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Customer Success Is Our Mission

SCAMPI^{SM} A V1.3 MDD Usage Profile

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Introduction

The presentation reviews the adoption and usage of SCAMPI A Method Definition Document (MDD) V1.3.

The primary focus is on “Determining Organizational Scope”.

- MDD V1.3 Activity 1.1.4 Determine Appraisal Scope
- MDD V1.3 Appendix F Scoping and Sampling in SCAMPI A Appraisals

The purpose of the analysis is to:

- Provide guidance to future MDD V1.3 users
- Ensure MDD V1.3 is working and being used as intended

Introduction – Briefing Contents

This briefing includes:

- MDD V1.3 Adoption
- Sampling Factor Analysis
- Subgroup Analysis
- Basic Unit Analysis
- Support Function Analysis
- Organizational Unit (OU) Size Analysis
- Data Relationships
- Guidance Summary
- Comparing MDD V1.2 and MDD V1.3 CMMI V1.3 Appraisals
- Other Observations

- Notes:
  - All data comes from the SEI Published Appraisal Results Site (PARS)
  - Data includes SCAMPI A MDD V1.3 appraisals and all CMMI V1.3 appraisals posted to PARS by October 1, 2012

MDD V1.3 Glossary Definitions

- **Basic unit** – A managed set of interrelated resources which delivers one or more products or services to a customer or end user and typically operates according to a plan (e.g., projects, work groups).
- **Sampling factor** – organizational or work context that reflects meaningful differences in the way work is performed across different basic units within the organizational unit (e.g., size, location, customer).
- **Subgroup** – Cluster of basic units that share common sampling factor alternatives and exhibit similar process implementations.
- **Support function** – An organizational group that provides products and/or services for a bounded set of activities needed by other portions of the organization (e.g., Configuration Management group, Quality Assurance group).
- **Organizational scope** - The collection of basic units and support functions that provides instantiations of practices used within, and representative of, an organizational unit.

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Sampling Factors in Action

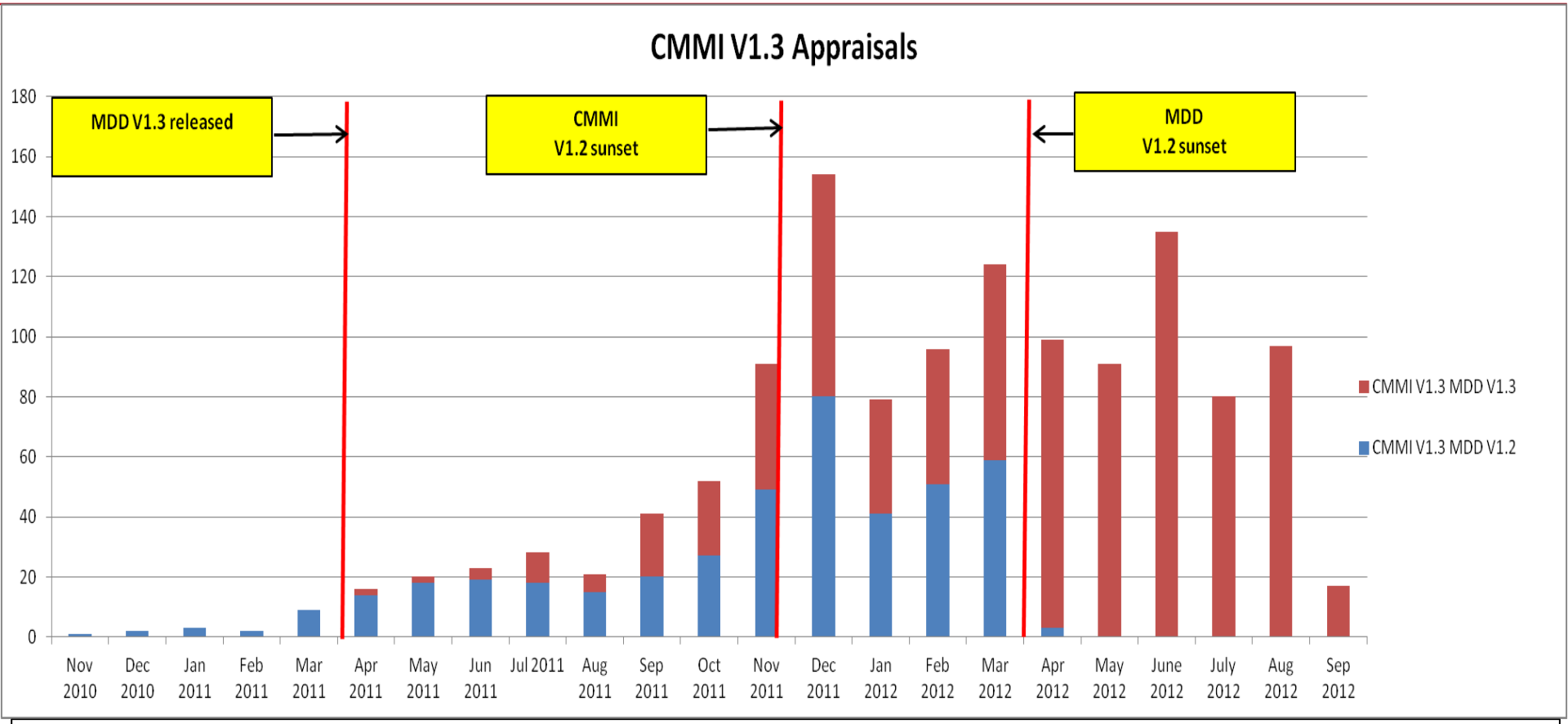
Fictional Example: BINDY Co.

1. Identify Sampling Factors
   - Location: Indianapolis, Boston
   - Type of Work: new, maintenance
   - Customer: DoD, commercial
2. Combine sample factors, sort basic units (BUs), determine min. sample
   - Minimum # of BUs per subgroup = (# BUs in subgroup × # subgroups) / total # BUs

BINDY Co.		Location	Type of Work	Customer	# of BUs in subgroup	# subgroups X # BUs in subgroup	...divided by total # BUs	Min. Number Sampled
		Boston	new	comm	0	0	0.00	0
	Subgroup 1	Boston	new	DoD	4	20	0.13	1
	Subgroup 2	Boston	maint	comm	49	245	1.64	2
		Boston	maint	DoD	0	0	0.00	0
	Subgroup 3	Indy	new	comm	5	25	0.17	1
	Subgroup 4	Indy	new	DoD	16	80	0.54	1
		Indy	maint	comm	0	0	0.00	0
	Subgroup 5	Indy	maint	DoD	75	375	2.52	3
Totals	5				149			8

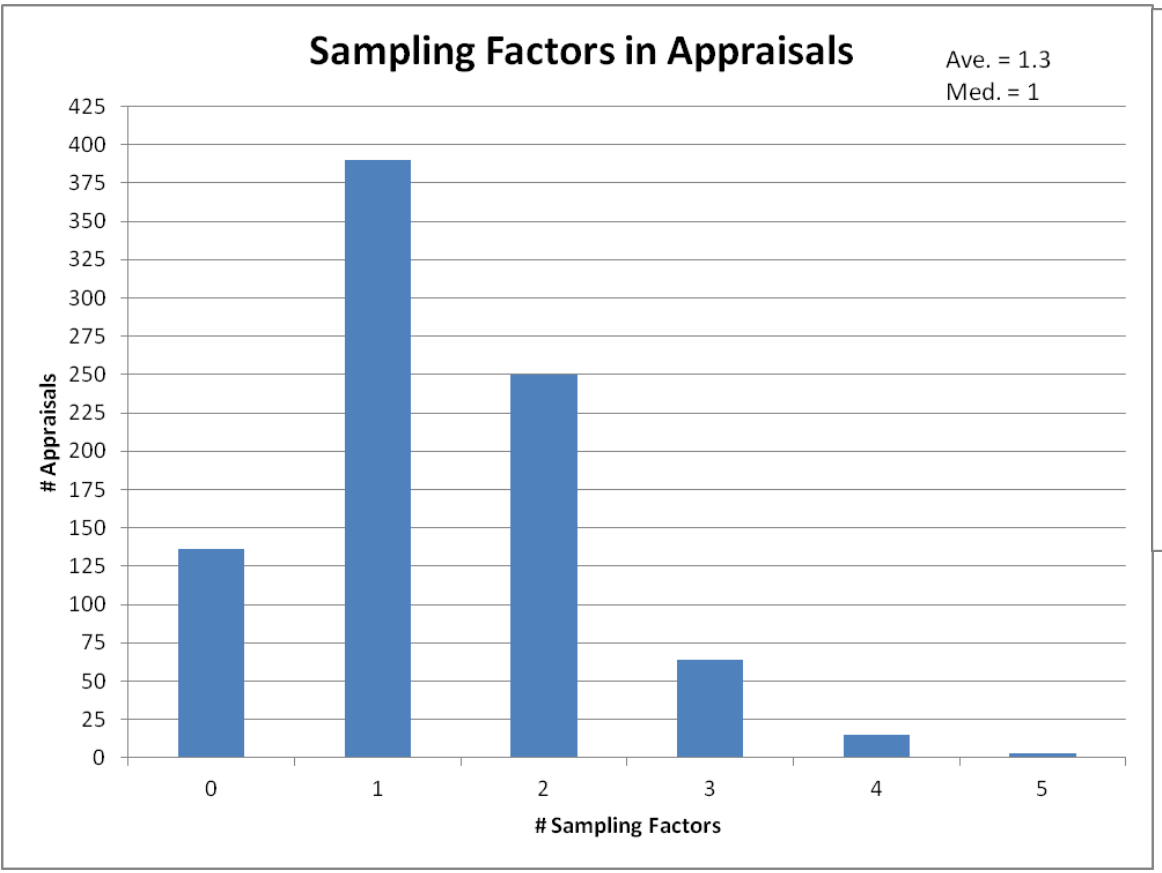
Bindy Co. must provide evidence from 8 basic units representative of the 5 subgroups.
(Note: The organizational unit can choose to provide more.)

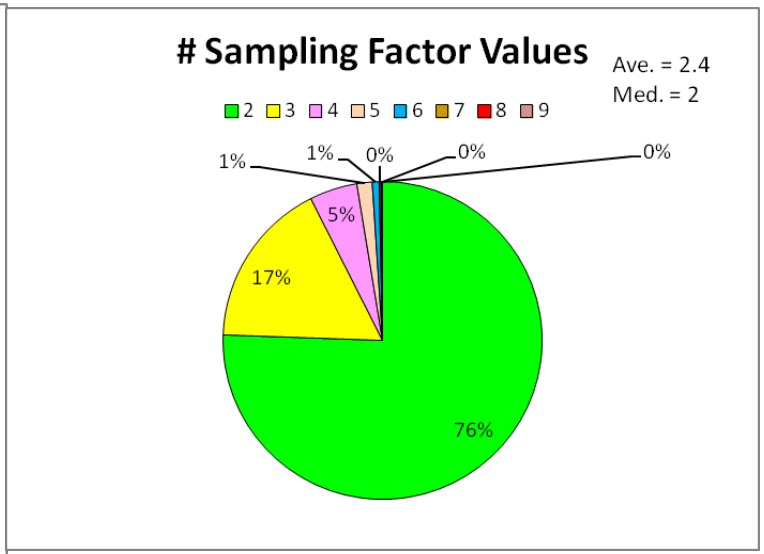
MDD V1.3 Adoption Data



- 1231 CMMI V1.3 appraisals have been recorded in PARS.
- 431 appraisals used MDD V1.2, 850 appraisals used MDD V1.3.
- All September 2012 appraisals have not been recorded yet.
- 2 P-CMM appraisals (not shown on chart or included in this presentation analysis) used MDD V1.3.
- 13 CMMI V1.3 Multi-model appraisals were conducted (all with CMMI-SVC as partner).

Sampling Factors

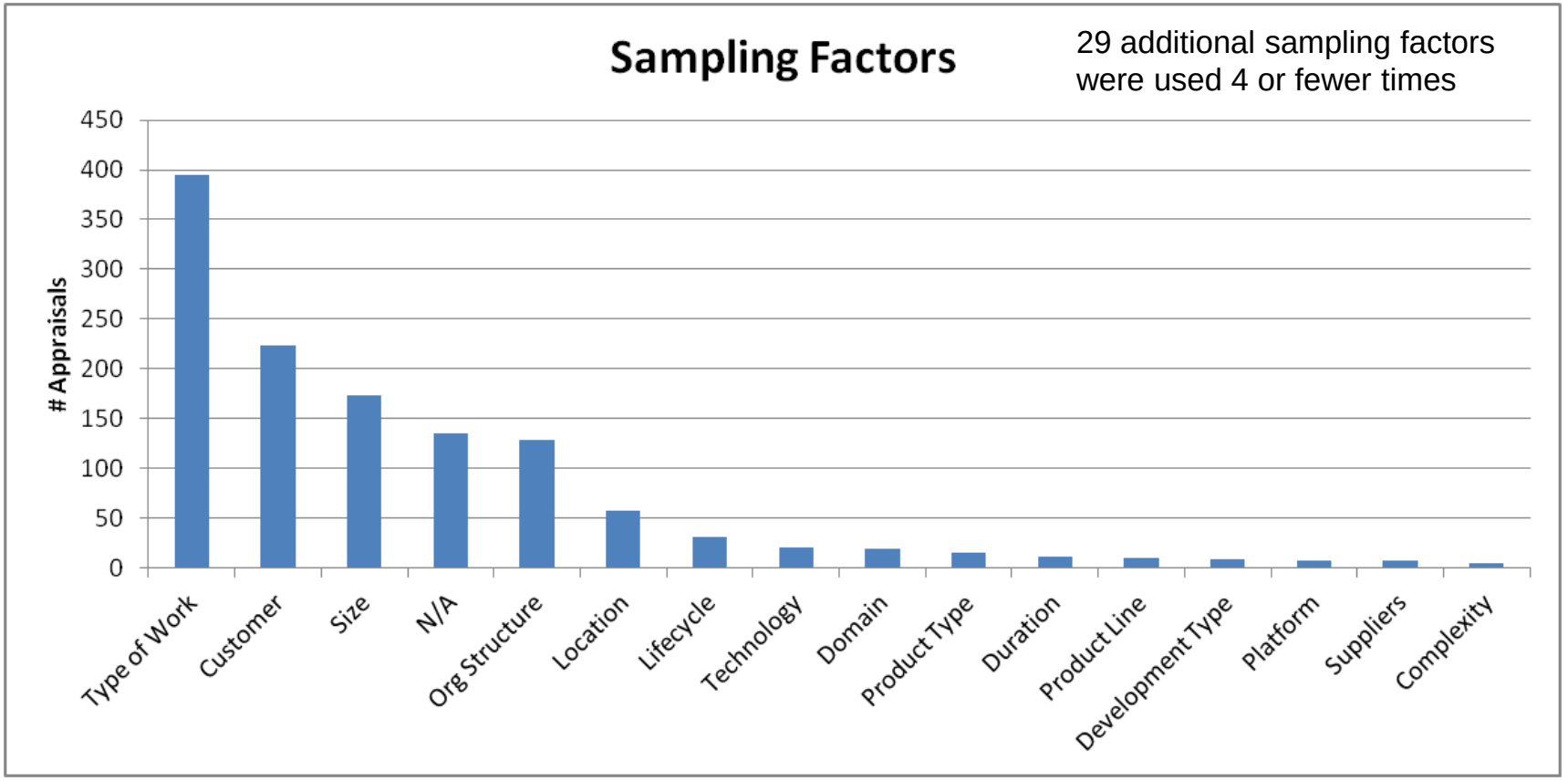




- 76% of sampling factors have 2 values (e.g., Type of Work – development, maintenance)

- 90% of appraisals have 2 or fewer sampling factors.
- 136 appraisals (16%) had zero sampling factors.

Sampling Factors



- [Type of Work, Customer, Org Structure, Size] constitute 79% of sampling factor usage (not counting N/As which are zero sampling factor appraisals).
- "Type of Work" is the biggest driver of process diversity in appraised organizations.

Sampling Factors Issues *Page 1 of 2*

Usage Issues:

- Organizational characteristics are identified as sampling factors even though there may be no process implementation impact
  - Example: Locations identified as sampling factor without any indications of process differentiation based on location

- Sometimes excessive sampling factor and/or sampling factor values are identified (and not used).
  - One appraisal had 96 possible sampling factor value combinations!
  - Some appraisals had more possible sampling factor value combinations than people in the organizational units

- Sampling factors (and/or sampling factor values) are identified but not used in organizational scoping
  - Past or future sampling factors/values that are not currently relevant to the organizational unit being appraised should not be included
    - Example: An OU identifies type of work as a sampling factor with 2 values: new, maintenance. Although the OU standard process still contains unique processes for maintenance type work, no maintenance work is currently being performed at the OU, and no basic units/support functions are providing objective evidence of maintenance processes being implemented

Sampling Factors Issues *Page 2 of 2*

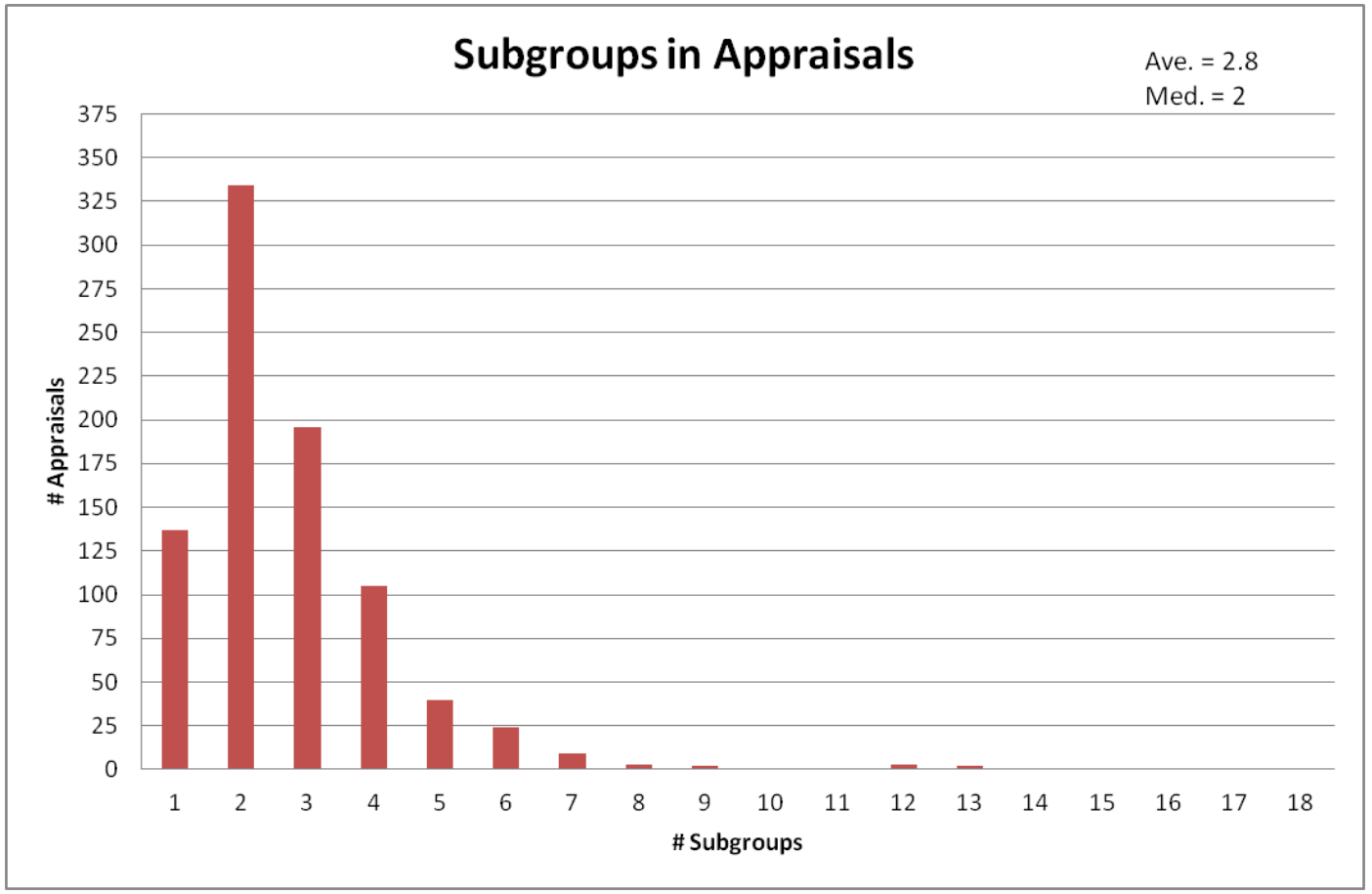
- Redundant sampling factors are identified
  - E.g., 2 sampling factors: location (Chicago, Dallas), type of work (new, maintenance)
  - If all new work is done in Dallas, and all maintenance in Chicago, one sampling factor may be redundant.

- Support functions identified as sampling factors and/or sampling factor values.
  - Example: “Support Functions” is identified as a “sampling factor” with 3 values (CM, QA, process improvement)
  - Sampling factor – organizational or work context that reflects meaningful differences in the way work is performed across different basic units within the organizational unit (e.g., size, location, customer).
  - Support function – An organizational group that provides products and/or services for a bounded set of activities needed by other portions of the organization (e.g., Configuration Management group, Quality Assurance group).

SEI Appraisal System (SAS) problem:

- Although “zero sampling factors” is a valid real world condition, SAS forces users to identify at least one sampling factor.
- Workaround:
  - Set #subgroups = 1
  - Identify 1 sampling factor with 2 values (all basic units, no basic units)

Subgroups



- 78% of appraisals have 3 or fewer subgroups.
- Median of 2 subgroups seems reasonable if median #sampling factors = 1 and median #sampling factor values = 2.

Subgroup Issues

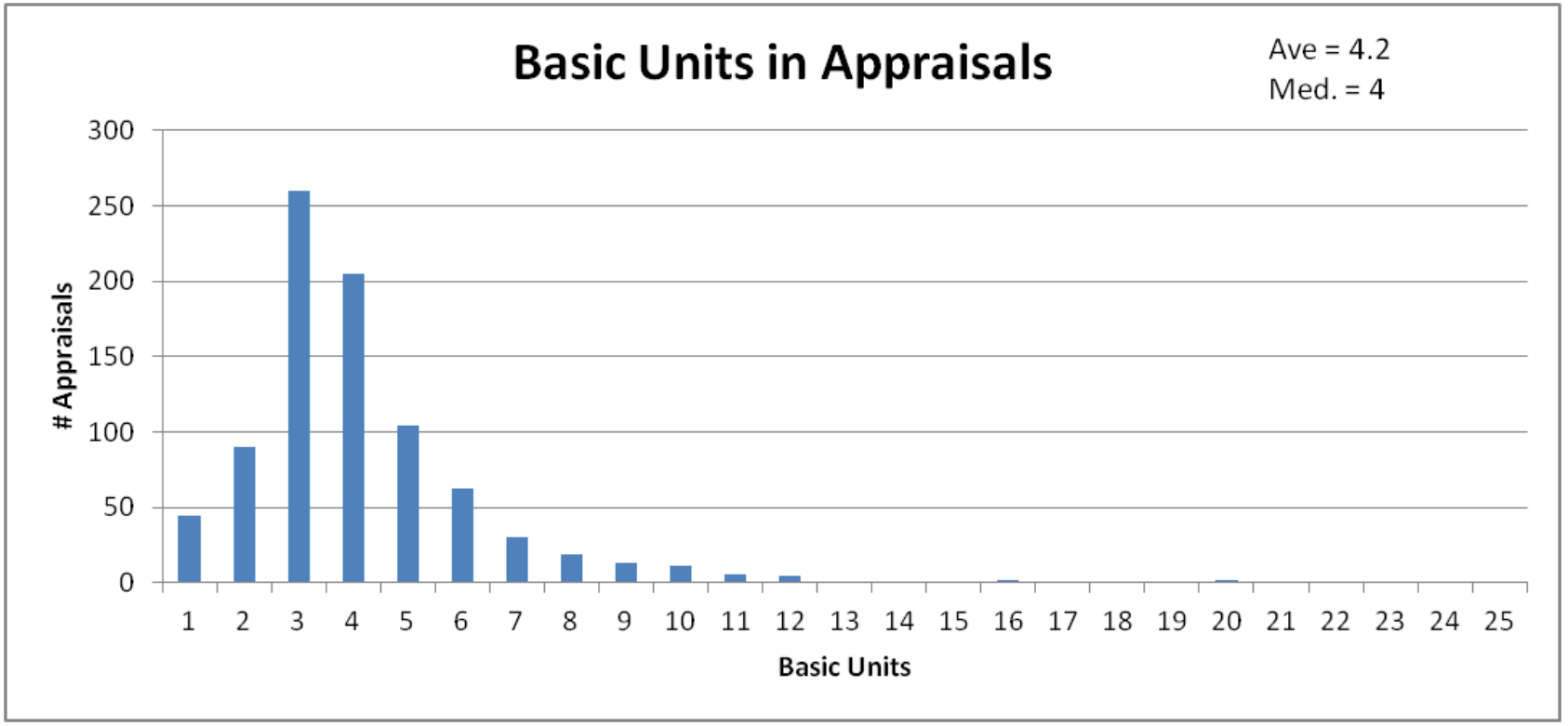
Usage Issues:

- In some cases, the number of sampling factors and sampling factor values identified does not always align with the number of subgroups. Examples:
  - Several appraisals had 1 sampling factors with 2 sampling factor values but 3 subgroups
  - 1 appraisal had 2 sampling factors, each with 2 values, but 6 subgroups
  - 1 appraisal had 1 sampling factor with 2 values but 18 subgroups and 25 basic units!
- In some appraisals, support functions were being called subgroups.
  - MDD definition of subgroup: "*a cluster of basic units* that share common sampling factor alternatives and exhibit similar process implementations"
- In 2 appraisals, multiple subgroups were identified with identical sampling factor value combinations

Guidance:

- The number of subgroups ≥ the number of sampling factors.
  - Zero sampling factors implies one subgroup (the entire OU)
  - One sampling factor implies at least 2 subgroups
- The number of subgroups ≤ the number of possible sampling factors value combinations
- Support functions are not subgroups and should not be designated as such.
- Different subgroups should not have the same sampling factor value combination.

Basic Units



- 70% of appraisals have 4 or fewer basic units
- Aligns with 78% of appraisals having 3 or fewer subgroups
- One appraisal had 23 basic units, one had 24 basic units, one had 25 basic units.

Basic Unit Issues

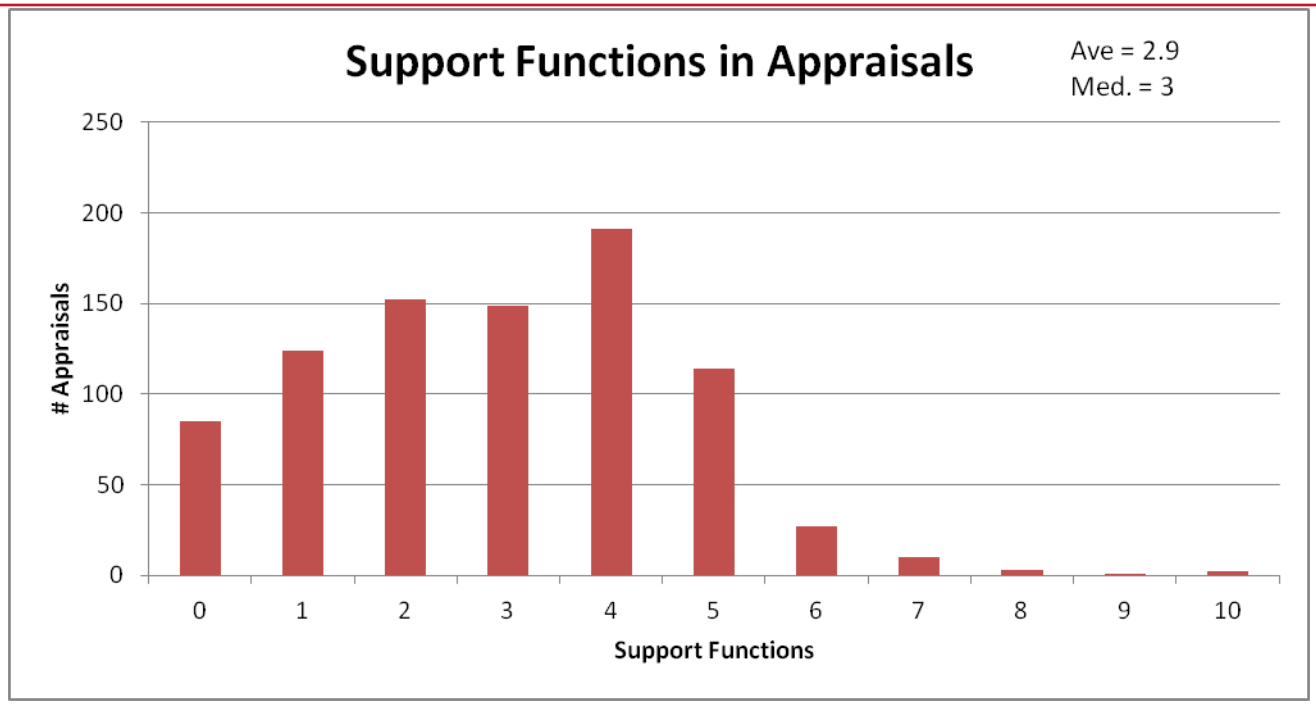
Usage Issues:

- In 12 appraisals, the number of basic units sampled was less than the number of subgroups.
  - MDD Coverage Rule 1 for Basic Units states that “For each subgroup, artifacts and affirmations shall be provided for at least one basic unit for each process area implemented by basic units within the subgroup.”
- In 11 appraisals, not all of the subgroups were represented by basic units in the organizational scope.

Guidance:

- The number of basic units ≥ the number of subgroups. All subgroups must be represented by at least one basic unit.
  - See MDD Coverage Rule 1 for Basic Units

Support Functions



- # support functions may be related to organizational unit (OU) structure
- There is no statistically significant relationship between OU size and # support functions.
- QA, CM, Training, Testing, EPG, and supplier-related groups (e.g., Contracts, Procurement, etc.) are the most commonly identified support functions in CMMI appraisals
- Other common support functions include MA, Management groups.
- Some support functions have multiple roles (e.g., a process group that also does training).

Support Function Issues

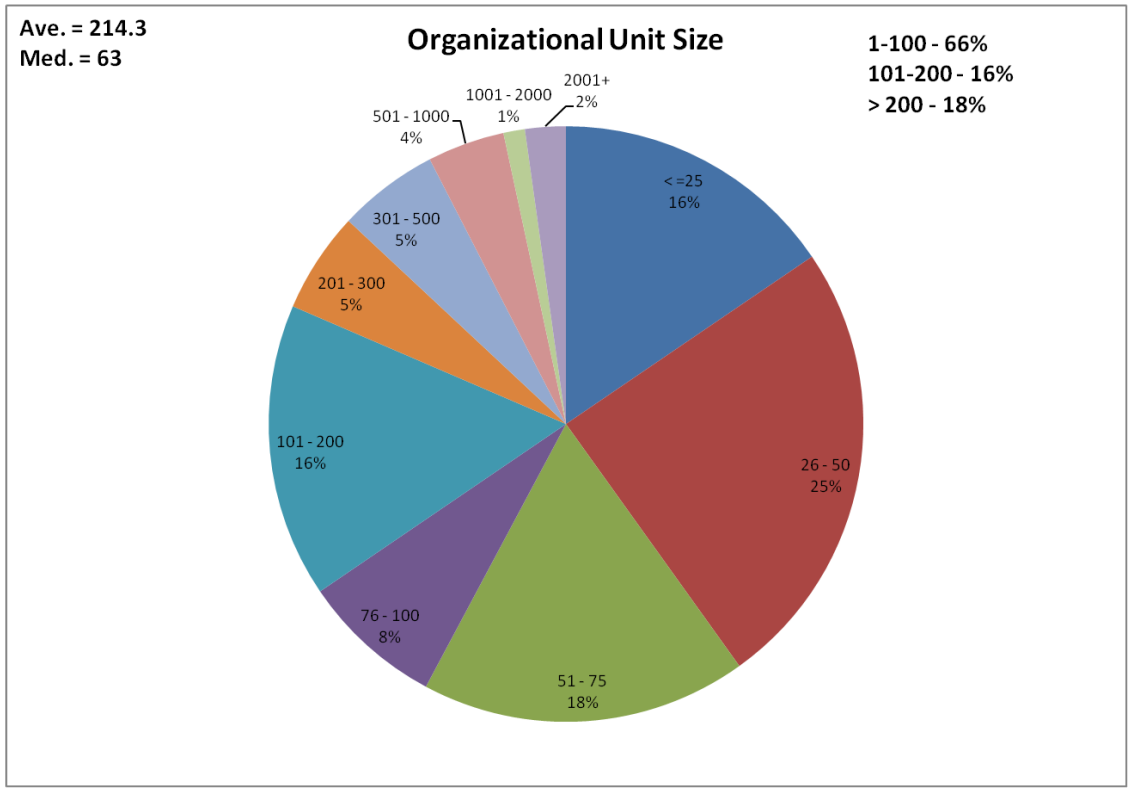
Usage Issues:

- In 23 appraisals, support functions were being called subgroups or sampling factors or sampling factor values or basic units.
  - MDD definition of a support function: An organizational group that provides products and/or services for a bounded set of activities needed by other portions of the organization (e.g., Configuration Management group, Quality Assurance group).
  - MDD definition of subgroup: "*a cluster of basic units* that share common sampling factor alternatives and exhibit similar process implementations"
  - MDD definition of sampling factors: "organizational or work context that reflects meaningful differences in the way work is performed across different basic units within the organizational unit (e.g., size, location, customer).

Guidance:

- Support functions are not subgroups or sampling factors or sampling factor values or basic units, and should not be designated as such.

Organizational Unit Size

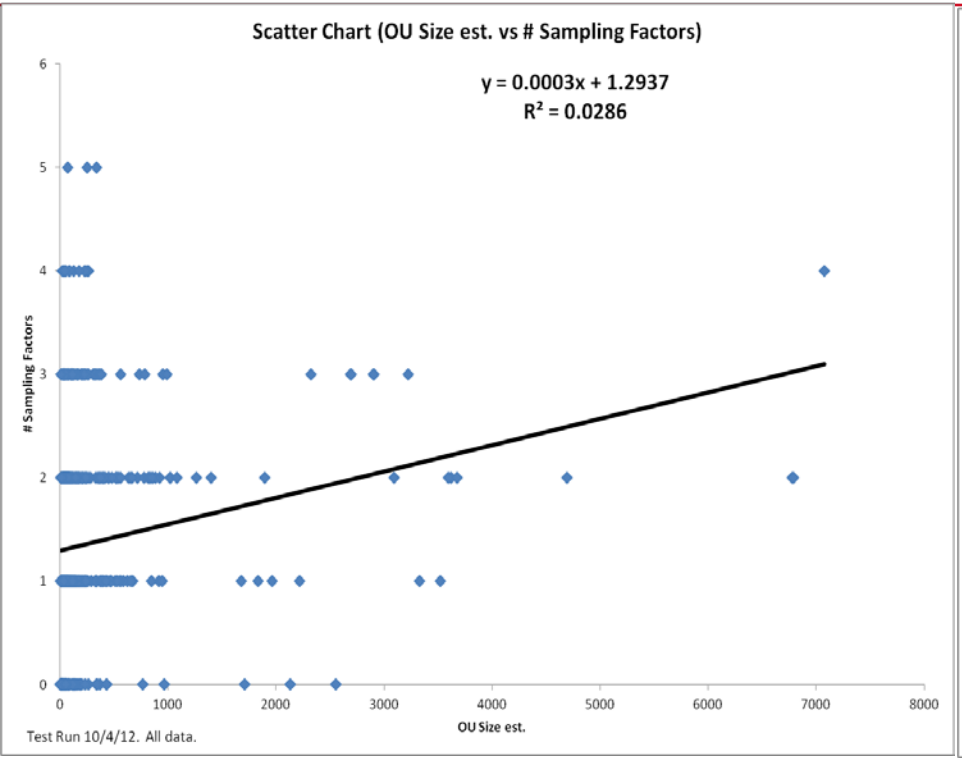


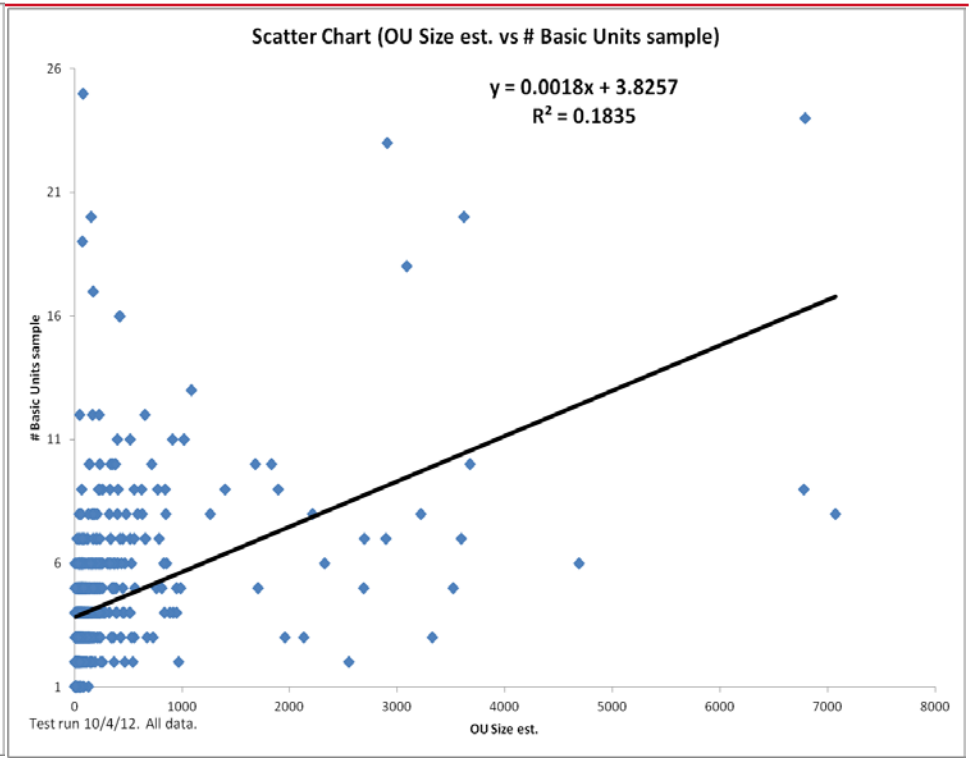
OU Size Study	MDD V1.2	MDD V1.3
sample size	427	850
1-100	68%	66%
101-200	14%	16%
201+	18%	18%
Average	190.8	214.3
Median	58	63

- Compared CMMI V1.3 MDD V1.2 vs. CMMI V1.3 MDD V1.3 data
  - No statistically significant difference between MDD V1.2 and MDD V1.3 observed
- OU size is estimated based on basic unit and support function “number of people”, and “% of people included” fields in PARS.

Data Relationships

OU Size and # Sampling Factors, # Basic Units





Notes:

Current data does not show a relationship between:

- OU Size and # Sampling Factors or
- OU Size and # Possible Sampling Factor combinations (graph not shown) or
- OU Size and # Subgroups (graph not shown)
- OU Size and # Basic Units

Conclusion:

- OU Size by itself is not the determinant of the extent of process diversity.
- Small organizations can exhibit as much process diversity as large organizations.

Guidance Summary *Page 1 of 2*

Error Code	Error Description	#	Example	Guidance
A	SAS does not allow “zero sampling factor” appraisals.	136	Many appraisals have no sampling factors (valid).	Use SAS Workaround until SAS is fixed. Be clear in SAS.
B	#subgroups < #sampling factors	14	2 sampling factors, 1 subgroup	#subgroups ≥ #sampling factors
C	Bad numerical combinations of sampling factors, sampling factor values, and subgroups	10	1 sampling factor with 2 values but 3 subgroups	#subgroups ≤ #possible sampling factor value combinations
D	#basic units < #subgroups	12	10 subgroups, 6 basic units	#basic units ≥ #subgroups (See MDD Coverage Rule 1 for Basic Units)
E	Not all subgroups are represented by basic units in the org. scope	11	List of basic units that excludes a subgroup	See MDD Coverage Rule 1 for Basic Units.
F	Redundant sampling factors	50	2 sampling factors identified, each with the same values. 2 sampling factors representing equivalent conditions.	Don’t “force” sampling factors.
G	Support functions being called sampling factors or sampling factor values or subgroups or basic units	23	A sampling factor called “support functions” with values: CM , QA, Training, MA	See MDD definitions of support function, subgroup, sampling factor, basic unit. Often pairs with error code D.

Guidance Summary *Page 2 of 2*

Error Code	Error Description	#	Example	Guidance
H	Gratuitous sampling factors (Sampling factors identified but not used)	4	“Customer” identified as sampling factor but not used in any subgroups.	Use sampling factors to create subgroups.
I	Gratuitous sampling factor values (Sampling factor values identified but not used)	24	Sampling factor Size (small, med, large) identified but small not used in any subgroups.	Past or future sampling factor values that are not currently relevant to the OU should not be included. (Processes related to the unused values are not being appraised.)
J	Multiple subgroups with the same sampling factor value combination.	2	2 sampling factors, 1 subgroup	Subgroups are unique combinations of sampling factor values.

Comparing MDD V1.2 and MDD V1.3 CMMI V1.3 Appraisals

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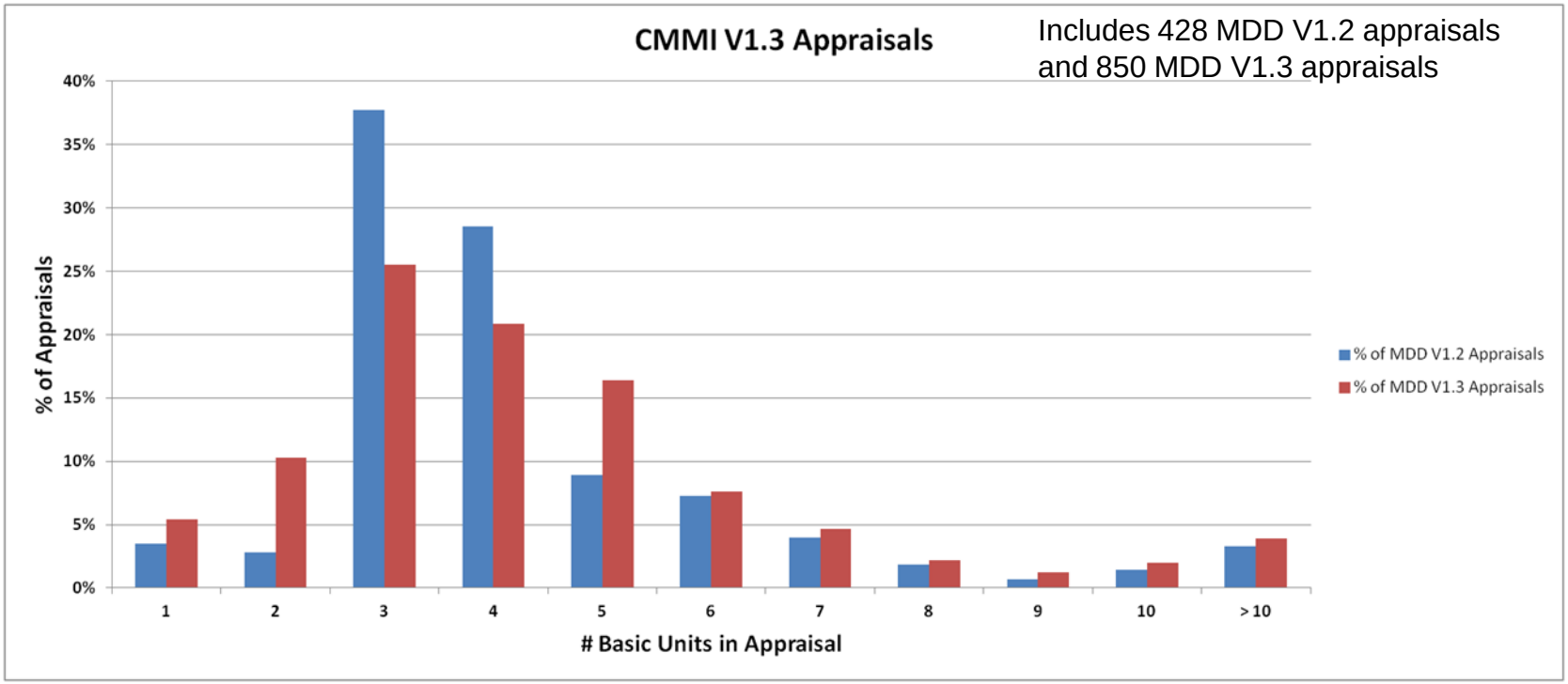

- MDD V1.2 spikes at 3 basic units, MDD V1.3 more normal
- MDD V1.2 Average = 4.4, Median = 4, 73% 4 basic units or less
- MDD V1.3 Average = 4.2, Median = 4, 70% 4 basic units or less
- No statistically significant difference between mean or standard deviation in methods

Other Observations - MDD V1.3 Appraisal Trends

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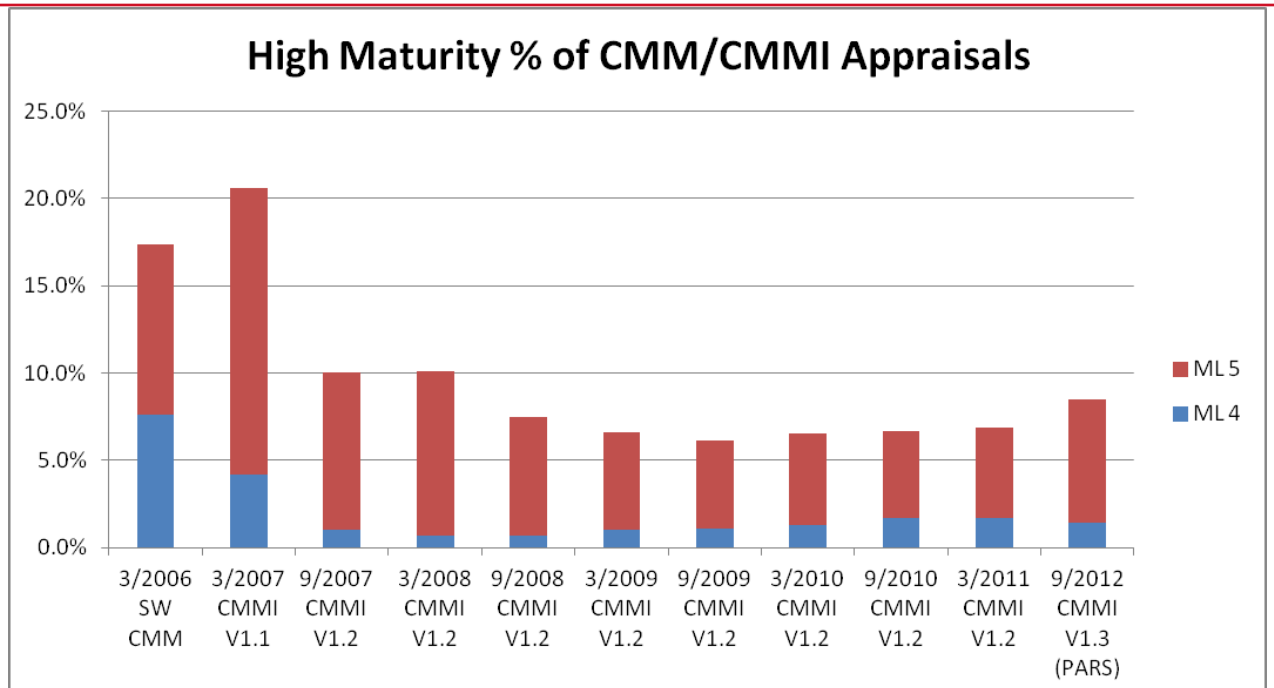
Cumulative Data	Q3 2011	Q4 2011	Q1 2012	Q2 2012	Q3 2012
# Appraisals	51	194	342	664	858
# Sampling Factors Ave.	1.45	1.48	1.45	1.40	1.35
# Sampling Factors Med.	2	1	1	1	1
# Subgroups Ave.	3.31	3.24	3.07	2.86	2.75
# Subgroups Med.	3	3	2	2	2
# Basic Units Ave.	4.82	4.81	4.72	4.33	4.22
# Basic Units Med.	4	4	4	4	4
# Support Functions Ave.	3.0	2.63	2.74	2.92	2.91
# Support Functions Med.	3	2	3	3	3
# Possible Sampling Factor Value Combinations Ave.	5.55	6.61	5.87	5.31	4.99
# Possible Sampling Factor Value Combinations Med.	4	4	3	3	2

Quarterly (non-cum) Data	Q3 2011	Q4 2011	Q1 2012	Q2 2012	Q3 2012
# Appraisals	51	143	148	322	194
# Sampling Factors Ave.	1.45	1.50	1.41	1.34	1.19
# Sampling Factors Med.	2	1	1	1	1
# Subgroups Ave.	3.31	3.21	2.85	2.63	2.40
# Subgroups Med.	3	3	2	2	2
# Basic Units Ave.	4.82	4.81	4.59	3.91	3.86
# Basic Units Med.	4	4	4	4	3
# Support Functions Ave.	3.0	2.49	2.88	3.12	2.86
# Support Functions Med.	3	2	3	3	3
# Possible Sampling Factor Value Combinations Ave.	5.55	6.99	4.91	4.71	3.91
# Possible Sampling Factor Value Combinations Med.	4	4	2	2.5	2

Other Observations – High Maturity



% of high maturity appraisals is higher with CMMI V1.3 than CMMI V1.2 2008 - 2011 era.

3/2006 M.P. SW CMM (2001-5)	3/2007 M.P. CMMI V1.1	9/2007 M.P. CMMI V1.2	3/2008 M.P. CMMI V1.2	9/2008 M.P. CMMI V1.2	3/2009 M.P. CMMI V1.2	9/2009 M.P. CMMI V1.2	3/2010 M.P. CMMI V1.2	9/2010 M.P. CMMI V1.2	3/2011 M.P. CMMI V1.2	9/2012 CMMI V1.3 (PARS)
1804	1712	100	545	958	1500	2053	2753	3284	3798	1281
	9.0%	11.0%	6.6%	6.2%	5.8%	5.0%	4.7%	4.5%	4.2%	0.8%
5.7%	1.7%	2.0%	1.5%	1.1%	0.8%	0.6%	0.5%	0.4%	0.4%	1.0%
39.6%	32.7%	40.0%	33.6%	32.0%	28.5%	27.1%	25.2%	24.5%	23.7%	22.3%
37.4%	36.1%	37.0%	43.8%	53.1%	58.3%	61.1%	63.0%	63.9%	64.8%	68.8%
7.6%	4.2%	1.0%	0.7%	0.7%	1.0%	1.1%	1.3%	1.7%	1.7%	1.4%
9.8%	16.4%	9.0%	9.4%	6.8%	5.6%	5.0%	5.2%	5.0%	5.2%	7.0%
17.4%	20.6%	10.0%	10.1%	7.5%	6.6%	6.1%	6.5%	6.7%	6.9%	8.5%

Other Observations – Appraisals over the Years

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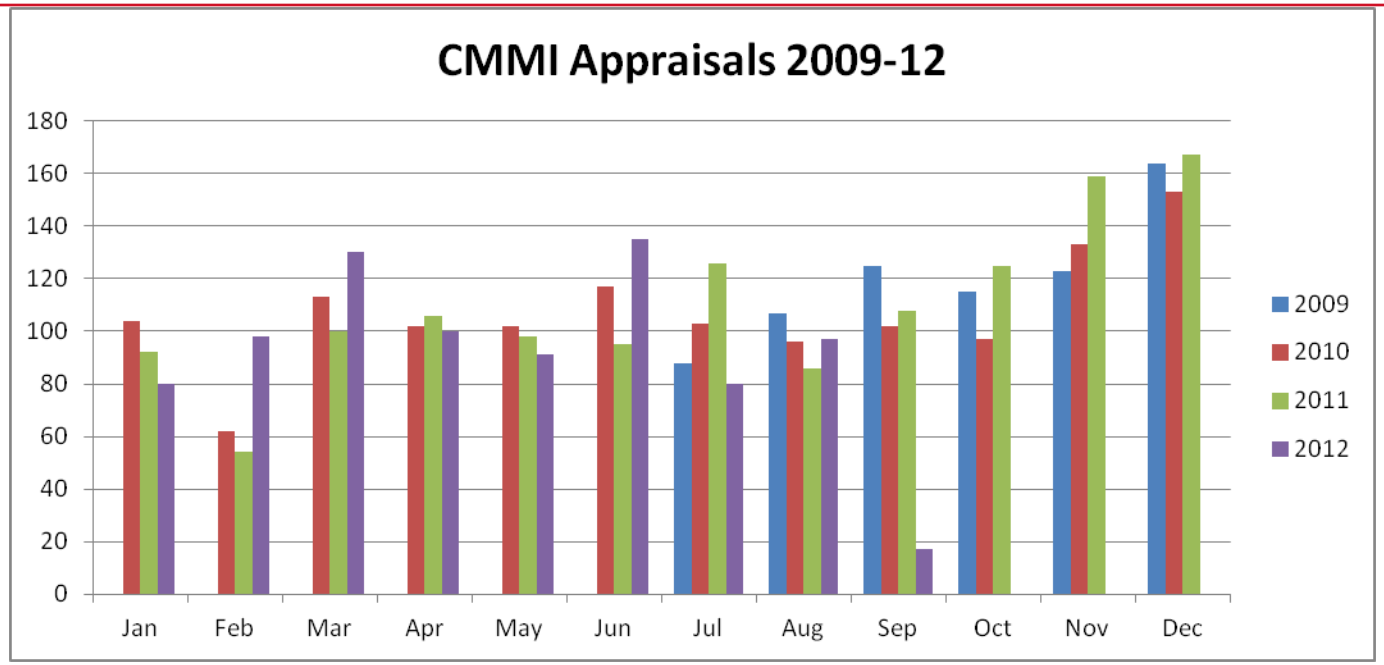


CMMI V1.2 sunset

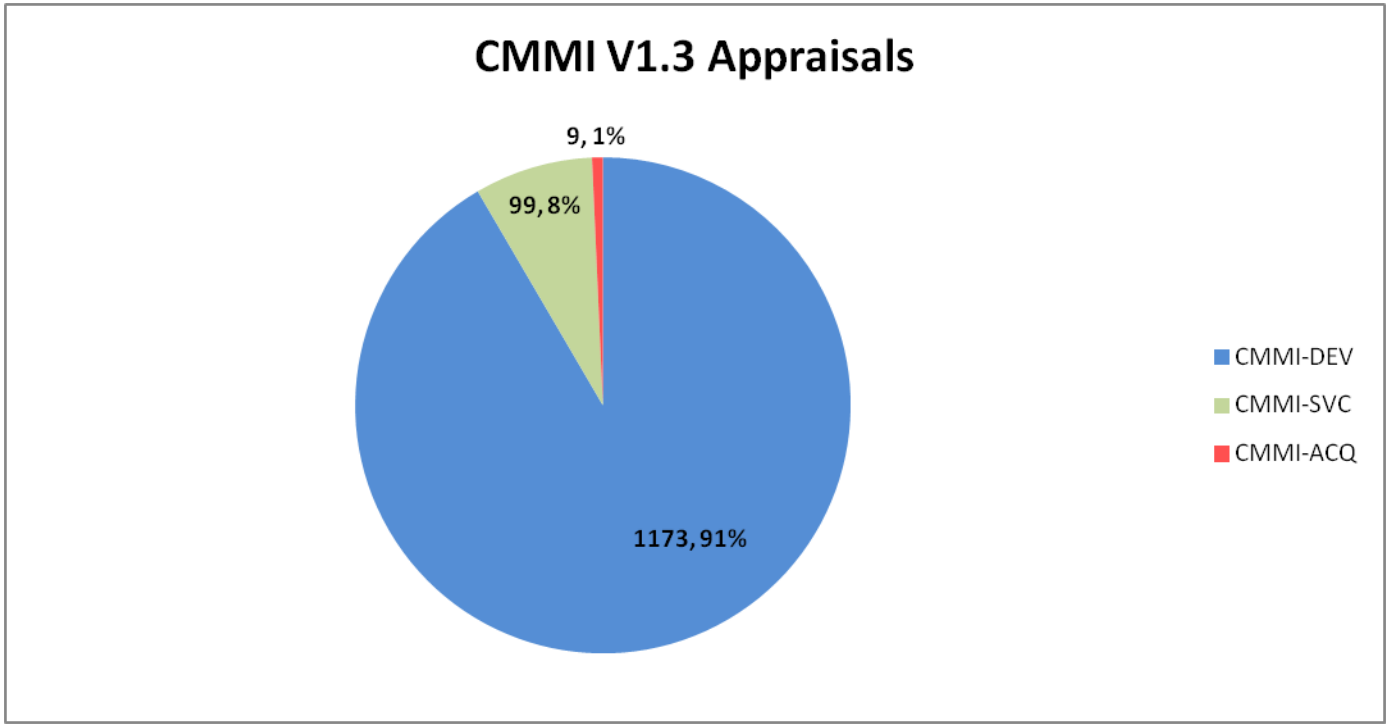
MDD V1.2 sunset

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	total
2009	*	*	*	*	*	*	88	107	125	115	123	164	722
2010	104	62	113	102	102	117	103	96	102	97	133	153	1284
2011	92	54	100	106	98	95	126	86	108	125	159	167	1316
2012	80	98	130	100	91	135	80	97	17	*	*	*	828

- 2010 Jan – Aug, 799 appraisals
- 2011 Jan – Aug, 757 appraisals
- 2012 Jan – Aug, 811 appraisals
- Not all Sept 2012 data entered into PARS yet

* - Data not available

Other Observations – CMMI V1.3 Appraisals by Model



- 91% of CMMI V1.3 appraisals are with CMMI-DEV V1.3
- 8% of CMMI V1.3 appraisals are with CMMI-SVC V1.3
- 1% of CMMI V1.3 appraisals are with CMMI-ACQ V1.3

Questions

Contact Information

- For future questions the presenter contact information is:

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Presenter Biography

- Michael Campo is a Principal Engineering Fellow at Raytheon Company, with 34 years experience that includes roles as a software developer, software/system integrator, manager, software project manager, and process group leader. As process group leader for Raytheon Integrated Defense Systems, Mike developed and deployed processes that led to achievement of CMMI Maturity Level 3 in 2003, Maturity Level 4 in 2005, and Maturity Level 5 in 2008.
- Mike's present position is Raytheon IDS Process Technical Director. He is a certified CMMI Instructor. Mike was a member of the CMMI V1.3 Core Model Team, the CMMI V1.3 Training Team, the CMMI Configuration Control Board, and is a member of the National Defense Industrial Association (NDIA) CMMI Working Group.