriptions • CCB / stakeholder review records (e.g., logs, meeting minutes) • Configuration item revision history	
Organizational Implementation Evidence	Example • Changes to formal baselines are processed through the PCCB with an associated Change Request (see SDP section 5.14.1.1 in Global\SDP, item G02-SDP Rev H). • Configuration Status and change tracking is discussed in section 5.14.3 of the project's SDP (see Global\SDP item G02- SDP Rev H).	Example See the PCCB meeting minutes in SP2.1 folder	
Status* 7/6 RB / Reviewer/ Author Comments **	7/6 RKW Good referencing. Evidence OK	7/6 RKW Issues (a) The reference is too vague -why is it relevant here and where in the artifact(s) does the team look? (b) This folder contained 8 artifacts – lets only put in the one(s) we want the appraisal team to examine (c) Must follow the referencing convention by labeling artifacts as Ixx–NameOfDoc	
*Status codes: RP – reviewed and changes needed in the PIID; RE – reviewed and changes needed in the evidence; RB – reviewed and changes need in both the PIID and evidence; C – complete: reviewed and no further changes needed in evidence or PIID **Indicate commenter initials and date for each comment made			
Appraisal Team Notes			
Appraisal Considerations	• Typical change request contents include entries such as item identifier, description of change, proposed change, rationale, impact analysis, review / authorization, etc.		

From SEI

Populated by Project

Populated by Reviewer

From SEI

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PIID Preparation Guidance Given to Projects

Do	Don't
Identify the single most relevant artifact for each practice	Add additional artifacts unless necessary to complete the description of what we do
Relate the evidence to the CMMI practice	Force the appraiser to try to figure out why the evidence is relevant
Provide contextual information as necessary to indicate how the artifact fits into the project	Assume that the appraiser understands the context of the project as well as you do
Identify the location of the evidence within the artifact: • Use a section reference, a page reference, or highlighting	Force the evaluator to hunt through a large document to find the evidence
Follow the file naming and folder conventions	Assume the appraiser ought to be able to figure out which file is associated with an artifact
Ask your EPG point of contact if you have any questions about interpretation of the CMMI practices or what is wanted in the PIIDs	Just assume something and hope that it's correct

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Evidence Collection Indicators

- Good measurements are needed to track the collection of PIIDs and OE
  - 17 PAs (34 PIID files) for each project through level 5
  - 334 practices (with associated direct and indirect evidence) through Level 5 for each project
  - 91 practices for organization PAs
  - Total of 1,427 practices to be documented
- Our tracking approach used earned value methods and quantitative measurements
  - Defined a collection process with 4 steps (including 2 reviews) and assigned a weight to each step
  - Evaluated status of each project at the practice level each week
  - Used a spreadsheet to aggregate results and graph progress against the plan

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Project PIIDs/Objective Evidence Status Measurement

Process Area	Type	Project Author	EPG Reviewer	No. Practices	1st Submittal	1st Review%	2nd Submittal	2nd Review%	No. Practices Completed	EV Points	Percent Complete
					40%	10%	20%	5%			
REQM	SP	Leticia	Dennis	5	✓	✓	✓		2	4.1	82%
	GP	Leticia	Dennis	12	✓	✓	✓		6	10.2	85%
PP	SP	Margaret	Linda	14	✓					5.6	40%
	GP	Margaret	Linda	12	✓					4.8	40%
PMC	SP	Margaret	Eric	10	✓	✓			3	6.5	65%
	GP	Margaret	Eric	12						0.0	0%
SAM	SP	Masaki	Eric	7						0.0	0%
	GP	Masaki	Eric	12						0.0	0%
MA	SP	Masaki	Randy	8	✓	✓			0	4.0	50%
	GP	Masaki	Randy	12	✓	✓			1	6.5	54%
PPQA	SP	Sukanta	Linda	4	✓					1.6	40%
	GP	Sukanta	Linda	12	✓					4.8	40%
CM	SP	Sukanta	Dennis	7	✓	✓	✓		2	5.5	79%
	GP	Sukanta	Dennis	12	✓	✓			5	8.5	71%
RD	SP	Leticia	Dennis	10	✓	✓			0	5.0	50%
	GP	Leticia	Dennis	12	✓	✓			2	7.0	58%
TS	SP	Yuk-Yee	Bill	9	✓	✓	✓	✓	8	8.8	97%
	GP	Yuk-Yee	Bill	12	✓	✓	✓		4	9.6	80%
PI	SP	Yuk-Yee	Dennis	9	✓	✓	✓		3	7.2	80%
	GP	Yuk-Yee	Dennis	12	✓	✓	✓		5	9.9	83%
VER	SP	Floyd	Randy	7	✓	✓	✓	✓	0	5.3	75%
	GP	Floyd	Randy	12	✓	✓			2	7.0	58%
VAL	SP	Floyd	Randy	6	✓					2.4	40%
	GP	Floyd	Randy	12	✓					4.8	40%
IPM	SP	Margaret	Randy	8						0.0	0%
	GP	Margaret	Randy	12						0.0	0%
RSKM	SP	Al	Dennis	7	✓	✓	✓		6	6.7	96%
	GP	Al	Dennis	12	✓	✓			3	7.5	63%
DAR	SP	Masaki	Randy	6	✓	✓			0	3.0	50%
	GP	Masaki	Randy	12	✓	✓			2	7.0	58%
QPM	SP	Margaret	Doug	8	✓					3.2	40%
	GP	Margaret	Doug	12	✓					4.8	40%
CAR	SP	Masaki	Andy	5	✓	✓			0	2.5	50%
	GP	Masaki	Andy	12	✓	✓			1	6.5	54%
Total Points				334						170.2	51%

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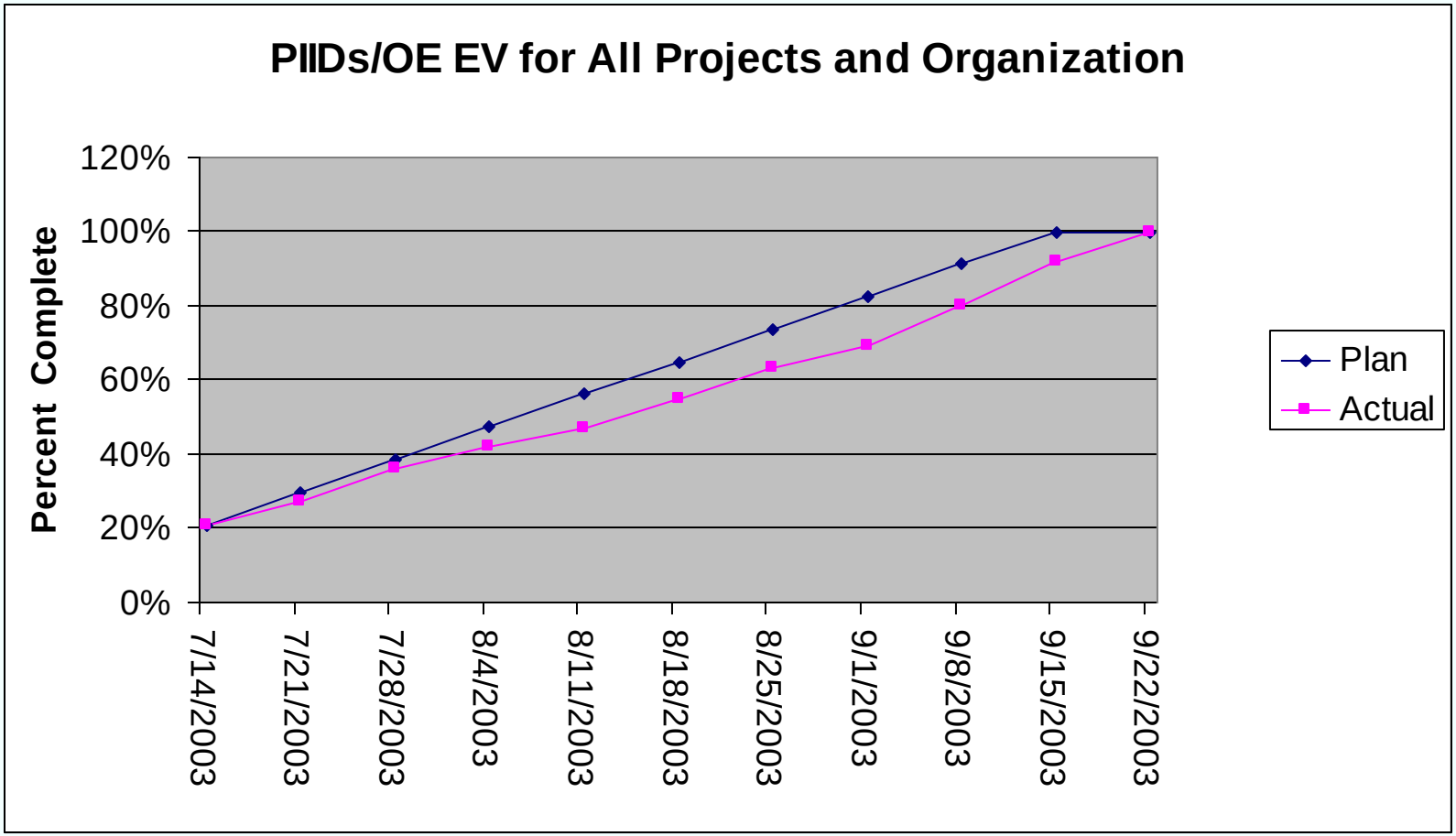
PIIDs/OE Overall Summary Measurement



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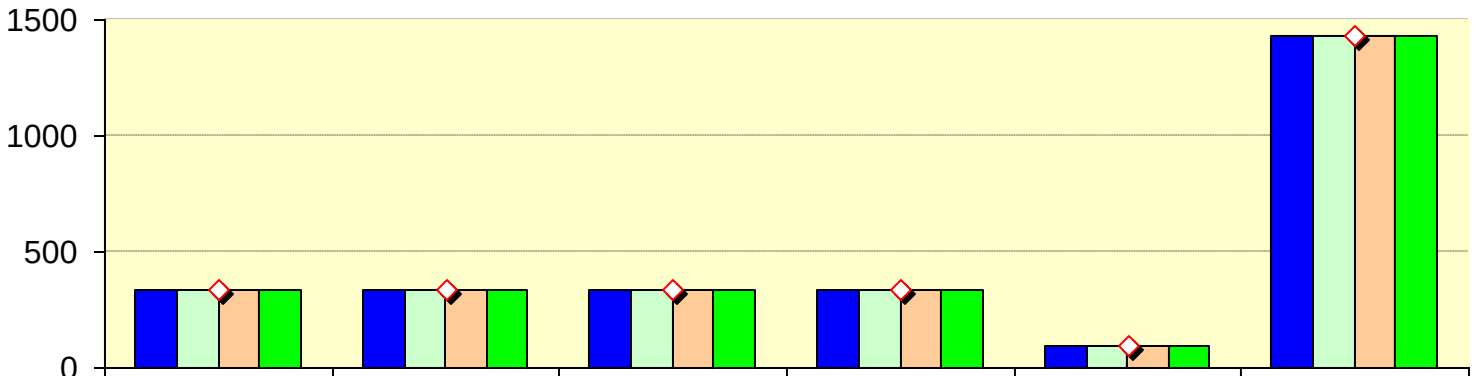
PIIDs/Objective Evidence Status as of 9/22/03



	Proj A	Proj B	Proj C	Proj D	Organization	Total
# Practices	334	334	334	334	91	1427
Submitted	334	334	334	334	91	1427
Reviewed	334	334	334	334	91	1427
Finalized	334	334	334	334	91	1427
Earned Valued	334	334	334	334	91	1427

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Evidence Collection Results

- Evidence collection was behind schedule up to the last week before readiness review
  - Project conflicts restricted availability of key people
  - Limited number of EPG reviewers to keep up with the stream of PIIDs/OE to be reviewed
    - Each set of PIIDs/OE (e.g., all SPs for a PA) typically took 2 to 4 hours for a thorough review
- As the readiness review approached, EPG reviewers worked directly with projects to complete the PIIDs/OE rather than sending comments back to projects for another cycle of changes and review
  - Should have used this approach earlier
- 100% of PIIDs/OE were reviewed and in place for the readiness review
  - Required significant overtime from both EPG and projects

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SCAMPI Readiness Review Results

- All PIIDs/OE were evaluated by the team
- Some issues were identified and corrected
- By the end of the readiness review, all OE had been appraised as fully satisfying CMMI practices through Level 5
- Formal appraisal scheduled to be conducted as planned

Formal SCAMPI appraisal completed 11/13/03
CMMI Level 5 Achieved!

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Lessons Learned

- Treat the readiness review as though it were the formal appraisal
  - Increases up-front effort, but reduces surprises
  - Provide detailed presentations on organization and project processes and status
    - Information can serve as affirmations for numerous practices
- Be prepared to invest a lot of effort in PIIDs and Objective Evidence (OE)
  - SCAMPI is verification rather than discovery, which increases the importance of OE
    - Detailed PIIDs smooth the appraisal process
  - Don’t expect project staff to understand the PIIDs without EPG guidance and training
  - Standardize PIID organization, format, default contents, and file organization early to reduce rework
  - Provide sample completed PIIDs to the projects including references to organizational policies and processes
  - Supplement electronic evidence with hard copies of the PIIDs for the readiness review and formal appraisal

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More Lessons Learned

- PIIDs/OE Considerations
  - PIIDs and OE constitute a very large amount of material (e.g., 5,700 files), so use good project practices for version tracking and control
  - Get projects to focus on satisfying the practices and not overwhelming with evidence
  - Decide when the evidence is "good enough"and establish a baseline – otherwise some engineers will refine the OE or the PIIDs indefinitely in search of "perfection"
- Summary
  - Treat the SCAMPI like a project, and use all of your best practices for planning, training, evaluating, and tracking
  - Capitalize on PIID preparation investment by retaining the records and consider keeping records current for use on future SCAMPIs
  - Consider using interim appraisals to build up OE over time and using automated tools to generate PIIDs from interim appraisal data
    - Avoid the crunch prior to a SCAMPI