



#### Standard CMMI<sup>s</sup> Appraisal Method for Process Improvement

# (SCAMPI Version 1.1)

Lockheed Martin Management & Data Systems King of Prussia, Pennsylvania

<sup>SM</sup> CMM Integration and CMMI are service marks of Carnegie Mellon University





# **Scars of a SCAMPI Appraisal**

- Introduction
- CMMI Artifact Development
- The On-Site Period Some Metrics
- Lessons Learned: Team Afterthoughts

# **Objectives of Appraisal**

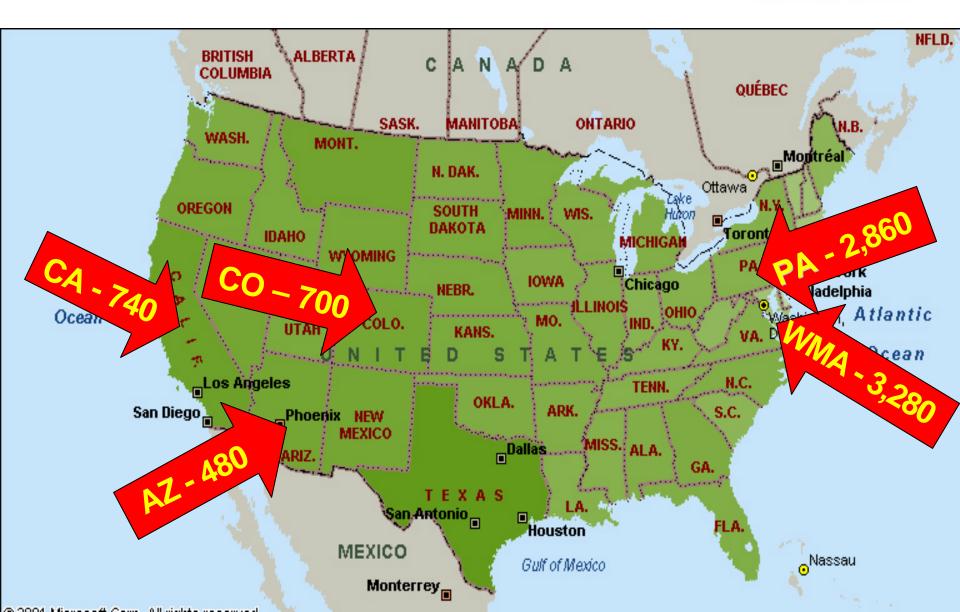


The goals of the process improvement program and this appraisal were to:

- Formally recognize the mature practices that are being used within this organization: for freely sharing results, methodology and experiences with other units and organizations.
- Determine the process maturity of M&DS under the CMMI model.
- Identify the strengths, weaknesses, and potential improvement opportunities.

#### The M&DS Team







✓ The scope of the SCAMPI was the entire M&DS organization. Representatives from all regions and lines of business were included.

✓ The primary focus programs represented
 60% of the full scale development work across all of M&DS in 2002.

✓ An additional 20% were covered through various participation levels and contributing benchmarks.



# **Overview of Appraisal**

#### **SCAMPI Appraisal Team Members**

- Brian Gallagher, Lead Appraiser, SEI
- Lt Col Melanie Benhoff, Team Member, USAF
  C.R. (Bob) Weiser, Team Member, LM EPI Center
  M. Lynn Penn, Team Member, LM M&DS
  - Dennis A. Ring*, Team Member, LM M&DS* William Pohle*, Team Member, LM M&DS* 
    - Richard Warren, Site POC/Librarian, LM M&DS

#### **Customer SCE Team Members**

Mike Orr, Paul Frommelt, Steve Wear, Deanne Weinberg



#### **Scope of Appraisal**

# CMMI Model: CMMI-SE/SW Version 1.1 (Staged)

Process Areas: All Process Areas Maturity Levels 2 through 5

# Schedule



#### Week 1 (3 June – 7 June 2002):

Monday Tuesday Wednesday Thursday Friday Team Arrives, Orientation Opening Briefing, Team Activities Team Activities Interviews and Team Activities Interviews and Team Activities

#### Week 2: (17 – 21 June 2002)

Monday Tuesday Wednesday Thursday Friday Interviews and Team Activities Interviews and Team Activities Team Activities Draft Findings Briefings Final Findings Briefing

#### **Presentation Agenda**



# **Scars of a SCAMPI Appraisal**

- Introduction
- CMMI Artifact Development
- The On-Site Period Some Metrics
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			Description	Organizational Policy	Project x : Procedures	Project x: Output
VER	SG 1		Preparation for verification is conducted.			
VER		SP 1.1	Select the work products to be verified and the verification methods that will be used for each.	PPS 1.1 (6) PPS 3.2 (9, 10, 17, 25) PPS 3.3 (4g & h, 7) PPS 3.5 (6, 17)	PP 3.7.4 Formal Qualification Testing; PP 3.12 Integration and Test; SDP 3.2 Process Description, Figure 3.2.1-1 Software Development Tasks and Products, 3.2.4.2 Software Formal Qualification Test Activities and Methodology	ABCDE-00-0155 Formal Qualification Test (FQT) Software Test Plan for the Common Services (CS) CSCI, Table of Contents, Section 4.1 General Information
VER		SP 1.2- 2	Establish and maintain the environment needed to support verification.	PPS 3.2 (7) PPS 3.3 (5) PPS 3.7 (5) PPS 3.9 (20) PPS 3.11 (6, 7, 8) PPS 3.12 (1)	PP 3.7.4 Formal Qualification Testing; PP 3.12 Integration and Test; SDP 3.2.4.2 Software Formal Qualification Test Activities and Methodology	ABCDE-00-0155 Formal Qualification Test (FQT) Software Test Plan for the Common Services (CS) CSCI, Section 3 Software Test Environment; ABCDE System Design Certification Test (SDCT) TRR, Software Under Test, SDCT Entrance Criteria, I5 Software Status
VER		SP 1.3- 3	Establish and maintain verification procedures and criteria for the selected work products.	PPS Section 1 PPS 3.2 (7) PPS 3.5 (23) PPS 3.6 (5) PPS 3.7 (4) PPS 3.9 (8, 19) PPS 3.10 (2) PPS 3.11 (2) PPS 3.12 (3)	PP 3.7.4 Formal Qualification Testing; PP 3.12 Integration and Test; SDP 3.2.4.2 Software Formal Qualification Test Activities and Methodology, 3.2.4.3 Software Formal Qualification Test Exit Criteria	ABCDE-00-0531 Formal Qualification Test (FQT) Software Test Procedures for the Engagement Manager (EM) CSCI, Table 1 EM FQT Testing (Surface); ABCDE System Design Certification Test (SDCT) TRR, Test Methodology and Sequence
VER	SG 2		Peer reviews are performed on selected work products.			
VER		SP 2.1	Prepare for peer reviews of selected work products.	PPS 1.3 (6) MPE-0902 (5.2)	SDP 4.7.2 (Inspections); JI 016 (ABCDE Inspection Support Data)	Inspection Notice for Inspection EM0056 with completed SWAD Checklist
VER		SP 2.2	Conduct peer reviews on selected work products and identify issues resulting from the peer review.	MPE-0902 (5.2 - 5.5) PPS 1.1 PPS 3.3 (8) PPS 3.5 (25) PPS 3.6 (4h) PPS 3.7 (TBD)	JI 016 (ABCDE Inspection Support Data)	Inspection Notice/Report for Inspection EM0056, Defects 10



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VER	2	SP 1.2- 2	suppon	CMMI REFE PROCESS		-0155 Formal Qualification Test ware Test Plan for the Common S) CSCI, Section 3 Software Test nt; ABCDE System Design n Test (SDCT) TRR, Software ; SDCT Entrance Criteria, I5 tatus
VER		SP 1.3- 3	products.	SPECIFIC SPECIFIC	GOAL PRACTICE	-0531 Formal Qualification Test ware Test Procedures for the nt Manager (EM) CSCI, Table 1 esting (Surface); ABCDE System tification Test (SDCT) TRR, Test gy and Sequence
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VER		SP 1.3- 3	criteria for the sel	This is the co will be rated	oncern which	-0531 Formal Qualification Test ware Test Procedures for the nt Manager (EM) CSCI, Table 1 esting (Surface); ABCDE System tification Test (SDCT) TRR, Test gy and Sequence
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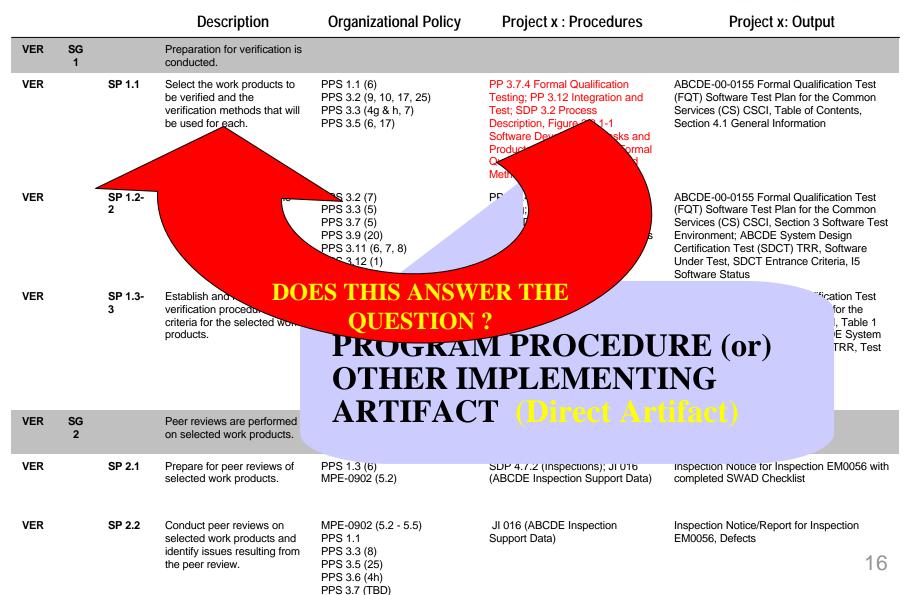


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VER		SP 1.3- 3	Establish and maintain verification procedures and criteria for the selected work products.	WHICH	IZATIONAL REQUIRES PECIFIC PRA	(SUPPORTS) st
				M&DS	Program Proc	cess Standard
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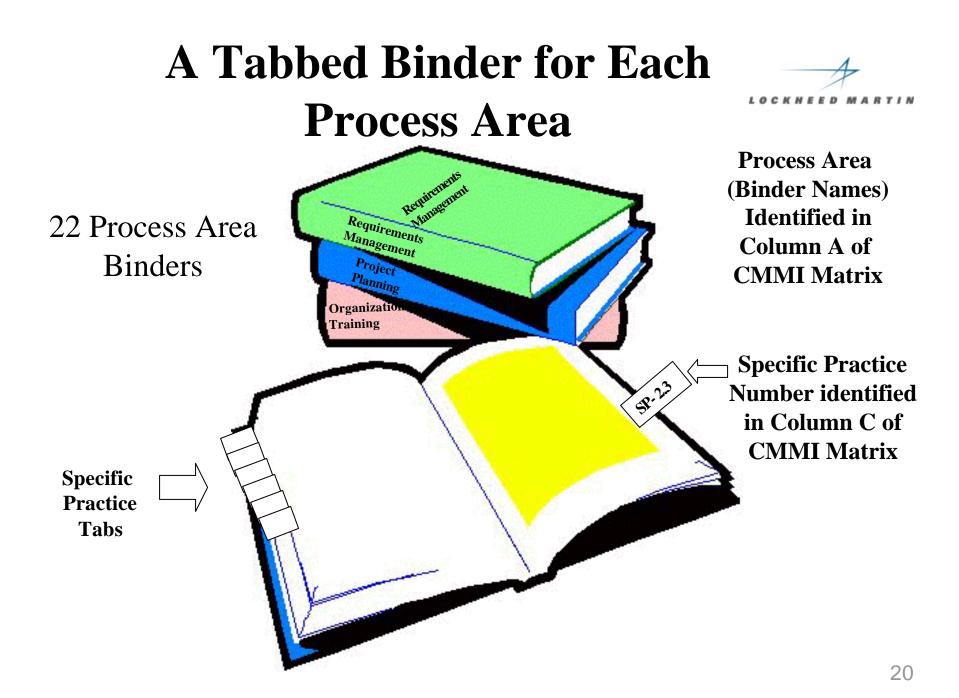
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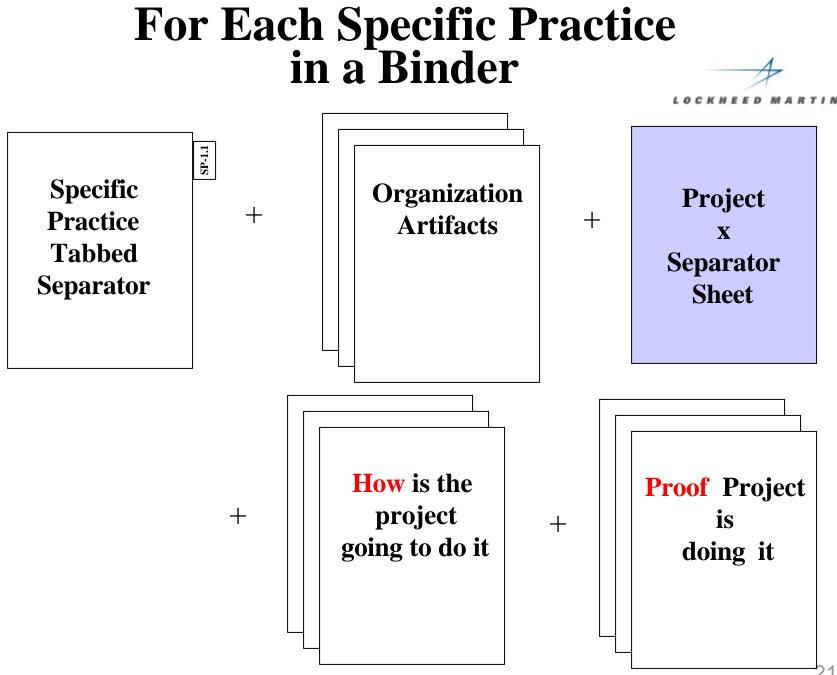


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#### **For Each Specific Practice** MARTIN Specific SP-1.1 **Practice** (What must be done) Project Tabbed Organization +X **Separator** artifacts: **Separator** policy, procedure, guidebook, etc. **Column E of CMMI Matrix** Sheet Use different color for each program (How is the project (Artifacts that the ying to do it) project is doing it) +**Column F of CMMI Matrix Project x's plans**, **Project xs status** procedu **System 1**, **minutes**, **Column G of CMMI Matrix** dir metrics, agendas expenditures,

etc.



# **BREAK TIME**

#### **Presentation Agenda**



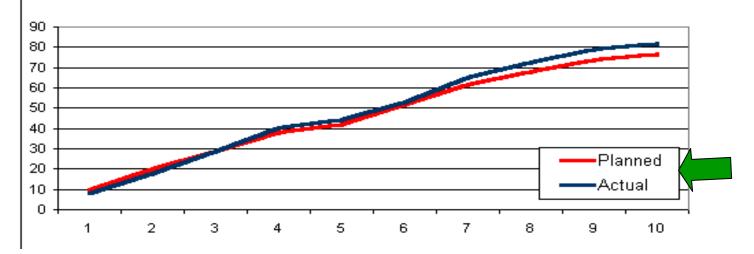
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# **Appraisal On-Site Time**

Date	Day	Planned	Actual	Estimate	Act Delta	Start Time	Stop Time	Adjust (Lunch)	Cumulative UnderRun
3-Jun-02	1	10	8.0	10	8.0	8.3	17.0	0.7	2.0
4-Jun-02	2	20	17.7	10	9.7	8.1	18.3	0.5	2.3
5-Jun-02	3	29	28.8	9	11.1	8.0	19.7	0.6	0.2
6-Jun-02	4	38	40.2	9	11.4	8.1	20.3	0.8	(2.2)
7-Jun-02	5	42	44.2	4	4.0	8.0	12.0	0.0	(2.2)
7-Jun-02	6	52	53.3	10	9.1	8.0	18.3	1.2	(1.3)
18-Jun-02	7	62	65.3	10	12.0	8.0	21.0	1.0	(3.3)
19-Jun-02	8	68	72.8	6	7.5	8.0	16.5	1.0	(4.8)
20-Jun-02	9	74	78.8	6	6.0	8.0	17.0	3.0	(4.8)
21-Jun-02	10	77	81.8	3	3.0	8.5	11.5		(4.8)
21-Jun-02	IU	11	81.8	3	3.0	0.5	11.5		(4.8)



**Some Metrics** 



#### Number of people interviewed: 67

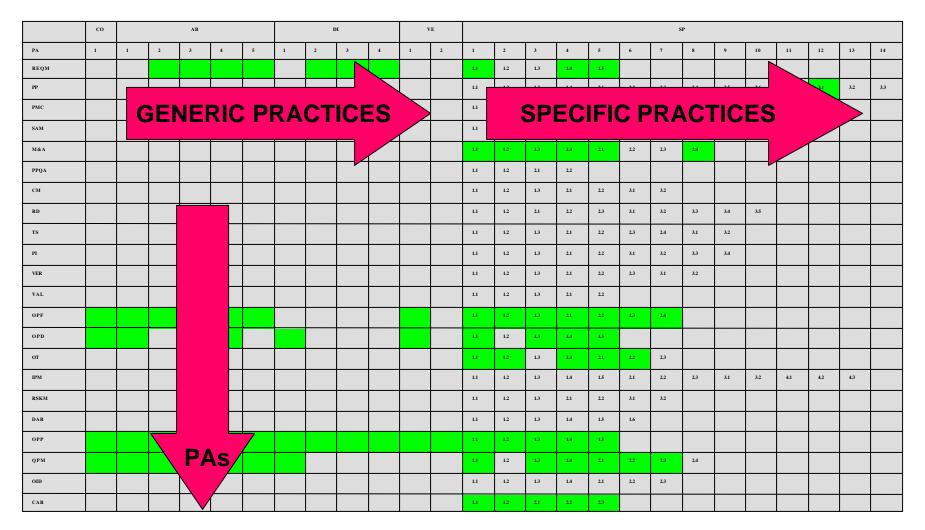
Data originally supplied: over 4000 items

**Additional documentation requests: 178** 

Number of on-site clock hours: 82

#### Week 1 Day 3





Week 1 Day 4



	со							DI				Е						s	P							
PA	1	1	2	3	4	5	1	2	3	4	1	2	1	2	3	4	5	6	7	8	9	10	11	12	13	14
REQM													1.1	1.2	13	1.4	1.5									
PP													1.1	1.2	1.3	1.4	2.1	2.2	2.3	2.4	2.5	2.6	2.7	3.1	3.2	3.3
РМС													1.1	1.2	1.3	1.4	1.5	1.6	1.7	2.1	2.2	2.3				
SAM													1.1	1.2	1.3	2.1	2.2	2.3	2.4							
M&A													1.1	1.2	1.3	1.4	2.1	2.2	2.3	2.4						
PPQA													1.1	1.2	2.1	2.2										
СМ													1.1	1.2	1.3	2.1	2.2	3.1	3.2							
RD													1.1	1.2	2.1	2.2	2.3	3.1	3.2	3.3	3.4	3.5				
TS													1.1	1.2	1.3	2.1	2.2	23	2.4	3.1	3.2					
РІ													1.1	1.2	13	2.1	2.2	3.1	3.2	3.3	3.4					
VER													1.1	1.2	1.3	2.1	2.2	2.3	3.1	3.2						
VAL													1.1	1.2	1.3	2.1	2.2									
OPF													1.1	1.2	1.3	2.1	2.2	23	2.4							
OPD													1.1	1.2	1.3	1.4	1.5									
от													1.1	1.2	1.3	1.4	2.1	2.2	2.3							
IPM													1.1	1.2	1.3	1.4	1.5	2.1	2.2	2.3	3.1	3.2	4.1	4.2	43	
RSKM													1.1	1.2	1.3	2.1	2.2	3.1	3.2							
DAR													1.1	1.2	1.3	1.4	1.5	1.6								
OPP													1.1	1.2	1.3	1.4	1.5									
QPM													1.1	1.2	1.3	1.4	2.1	2.2	2.3	2.4						
OID													1.1	1.2	13	1.4	2.1	2.2	2.3							
CAR													1.1	1.2	2.1	2.2	2.3									





	со	CO AB						DI				E							5	\$						
РА	1	1	2	3	4	5	1	2	3	4	1	2	1	2	3	4	5	6	7	8	9	10	11	12	13	14
REQM													1.1	1.2	1.3	1.4	1.5									
PP													ш	1.2	13	1.4	2.1	2.2	2.3	2.4	2.5	2.6	2.7	3.1	3.2	33
PMC														1.2	1.3	1.4	1.5	1.6	1.7	2.1	2.2	23				
SAM													1.1	1.2	1.3	2.1	2.2	23	2.4							
M&A													ш	1.2	13	1.4	2.1	2.2	2.3	2.4						
ррда													1.1	1.2	2.1	2.2										
СМ													1.1	1.2	1.3	2.1	2.2	3.1	3.2							
RD													ш	1.2	2.1	2.2	2.3	3.1	3.2	3.3	3.4	3.5				
TS													1.1	1.2	13	2.1	2.2	23	2.4	3.1	3.2					
PI													1.1	1.2	1.3	2.1	2.2	3.1	3.2	3.3	3.4					
VER													1.1	1.2	1.3	2.1	2.2	2.3	3.1	3.2						
VAL													1.1	1.2	1.3	2.1	2.2									
OPF													ш	1.2	13	2.1	2.2	2.3	2.4							
OPD													ш	1.2	13	1.4	1.5									
от													ш	1.2	1.3	ы	2.1	2.2	2.3							
IPM													1.1	1.2	13	1.4	1.5	2.1	2.2	2.3	3.1	3.2	4.1	42	t)	
RSKM													1.1	1.2	1.3	2.1	2.2	3.1	3.2							
DAR													1.1	1.2	13	1.4	1.5	1.6								
OPP													1.1	1.2	13	1.4	1.5									
QPM													1.1	1.2	1.3	1.4	2.1	2.2	2.3	2.4						
OID													ш	1.2	13	1.4	2.1	2.2	23							
CAR													ш	1.2	2.1	2.2	2.3									20





	со			AB			DI				VE		8													
РА	1	1	2	3	4	5	1	2	3	4	1	2	1	2	3	4	5	6	7	8	9	10	11	12	13	14
REQM													ы	1.2	1.3	14	1.5									
РР													1.1	1.2	13	14	2.1	2.2	2.3	2.4	2.5	2.6	2.7	3.1	3.2	3.3
РМС													1.1	1.2	13	1.4	1.5	1.6	1.7	2.1	2.2	23				
SAM													1.1	1.2	13	2.1	2.2	23	2.4							
M&A													1.1	1.2	13	1.4	2.1	2.2	2.3	2.4						
PPQA													1.1	1.2	2.1	2.2										
СМ													1.1	1.2	13	2.1	2.2	3.1	3.2							
RD													ш	1.2	2.1	2.2	2.3	3.1	3.2	33	3.4	3.5				
TS													1.1	1.2	1.3	2.1	2.2	23	2.4	3.1	3.2					
PI													ш	1.2	13	2.1	2.2	3.1	3.2	33	3.4					
VER													1.1	1.2	13	2.1	2.2	23	3.1	3.2						
VAL													ш	1.2	13	2.1	2.2									
OPF													1.1	1.2	13	2.1	2.2	23	2.4							
OPD													ш	1.2	13	1.4	1.5									
от													1.1	1.2	13	14	2.1	2.2	23							
IPM													1.1	1.2	13	1.4	1.5	2.1	22	2.3	3.1	3.2	4.1	42	43	
RSKM													ш	1.2	13	2.1	2.2	3.1	3.2							
DAR													1.1	1.2	1.3	1.4	1.5	1.6								
OPP													1.1	1.2	13	14	1.5									
QPM													1.1	1.2	13	14	2.1	2.2	23	2.4						
OID													ш	1.2	13	1.4	2.1	22	2.3							
CAR													1.1	1.2	2.1	2.2	2.3									





	со			AB			DI				VE		8													
РА	1	1	2	3	4	5	1	2	3	4	1	2	1	2	3	4	5	6	7	8	9	10	п	12	13	14
REQM													1.1	1.2	1.3	1.4	1.5									
PP													1.1	1.2	13	1.4	2.1	2.2	23	2.4	2.5	2.6	2.7	3.1	3.2	33
PMC													ш	1.2	13	1.4	1.5	1.6	1.7	2.1	22	23				
SAM													1.1	1.2	13	2.1	2.2	2.3	2.4							
M&A													1.1	1.2	13	1.4	2.1	2.2	23	2.4						
PPQA													ш	1.2	2.1	22										
СМ													1.1	1.2	13	2.1	2.2	3.1	3.2							
RD													1.1	1.2	2.1	2.2	2.3	м	3.2	33	3.4	3.5				
TS													1.1	1.2	13	2.1	2.2	23	2.4	3.1	3.2					
PI													1.1	1.2	13	2.1	2.2	3.1	3.2	33	3.4					
VER													1.1	1.2	13	2.1	2.2	23	м	3.2						
VAL													1.1	1.2	13	2.1	2.2									
OPF													1.1	1.2	13	2.1	2.2	23	2.4							
OPD													1.1	1.2	13	1.4	1.5									
от													1.1	1.2	ы	1.4	2.1	2.2	23							
IPM													1.1	1.2	13	1.4	1.5	2.1	2.2	23	3.1	3.2	4.1	4.2	43	
RSKM													1.1	1.2	13	2.1	2.2	3.1	3.2							
DAR													1.1	1.2	ы	1.4	1.5	1.6								
OPP													1.1	1.2	13	1.4	1.5									
QPM													1.1	1.2	13	1.4	2.1	2.2	23	2.4						
OID													11	1.2	ы	1.4	2.1	22	23							
CAR													1.1	1.2	2.1	22	2.3									





	со	CO AB						DI				VE					ş													
РА	1	1	2	3	4	5	1	2	3	4	1	2	1	2	3	4	5	6	7	8	9	10	11	12	13	14				
REQM													1.1	1.2	13	1.4	15													
PP													ш	1.2	13	1.4	2.1	22	2.3	2.4	2.5	2.6	2.7	3.1	3.2	33				
PMC													ш	1.2	13	1.4	1.5	1.6	1.7	2.1	2.2	2.3								
SAM													ш	1.2	13	2.1	2.2	23	2.4											
M&A													ш	1.2	13	14	2.1	2.2	23	2.4										
PPQA													ш	1.2	2.1	2.2														
СМ													1.1	1.2	13	2.1	2.2	3.1	3.2											
RD													1.1	1.2	2.1	2.2	2.3	3.1	3.2	3.3	3.4	3.5								
TS													1.1	1.2	13	2.1	2.2	23	2.4	3.1	3.2									
PI													1.1	1.2	13	2.1	2.2	3.1	3.2	3.3	3.4									
VER													1.1	1.2	13	2.1	2.2	23	м	3.2										
VAL													1.1	1.2	13	2.1	2.2													
OPF													1.1	1.2	13	2.1	2.2	23	2.4											
OPD													1.1	1.2	13	14	1.5													
от													1.1	1.2	13	14	2.1	2.2	2.3											
IPM													1.1	1.2	13	1.4	15	2.1	2.2	2.3	3.1	3.2	4.1	4.2	43					
RSKM													1.1	1.2	13	2.1	2.2	3.1	3.2											
DAR													1.1	1.2	13	14	1.5	1.6												
OPP													1.1	1.2	13	14	1.5													
QPM													1.1	1.2	13	1.4	2.1	2.2	23	2.4										
OID													ш	12	13	14	2.1	2.2	23											
CAR													LI	12	2.1	2.2	2.3									5/				

#### **Presentation Agenda**



# **Scars of a SCAMPI Appraisal**

- Introduction
- CMMI Artifact Development
- The On-Site Period Some Metrics
- Lessons Learned: Team Afterthoughts



# **Process Improvement Journey**

Began in **early 1990s** (GE EPI) to establish foundation within Engineering

**1995** - Integrated Process activities at enterprise level (PCBs/EPSC)

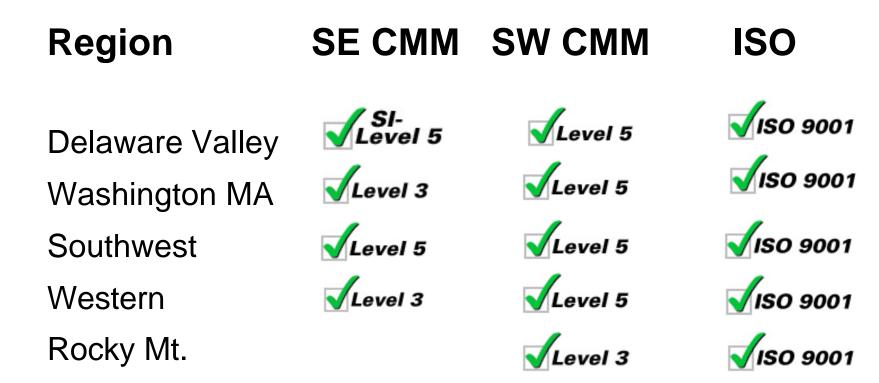
**1995** - Integrated Program Process Standard (PPS) at enterprise level

2000 - SE CMM Level 5 (12 PAs) SI LOB

2000 - SW CMM Maturity Level 5

#### **Process Excellence - 2001**





# **Transition to CMMI**



# 18 months of additional work to get CMMI Compliance

- Functional/ LOB Support
- Mature Programs
- Dedicated/ experienced staff

# **Team Composition**



#### **Experienced & trained**

- All six had 10+ years experience
- All completed Intermediate CMMI course
- 3 SCAMPI Lead Appraisers + Lead Evaluator

Mini-teams help parallel development Cross mini-team work More team-wide interviews

**Team Training** 



# How to develop common understanding when mini-teams used

**Common criteria for evaluation of PA's** 

- Not consistent on OE filtering
- What constitutes acceptable entries

Team building & trust Extra day of ATT ?

#### Data



#### Access to data on-line

• Problem - try project CD-ROM

# Network configuration w/ documentation IT support for team Plan for backup method (if data lost)

#### Process



#### "Validation" =

- BAD for draft findings presentation
- When non-attribution is used for projects

#### Just write down:

- "Don't give us more rocks"
- Use POC as filter for supplied data

#### No Synergy between SCAMPI & SCE

Different intents, team focus

#### Generics



#### **GP** leveling (common ground)

No clear (early) definition of how to be handled

#### **GP** recommended distribution:

- GP 2.5 ? OT 2.1, 2.10 ? OPF/OPD
- GP 2.6 ? CM 3.1, 3.2
- GP 2.8 ? MA
- GP 2.9 ? PPQA
- GP 2.2, 2.3, 2.4, 2.7, 2.8, 3.1 ? stay w/ PA

**Tool Issues** 



Tool helped capture /manage data Networking necessary for team Make sure tool is designed for SCAMPI License or seats for all team members Training & tailoring before on-site use Focused tool training

# Thoughts



Site coordinator / project POC's Lunch / facilities Ability to go unstructured into projects Hours **Downtime (interval week off): refresh** Didn't take advantage of downtime (recover losses)



# **SCAMPI WORKS!**



# **QUESTIONS ?**