CMMI® Surveillance Appraisals: A Modest Proposal

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2011 NDIA CMMI Technology Conference and User Group

November 16, 2011

Note

The CMMI Surveillance Appraisal method described in this presentation represents the thoughts and recommendations of the NDIA CMMI Working Group, with inputs from selected stakeholders. The method has not been approved or endorsed by the CMMI Program.

You feedback will help determine if this is a viable concept. Suggestions are welcome.

Agenda

Introduction

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Operational Concept

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- Organizational Unit Change Constraints
- Organizational Scope and Sampling

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Characterization & Rating

Team Qualifications

Open Issues

Summary

Introduction

SCAMPI A appraisal costs have been problematic for many businesses seeking to use CMMI and SCAMPI A to benchmark their organizational processes.

- Appraisals are expensive and often perceived as a burden to CMMI adoption.

After a SCAMPI A is completed, an organization must then conduct additional SCAMPI A appraisals every 3 years to maintain the previously achieved rating.

- Diverts valuable process improvement funding to a benchmarking activity that may offer little value in return.

Goal: Develop a *CMMI Surveillance Appraisal*

- Remove the need for a full SCAMPI A appraisal every 3 years by defining a low cost surveillance appraisal method to extend the lifespan of a SCAMPI A rating without compromising rating integrity.
- Align with ISO 9001/AS9100, TL9000 surveillance benchmarking activities.

General Concepts *(1 of 2)*

A CMMI surveillance appraisal should be not be more than 25-30% of the cost of a SCAMPI A.

- This should be a design constraint on the method.

A CMMI surveillance appraisal must be rigorous enough to ensure full confidence in extending the results of a SCAMPI A appraisal.

A CMMI surveillance appraisal will provide an extension of SCAMPI A results for 2 years from the completion date of the surveillance appraisal.

Maximum time between SCAMPI A appraisals is 7 years.

- CMMI surveillance appraisals cannot extend SCAMPI A rating(s) beyond 7 years.
- Two CMMI surveillance appraisals could be conducted in that timeframe

CMMI surveillance appraisals can be used for all CMMI constellations and the People CMM. Both staged and continuous representations will be supported.

General Concepts *(2 of 2)*

Model scope cannot be greater than the SCAMPI A baseline model scope.

- Can't add PAs that weren't in baseline, including previously not applicable PAs.
- Can't increase maturity levels or capability levels using a CMMI surveillance appraisal.

Organizational unit change must be within CMMI surveillance appraisal method constraints.

If a CMMI surveillance appraisal identifies problems (e.g., goal failures) the SCAMPI A rating cannot be extended.

- The SCAMPI A rating would not be immediately revoked.
- Additional CMMI surveillance appraisals would not be permitted until after another SCAMPI A.

If a SCAMPI A rating (or successful surveillance appraisal extension) expires before a surveillance appraisal is successfully conducted, the rating cannot be restored via a surveillance appraisal.

Maximum duration of surveillance appraisal is 45 days.

CMMI surveillance appraisal ratings should be noted as such in PARS.

Example Appraisal Timelines

CMMI ML rating validity

Use 2 Surveillance Appraisals to extend rating 3 years

T+2: Conduct Surv. Appraisal

T+4: Conduct Surv. Appraisal

Extended CMMI ML rating validity | Extended CMMI ML rating validity

CMMI ML rating validity

Use 2 Surveillance Appraisals to extend rating 4 years

T+3: Conduct Surv. Appraisal

T+5: Conduct Surv. Appraisal

Extended CMMI ML rating validity | Extended CMMI ML rating validity

Surveillance Appraisals - Operational Concept

Time, coverage, confidence

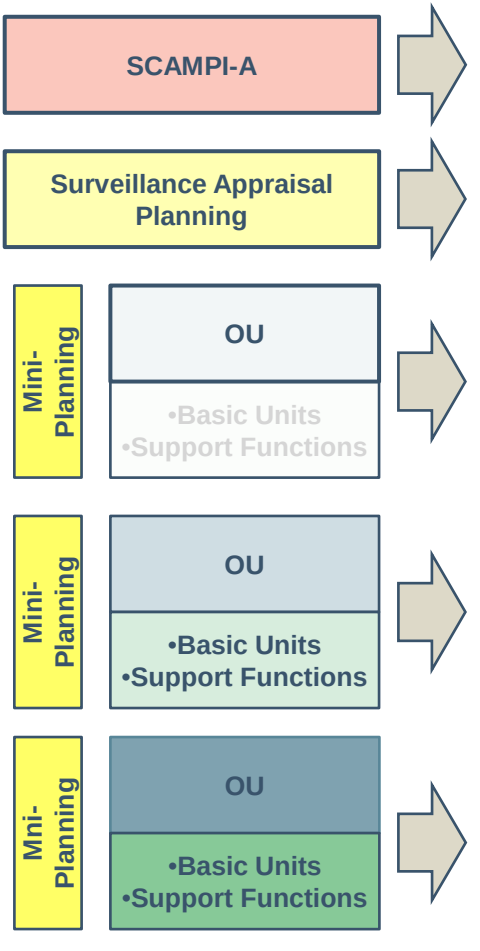
T-0:

Stage 1: Contextual Overview
- Business objectives, process plans
- Interviews (sponsor, EPG, QA leads)
- Performance measures
- Process deployment/maintenance
- QA audit analysis

Stage 2: High-Yield Artifacts
- Work products (basic units, support); high leverage artifacts
- Interviews (basic unit/support leads as needed)

Stage 3: Model Sampling
- Artifacts, affirmations (interviews)
- Sampling of model SGs, GPs

≤ T+3 yrs:



- Appraisal scope (model, basic units, sampling)
- Ratings
- Findings (strengths, weaknesses, opportunities)

- Surveillance appraisal plan (preliminary)
- Schedule, timelines, constraints, risks
- SEI notification 30 days in advance
- Appraisal scope, initial data collection

- Performance measures
- Process deployment/maintenance
- QA audit analysis
- Scope: initial areas of emphasis (PAs, units, etc.)
- Data collection plan for Stage 2

- Final model sample scope: investigative and random sampling (SGs, GPs)
- Final data coverage
- Data collection plan for Stage 3

- Practice characterizations
- Goal ratings
- Surveillance appraisal final findings
- Extension of Maturity Level rating (+2 yrs x 2)
- Package and archive appraisal assets

Operational Concept
Stage 1: Contextual Overview

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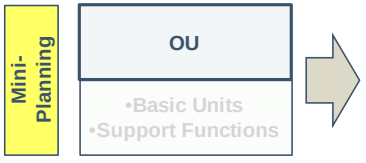
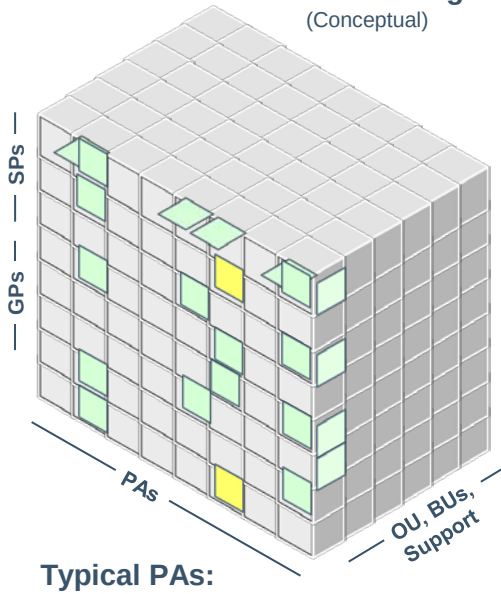
- Business objectives, process plans
- Interviews (sponsor, EPG, QA leads)
- Performance measures
- Process deployment/maintenance
- QA audit analysis



- Performance measures
- Process deployment/maintenance
- QA audit analysis
- Scope: initial areas of emphasis (PAs, units, etc.)
- Data collection plan for Stage 2

Goals:	Contextual understanding of the organization's process state, process deployment and maintenance status, possible noncompliance trends
Interviews:	Sponsor, EPG leads, Quality leads
Activities:	**Review performance measures from the organization** • *Business objectives, process performance objectives* • *Measurement and analysis related to achieving objectives* • *Corrective actions and process improvements*
	Review status of process deployment and maintenance • *Status of deployment to basic units, support functions* • *Results of process implementation/compliance monitoring* • *Status of improvement activities, appraisal findings*
	Review PPQA audit-type analysis • *Trend reports of audit non-compliances* • *Relate significant areas of concern to CMMI process areas*
Output:	Potential areas for further investigation in Stages 2 and 3

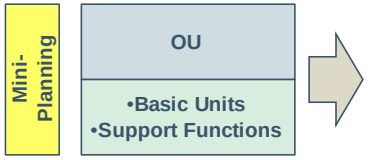
Model Coverage
(Conceptual)



Typical PAs:
- MA, PPQA
- OPF, OPD, OT, OPM, OPP
- Probe selected PAs based on data collected

Operational Concept
Stage 2: High Yield Artifacts

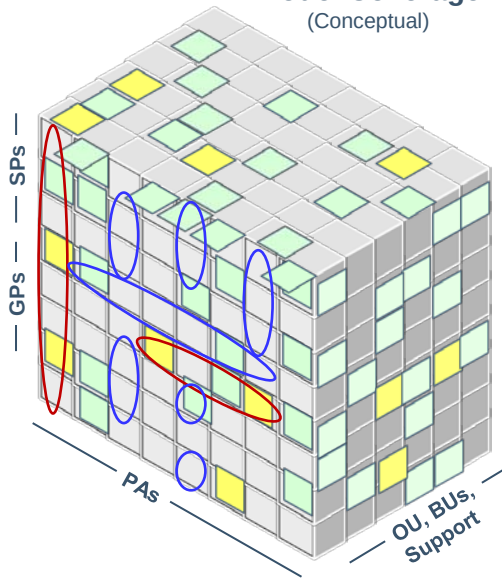
Stage 2: High-Yield Artifacts
- Work products (basic units, support); high leverage artifacts
- Interviews (basic unit/support leads as needed)



- Final model sample scope: investigative and random sampling (SGs, GPs)
- Final data coverage
- Data collection plan for Stage 3

Goals:	Determine Stage 3 model sample scope
Interviews:	Optional interviews with basic unit and support function leads as needed for high yield artifact analysis
Activities:	**Review example high yield artifacts** • *Plans, documents, reviews, financial reports, etc. (MDD Table18)* • *Collected from basic units and support functions in org scope* •*Identify areas of concern, initial Stage 3 model sample scope*
	Use random sampling to fill Stage 3 model sample scope • *Random sampling of SGs/GPs to supplement evidence review* • *Must meet method-defined minimum model sampling reqts* • *Status of improvement activities, addressing appraisal findings*
	"Finalize" Stage 3 model sample scope • *Appraisal team can identify additional SGs/GPs* • *Determine data coverage reqts based on model scope and applicable MDD coverage rules* • *Update Data Collection Plan for Stage 3*
Output:	Final Stage 3 model scope, updated data collection plan

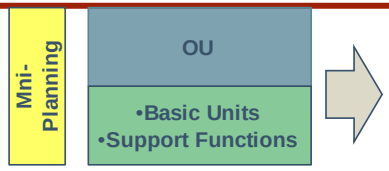
Model Coverage
(Conceptual)



- Map OE to model SPs, GPs
- Identify model sample scope for Stage 3 *(see sampling rules)*
  - -Targeted sampling (investigative)
  - -Random sampling (supplementary)

Operational Concept
Stage 3: Model Sampling

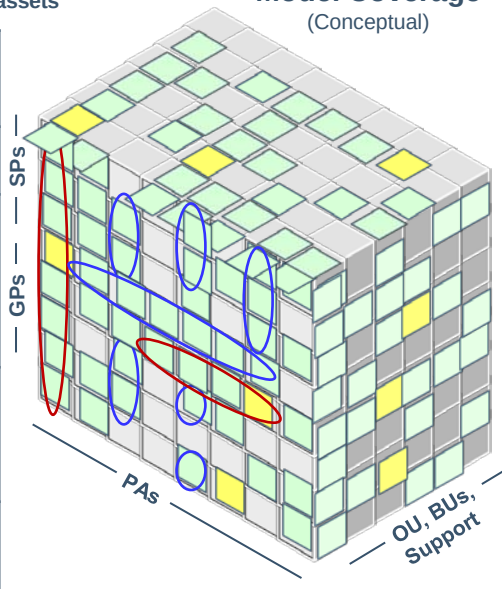
Stage 3: Model Sampling
- Artifacts, affirmations (interviews)
- Sampling of model SGs, GPs



- Practice characterizations
- Goal ratings
- Surveillance appraisal final findings
- Extension of Maturity Level rating (+2 yrs x 2)
- Package and archive appraisal assets

Goals:	Rate SGs and GGs included in model sample scope to determine if SCAMPI A rating can be extended
Interviews:	As needed for affirmations based on applicable MDD coverage rules
Activities:	**Verify objective evidence** • *Review data collected by OU based on model sample scope and MDD coverage rules* • *Conduct interviews for affirmations*
	Perform practice characterizations as described in MDD • *Characterize all SPs for SGs in model sample scope* • *Characterize GPs in model sample scope*
	Derive findings and rate goals • *Document preliminary findings (strengths and weaknesses)* • *Validate preliminary findings (optional)* • *Rate goals in model sample scope, determine ratings extension*
	Report results •*Deliver final findings. Package and archive appraisal assets.*
Output:	Final findings and ratings

Model Coverage
(Conceptual)



- Collect and verify OE for SPs and GPs in model sample scope
- See details for sampling and rating methods
- Follow MDD rules for practice characterization and aggregation

Organizational Unit Change Constraints

If the Organizational Unit has evolved since the previous SCAMPI A…

- The determinant on whether a surveillance appraisal is appropriate is the amount of change in the sampling factors used to scope the previous SCAMPI A.

Change in Sampling Factors/Values	Surveillance Appraisal Candidate*
No change.	Yes
# sampling factors/values has been reduced, with no new sampling factors/values added	Yes
# sampling factors/values have grown or sampling factors/values have changed	No
Internal reorganizations or external mergers/acquisitions	Maybe •Sampling factor/value changes? – see above •If no process implementation impact - Yes

* - The lead appraiser makes the final decision on whether a CMMI surveillance appraisal may be performed. Document rationale in plan/ADS.

Organizational Scope and Sampling *(1 of 2)*

Basic Unit and Support Function Sampling

- Organizational scope is determined using SCAMPI A V1.3 MDD rules.
  - Sampling factors beget subgroups which beget sample basic units and support functions.
  - Sampled basic units and support functions may or may not be the same as those sampled in baseline SCAMPI A.
  - All sampled basic units in each subgroup and support functions undergo Stage 2 high yield artifact review and Stage 3 sampling.
  - Stage 3 data coverage is based upon applicable SCAMPI A V1.3 MDD rules applied to Stage 3 model sample scope.
    - Coverage Rule 1 for Process Areas is not applicable by design of the CMMI surveillance appraisal method.
    - Process Area practice coverage is determined by SGs and GPs identified during Stages 1 and 2.

Organizational Scope and Sampling *(2 of 2)*

Model Sampling Methodology

- Specific Goals and Generic Practices are identified in Stage 1 and 2 for inclusion in Stage 3 sample scope (investigative sampling).
- A minimum of 33% of SGs and GPs in model scope must be included in Stage 3 sample scope.
  - Random sampling of SGs and GPs in model scope supplements investigative sampling performed in Stage1 and Stage 2.
  - At least two SGs must be selected for random sampling (even if Stage 1 and Stage 2 identified SGs are ≥ 33%.
  - At least one SG from each Process Area Category (within model scope) must be included in the Stage 3 sample.
  - GPs identified for Stage 3 sample are sampled for all Process Areas with SGs in Stage 3 sample scope.
- Appraisal team can always request additional evidence beyond original sample scope.

Case Study Example *(1 of 5)*

Reference MDD V1.3 Appendix F, Case Study 1 (expanded to Maturity Level 5). OU undergoes a CMMI Surveillance Appraisal 2 years after achieving Maturity Level 5.

- Stage 1
  - Team meets with Sponsor
    - Observes business objectives unchanged since last appraisal
  - Team meets with EPG Lead, Quality Leads
    - Observes some updated OSSP standards and quality issues with suppliers
- Stage 2
  - Team reviews OSSP, project plans, tailorings, status reporting packages
    - Observes QPPOs unchanged and some projects not meeting objectives without appearing to take action or use CAR
    - Observes supplier quality, cost, and schedule problems in status. Supplier stakeholder involvement questionable.
- Stage 3
  - Team identifies all SAM, OPP, QPM, CAR, OPM SGs, and IPM SG2 (11 SGs), and GP 2.2 and GP 2.7 for Stage 3 sample
  - For 33% SG coverage (16), randomly select 5 more SGs
  - For 33% GP coverage (4), randomly select 2 more GPs

Case Study Example *(2 of 5)*

SGs and GPs identified during Stages 1 and 2:

- All SGs in SAM, OPP, QPM, CAR, OPM, and also IPM SG2
- GPs: GP 2.2, GP 2.7

PA	SG	# SPs
SAM	SG 1	3
SAM	SG 2	3
IPM	SG 2	3
OPP	SG 1	5
QPM	SG 1	4
QPM	SG 2	3
CAR	SG 1	2
CAR	SG 2	3
OPM	SG 1	3
OPM	SG 2	4
OPM	SG 3	3

GPs
GP 2.2
GP 2.7

Case Study Example *(3 of 5)*

Use Random Number Generator to select 5 additional SGs and 2 additional GPs.

	PA	SG	# SPs
1	CM	SG 1	3
2	CM	SG 2	2
3	CM	SG 3	2
4	MA	SG 1	4
5	MA	SG 2	4
6	PPQA	SG 1	2
7	PPQA	SG 2	2
8	PMC	SG 1	7
9	PMC	SG 2	3
10	PP	SG 1	4
11	PP	SG 2	7
12	PP	SG 3	3
13	REQM	SG 1	5
14	DAR	SG 1	6
15	IPM	SG 1	7
16	OPD	SG 1	7
17	OPF	SG 1	3
18	OPF	SG 2	2
19	OPF	SG 3	4

	PA	SG	# SPs
20	OT	SG 1	4
21	OT	SG 2	3
22	PI	SG 1	3
23	PI	SG 2	2
24	PI	SG 3	4
25	RD	SG 1	2
26	RD	SG 2	3
27	RD	SG 3	5
28	RSKM	SG 1	3
29	RSKM	SG 2	2
30	RSKM	SG 3	2
31	TS	SG 1	2
32	TS	SG 2	4
33	TS	SG 3	2
34	VAL	SG 1	3
35	VAL	SG 2	2
36	VER	SG 1	3
37	VER	SG 2	3
38	VER	SG 3	2

	GPs
1	GP 2.1
2	GP 2.3
3	GP 2.4
4	GP 2.5
5	GP 2.6
6	GP 2.8
7	GP 2.9
8	GP 2.10
9	GP 3.1
10	GP 3.2

11 investigative sample SGs + 5 random sample SGs = 16 = 33% SG model scope.
2 investigative sample GPs + 2 random sample GPs = 4 = 33% GP model scope.

Case Study Example *(4 of 5)*

MDD Appendix F Case Study 1 Table 27 expanded to ML5 SCAMPI A Practice Instantiations

SCAMPI A SPs	627
SCAMPI A GPs	1008
Total	1635

		REQM		PP		PMC		MA		CM		PPQA		SAM		OPF		OPD		OT		RD	
Subgroups	**Sample**	SP	GP	SP	GP	SP	GP	SP	GP	SP	GP	SP	GP	SP	GP	SP	GP	SP	GP	SP	GP	SP	GP
LA, Commercial, Large, Short	1	5	12	14	12	10	12	8	12	7	12	4	12	6	12							10	12
LA, Commercial, Small, Short	1	5	12	14	12	10	12	8	12	7	12			6	12							10	12
LA, DoD, Large, Long	1	5	12	14	12	10	12	8	12	7	12											10	12
LA, DoD, Small, Short	2	5	12					8	12	0	0											10	12
		5	12					0	0	0	0											0	0
Dayton, DoD, Large, Long	1	5	12					8	12	7	12	4	12									10	12
Dayton, DoD, Small, Long	2	5	12					8	12	0	0											10	12
		0	0					8	12	0	0											0	0
Enterprise Process Group																9	12	7	12	7	12		
		35	84	42	36	30	36	56	84	28	48	8	24	12	24	9	12	7	12	7	12	60	72

		TS		PI		VER		VAL		IPM		RSKM		DAR		OPP		QPM		CAR		OPM	
Subgroups	**Sample**	SP	GP	SP	GP	SP	GP	SP	GP	SP	GP	SP	GP	SP	GP	SP	GP	SP	GP	SP	GP	SP	GP
LA, Commercial, Large, Short	1	8	12	9	12	8	12	5	12	10	12	7	12	6	12			7	12	5	12		
LA, Commercial, Small, Short	1	8	12	9	12	8	12	5	12	10	12	7	12	6	12			7	12	5	12		
LA, DoD, Large, Long	1	8	12	9	12	8	12	5	12					6	12					5	12		
LA, DoD, Small, Short	2	8	12	9	12	8	12	5	12					6	12					5	12		
		0	0	0	0	0	0	0	0	10	12	7	12	0	0			7	12	0	0		
Dayton, DoD, Large, Long	1	8	12	9	12	8	12	5	12					6	12					5	12		
Dayton, DoD, Small, Long	2	8	12	9	12	8	12	5	12					6	12					5	12		
		0	0	0	0	0	0	0	0					0	0					0	0		
Enterprise Process Group																5	12					10	12
		48	72	54	72	48	72	30	72	30	36	21	36	36	72	5	12	21	36	30	72	10	12

Case Study Example *(5 of 5)*

MDD Appendix F Case Study 1 Table 27 expanded to ML5 Surveillance Appraisal Practices

Total Stage 3 SPs Sampled	161
Total Stage 3 GPs Sampled	144
Total Stage 3 Sample	305

SP % of SCAMPI	26%
GP % of SCAMPI	14%
Total % of SCAMPI	19%

Proj. Mgt.: SAM, IPM, QPM
Proc. Mgt.: OPD, OPF, OPP, OPM
Eng.: PI
Support: MA, CM, CAR

		REQM		PP		PMC		MA SG1		CM SG2		PPQA		SAM		OPF SG2		OPD SG1		OT		RD	
Subgroups	**Sample**	SP	GP	SP	GP	SP	GP	SP	GP	SP	GP	SP	GP	SP	GP	SP	GP	SP	GP	SP	GP	SP	GP
LA, Commercial, Large, Short	1	*	*	*	*	*	*	4	4	2	4			6	4							*	*
LA, Commercial, Small, Short	1	*	*	*	*	*	*	4	4	2	4	*	*	6	4							*	*
LA, DoD, Large, Long	1	*	*	*	*	*	*	4	4	2	4											*	*
LA, DoD, Small, Short	2	*	*	*	*	*	*	4	4	*	*											*	*
		*	*	*	*	*	*	*	*	*	*											*	*
Dayton, DoD, Large, Long	1	*	*	*	*	*	*	4	4	2	4											*	*
Dayton, DoD, Small, Long	2	*	*	*	*	*	*	4	4	*	*	*	*									*	*
		*	*	*	*	*	*	4	4	*	*											*	*
Enterprise Process Group																2	4	7	4	*	*		
		0	0	0	0	0	0	28	28	8	16	0	0	12	8	2	4	7	4	0	0	0	0

		TS		PI SG3		VER		VAL		IPM SG2		RSKM		DAR		OPP		QPM		CAR		OPM	
Subgroups	**Sample**	SP	GP	SP	GP	SP	GP	SP	GP	SP	GP	SP	GP	SP	GP	SP	GP	SP	GP	SP	GP	SP	GP
LA, Commercial, Large, Short	1	*	*	4	4	*	*	*	*	3	4	*	*	*	*			7	4	5	4		
LA, Commercial, Small, Short	1	*	*	4	4	*	*	*	*	3	4	*	*	*	*			7	4	5	4		
LA, DoD, Large, Long	1	*	*	4	4	*	*	*	*					*	*					5	4		
LA, DoD, Small, Short	2	*	*	4	4	*	*	*	*					*	*					5	4		
		*	*	*	*	*	*	*	*	3	4	*	*	*	*			7	4	5	4		
Dayton, DoD, Large, Long	1	*	*	4	4	*	*	*	*					*	*					5	4		
Dayton, DoD, Small, Long	2	*	*	4	4	*	*	*	*					*	*					5	4		
		*	*	*	*	*	*	*	*					*	*					*	*		
Enterprise Process Group																5	4					10	4
		0	0	24	24	0	0	0	0	9	12	0	0	0	0	5	4	21	12	35	28	10	4

* - reviewed in Stage 1 and 2 only

Investigative Sample | Random Sample

Characterizations and Ratings

Characterizations are done on the Stage 3 sampled practices using SCAMPI A MDD characterization rules.

Goals that have Stage 3 sampled practices are rated based on the characterizations of the sampled practices and associated weaknesses (if any).

If all sampled goals are satisfied, the SCAMPI A rating can be extended.

If any sampled goals are not satisfied, the SCAMPI A rating cannot be extended.

Team Qualifications *(1 of 2)*

CMMI Surveillance Appraisal Team member qualifications are more stringent than SCAMPI A requirements

- Experienced team members able to reach accurate conclusions with less evidence

SCAMPI A	Surveillance Appraisal
Minimum team size is 4, including the lead appraiser	Minimum team size is 2, including the lead appraiser •Members of the appraised organization are allowed to be team members but the team must have a minimum of 2 team members external to the OU (including the lead appraiser).
Team members complete Introductory to model course	Team members must have previous experience as appraisal team members on at least two SCAMPI A appraisals
Average of 6 years field experience wrt reference model, aggregate of 10 yrs management experience, 1 team member with 6 yrs mgt. experience	Each team member must have minimum of 6 yrs field experience, (including experience performing practices from the process areas that the team member is reviewing)
Aggregate of 25 years field experience	N/A

Team Qualifications *(2 of 2)*

High Maturity

SCAMPI A	Surveillance Appraisal
Certified High Maturity Lead Appraiser (HMLA)	Certified High Maturity Lead Appraiser (HMLA)
All members of high maturity mini-team have high maturity experience	Team members reviewing high maturity process areas must have been on a previous SCAMPI A high maturity appraisal
HMLA or ATM with statistical analysis & other high maturity training assigned to high maturity mini-teams	At least one team member reviewing high maturity process areas must: • have been on a previous SCAMPI A high maturity appraisal as part of a high maturity mini-team or •be a certified HMLA who has been on a high maturity appraisal as lead or team member
Team as a whole has collective experience implementing high mat activities	N/A

Open Issues

V1.2 Model and Method Sunset issue

- **Should CMMI V1.2 model appraisals be candidates for surveillance appraisals?**
  - Under discussion
  - If no, there may be no surveillance appraisal market until 2013
  - If yes, outdated model ratings are being extended
- **Should surveillance appraisals be done with MDD V1.2?**
  - Recommendation – NO
  - The CMMI Surveillance Appraisal method requires use of the SCAMPI A V1.3 MDD methods.
    - Appraisal scoping, characterizations, ratings, etc. must be done in accordance with MDD V1.3
    - For example, an OU that used MDD V1.2 would have to convert critical factors to sampling factors, and apply the MDD V1.3 subgroup/sampling process, data coverage rules, etc.
    - The lead appraiser must ensure that the OU in the CMMI Surveillance Appraisal falls within the OU change constraints described earlier in this presentation, and document the rationale in the CMMI Surveillance Appraisal plan.

Summary

Goal: Define a *low cost CMMI* Surveillance Appraisal method to extend the lifespan of a SCAMPI A rating *without compromising rating integrity.*

Lower costs…	…without compromising integrity
Less evidence collection and review by the organizational unit and appraisal team	Organizational Unit has already undergone a recent baseline SCAMPI A appraisal
Fewer, but more experienced team members	Team member qualifications are more stringent than SCAMPI A V1.3 MDD team member qualifications
Fewer SCAMPI A appraisals performed just to maintain ratings	Combines investigative sampling and random sampling of specific goals and generic practices

For More Information….

NDIA CMMI Working Group

http://www.ndia.org/Divisions/Divisions/SystemsEngineering/Pages/CMMI_Working_Group.aspx

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