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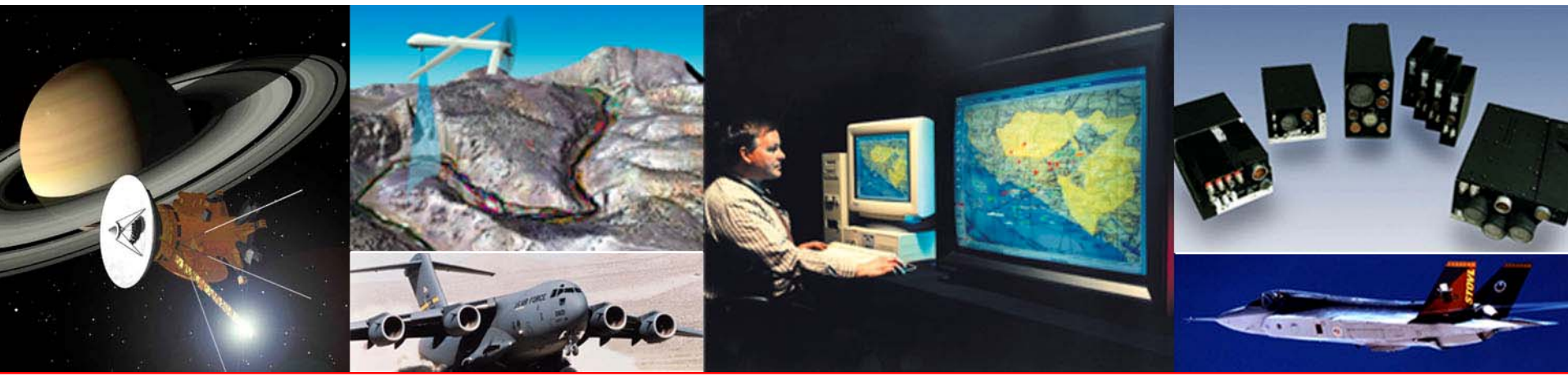
On Your Mark, Get Set, Go!
Effective Solutions to Prepare for a CMMI® Based Appraisal

Electronics, Intelligence and Support Operating Group

Lisa Ming



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Overview

Preparing for CMMI® Class A appraisals can be a very costly and chaotic experience without *early* detailed planning

- Several innovative and cost effective approaches were developed to address all aspects of CMMI® Class A appraisal preparation
- A series of appraisals were conducted allowing the greatest level of "reusability" of appraisal effort and artifacts
  - Internal continuous Class C appraisals
  - "Dry Run" SCAMPI[SM] B independent appraisal
  - "Benchmark" SCAMPI[SM] A independent appraisal

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[SM] SCAMPI is a service mark of Carnegie Mellon University

Prior Appraisal Experience

- Four previous SW CMM® and two EIA 731 appraisals
- SEI CMMI® SE/SW v1.1 (2005)
- SEI CMMI® -DEV+IPPD v1.2 (2008)

- Second CMMI® appraisal resulted in
  - Improved project satisfaction
    - Less intrusive
    - Better communication
    - Less Rework; “Bring me a rock”
  - Broader project organizational coverage
  - Reduction in amount of artifacts collected per Process Area (PA), per project
  - Reduction in Process Group effort to support appraisal activities

Approaches Leveraged for a Successful CMMI® Appraisal

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- Project Selection
  - Real-time trade studies resulted in optimal organizational scope
- Continuous Class C Appraisal
  - Internal appraisal was conducted over time, proven to be less intrusive
- Artifact Collection Sampling
  - Sampling method implemented to minimize cost
- Communication
  - Microsoft SharePoint® was used as a collaboration tool, enhancing communication
- Automation
  - Developed utilities to increase efficiency

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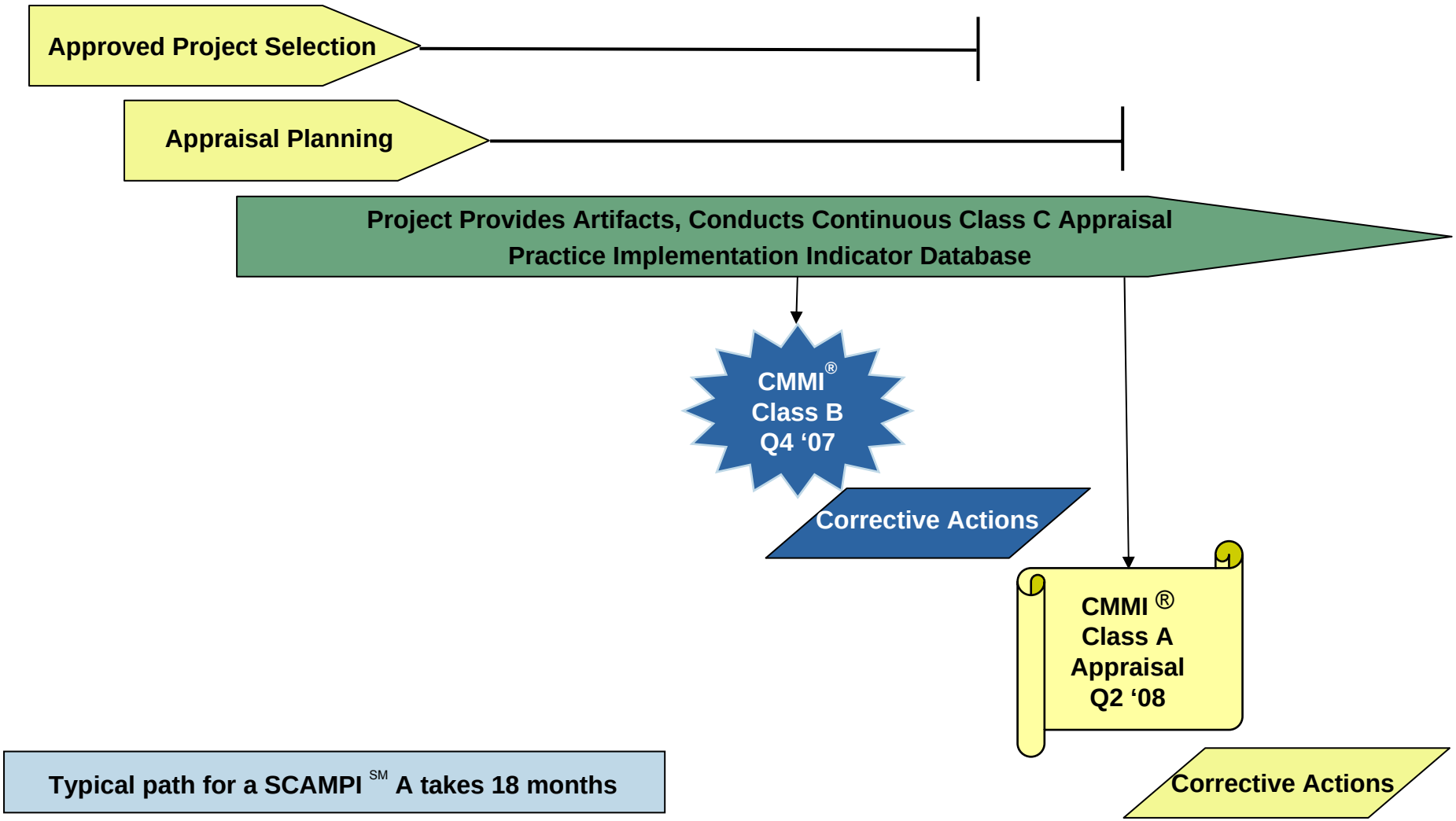
Path to CMMI® Appraisals



Typical path for a SCAMPI SM A takes 18 months

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Project Selection Approach

Without a representative sample of projects, appraisal results cannot be generalized to the Organizational Unit (OU) being appraised

- A Formal Decision Analysis and Resolutions Approach (trade study) was used to determine the organizational scope, based on maximizing the achievement of meeting the selection criterion
  - Process Area (PA) coverage
  - Dollar value
  - Equivalent peak staffing
  - Project size
  - Application domain (Lines of Business)
  - Geographic dispersion
  - Development Lifecycle Model (spiral, waterfall, incremental)
  - Project types (SDD, LRIP, Maintenance)
- A Microsoft Excel® spreadsheet was developed to capture project characteristics, and calculate coverage of criteria, based on project selections
  - Selected PAs for non-focus project to meet minimum coverage criteria of three instantiations per PA

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Project Selection Approach - Example

Alternative 1 (5 Projects): **Project 1**: Focus Project
Non Focus Projects:
Project 2 (SAM, DAR, REQM, RD, TS, PI, VER, VAL, MA)
Project 6 (PP, PMC, IMP, RSKM, SAM, CM, PPQA, DAR, TS, PI, VER, VAL)
Project 8 (PP, PMC, IMP, RSKM, MA); **Project 9** (SAM, CM, PPQA, REQM, RD)
Alternative 2 (7 Projects): **Project 1:** Focus Project
Non Focus Projects:
Project 2: (SAM, DAR, REQM, RD, TS, PI, VER, VAL, MA)
Project 3 (PPQA); **Project 4** (DAR, SAM, RD, REQM,TS, PI, VER, VAL, MA)
Project 5 (SAM, CM); **Project 6** (PP, PMC, IMP, RSKM, TS, PI, VER, VAL)
Project 7 (PP, PMC, IPM, RSKM, CM, PPQA, DAR)
Alternative 3 (8 Projects): **Project 1**: Focus Project
Non Focus Projects:
Project 2 (SAM, DAR, REQM, RD, TS, PI, VER, VAL, MA)
Project 3 (PPQA, SAM); **Project 8** (RD, REQM, MA); **Project 5** (SAM, CM)
Project 6 (PP, PMC, IPM, RSKM, TS, PI, VER, VAL, SAM, DAR)
Project 7 (PP, PMC, IPM, DAR, RSKM, PPQA, CM); **Project 9** (REQM)

Alternative	PAs	Staffing	$	Size	Site	LOB	Type	Lifecycle Model
1	All	47%	62%	No Small	No NY, TX, NJ	All	SDD	All
2	All	54%	73%	All	No NY	All	SDD	All
3	All	54%	69%	All	All	All	SDD	All

Project Selection Benefits

- Resulted in selecting the optimal, representative sample of focus and non-focus projects within the Organizational Unit
  - Supported discussions with lead appraiser on organizational scope
- Real-time trade studies enabled response to project fluidity over long period of time
- Easily updated trade studies monthly to reflect current information
  - New projects
  - Completed projects
  - Unplanned events (stop order)

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Continuous Class C Appraisal Approach

Continuous approach proven more successful than previously performed discrete events

- Key components of the continuous approach are:
  - Dedicated team of CMMI® & process experts
  - Projects/Groups delivered artifacts over time
  - Emphasized use of objective evidence
  - "Interviews" conducted to resolve inconsistencies
  - Communicated corrective actions

  Outcome: continuously populated the Practice Implementation Indicator Database (PIIDB)

- Developed a profile of results (strengths and weaknesses) over time
  - Drove process improvement engine
  - Also used as risk reduction in preparation for SCAMPI℠ A

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Continuous Class C Appraisal Approach

Category	Grouping	Team of Reviewers						
Management	PP, PMC, IPM, GP2.2, GP2.3, GP2.4, GP2.7				✓			
	SAM				✓			
	RSKM					✓		
Engineering	REQM, RD							✓
	TS, PI, VER, VAL						✓	
Support	CM, GP2.6		✓					
	PPQA, GP2.9		✓					
	DAR							✓
Measurement	MA, QPM, CAR, GP2.8, GP2.10	✓						
Organizational	OPD, OPF, GP2.1, GP3.1, GP3.2			✓				

- Dedicated team assigned to review Process Area (PA) Specific Practices (SPs) and related Generic Practices (GPs) across PAs
- Grouping based on how an artifact supports multiple PAs and GPs
  - This approach reduced duplication of effort
    - Example:

      Organization Chart is used to support both Integrated Project Management (IPM) SP 3.2 Establish the Integrated Team Structure and GP 2.4 Assign Responsibility across all PAs
- Overall approach was recognized by our CMMI® lead appraiser as best practice

Continuous Class C Appraisal Benefits

- Reusability of information across appraisal events (Class C, SCAMPI℠ B & A)
  - Practice Implementation Indicator Data Base (PIIDB)
  - Description of the artifact and how it satisfies a given CMMI® practice
- Less intrusive to projects
  - Project delivered artifacts over time based on project schedule
  - “Interviews” conducted only as needed
- Early project notification of Corrective Actions (CAs), resulted in early response to CAs
- Less impact to Process Group, balancing workload with appraisal activities

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Artifact Collection Sampling Approach

Artifact collection can be a costly and intrusive aspect of preparing for a CMMI® appraisal

- Artifacts were collected from all projects within the Organizational Unit to support continuous Class Cs and formal SCAMPI℠ B & A
- Strategy based on a sampling method
- Based on project classifications, artifacts were collected that
  - Fully support a Process Area (PA)

    or
  - Provided a limited number of key artifacts as an indication of PA compliance
- Continuously populated Practice Implementation Indicator Data Base (PIIDB)
  - Projects provided artifacts as they became available

Sampling approach combined with continuous Class C significantly reduced cost and effort

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Artifact Collection Sampling Approach

Process Area	Project 1	Project 2	Project 3	Project 4	Project 5	Project 6	Project 7	Project 8	Project 9	Project 10	Project 11	Project 12	Project 13
PP	√		√		√	√			√	√	√	√	
PMC	√		√		√	√			√	√	√	√	
IPM	√		√		√	√			√	√	√	√	
RSKM	√		√		√	√			√	√	√	√	
CM	√		√	√	√		√		√				
PPQA	√		√	√	√		√		√			√	
REQM	√		√	√		√	√	√					√
RD	√		√	√		√	√	√			√		√
TS	√		√	√		√	√	√		√			
PI	√			√		√	√						
Ver	√			√			√	√					
Val	√					√	√		√				
SAM				√						√			
DAR	√		√	√		√	√						√
M&A	√		√	√				√		√		√	√

> 3 Instances of each PA

Production Project

Small Project

	Artifacts available to fully support PA
	PA selected as part of Organizational Scope
√	Collected key artifacts only
	PA is either not applicable or not yet

Supported Project Selection Trade Study

Artifact Collection Sampling Benefits

- Artifact sampling strategy minimized cost and ensured institutionalization
  - Collection included all projects in the organizational unit
  - Fewer artifacts collected; key artifacts vs. full PA coverage
- Supported monthly update of project selection trade study
  - Accommodated changes in organizational scope over time based on project availability, project scope change, funding, etc.
- Resulted in minimal disruption to the projects by reducing requests for additional artifacts as the organization scope changed
  - Less intrusive to projects/support groups

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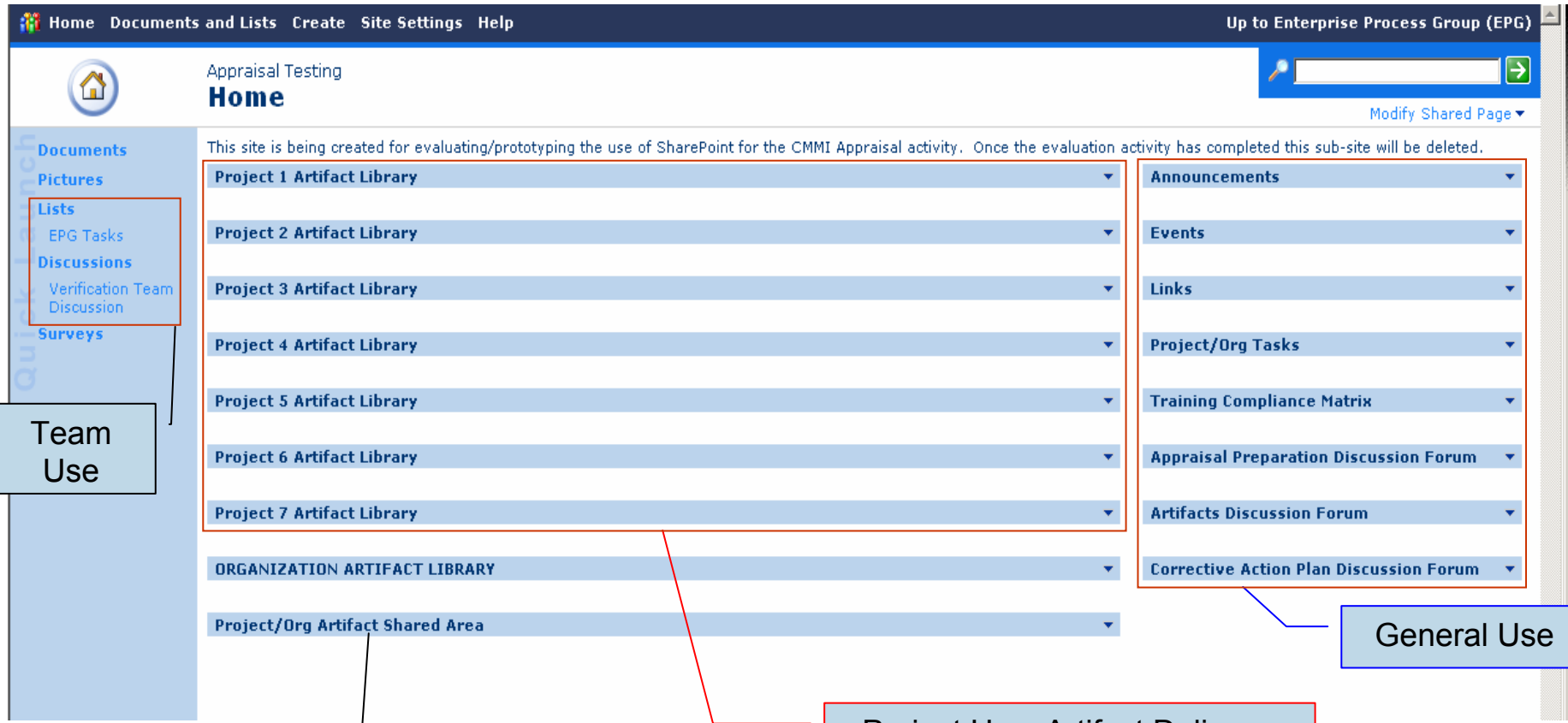
Communication Approach

There is a need for quick, continuous and accurate communication between projects and appraisal preparation team

- Specific Microsoft SharePoint® collaboration features were customized to support appraisal preparation
  - Document libraries were used as a staging area to collect artifacts and capture status
  - Discussion boards were used to clarify artifact requests and other appraisal activities
  - Lists were used to coordinate project and process group tasking
- Historically, project communication occurred periodically primarily via e-mail which resulted in
  - Duplication of effort
  - Minimal sharing of information
  - Delayed access to status

Communication Approach – Appraisal Preparation Microsoft SharePoint® Site



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Communication Approach - Appraisal Preparation Microsoft SharePoint® Site

Time-independent information (e.g., change in appraisal team lead)

Time-dependent happenings (e.g., Functional Area Representative (FAR) session, opening brief)

Hyperlinks to useful information (e.g., CMMI®, Microsoft SharePoint® guide)

e.g., Provide artifact, respond to Corrective Action Plan (CAP)

Flow of communication between projects and the Enterprise Process Group

Communication Benefits

- The use of Microsoft SharePoint® as a collaboration tool greatly enhanced communication among projects, support groups and the appraisal preparation team

- Enabled projects to:
  - Continuously deposit artifacts in staging area
  - Respond to Corrective Actions (CA) requests
  - Ready access status (artifact and CA burn down) & compliance report
  - View PIIDBs (current artifact vs. pre-CA artifact)

- Resulted in:
  - Improved understanding of expectations
  - Less face to face meetings
  - Less Rework; “Bring me a rock”

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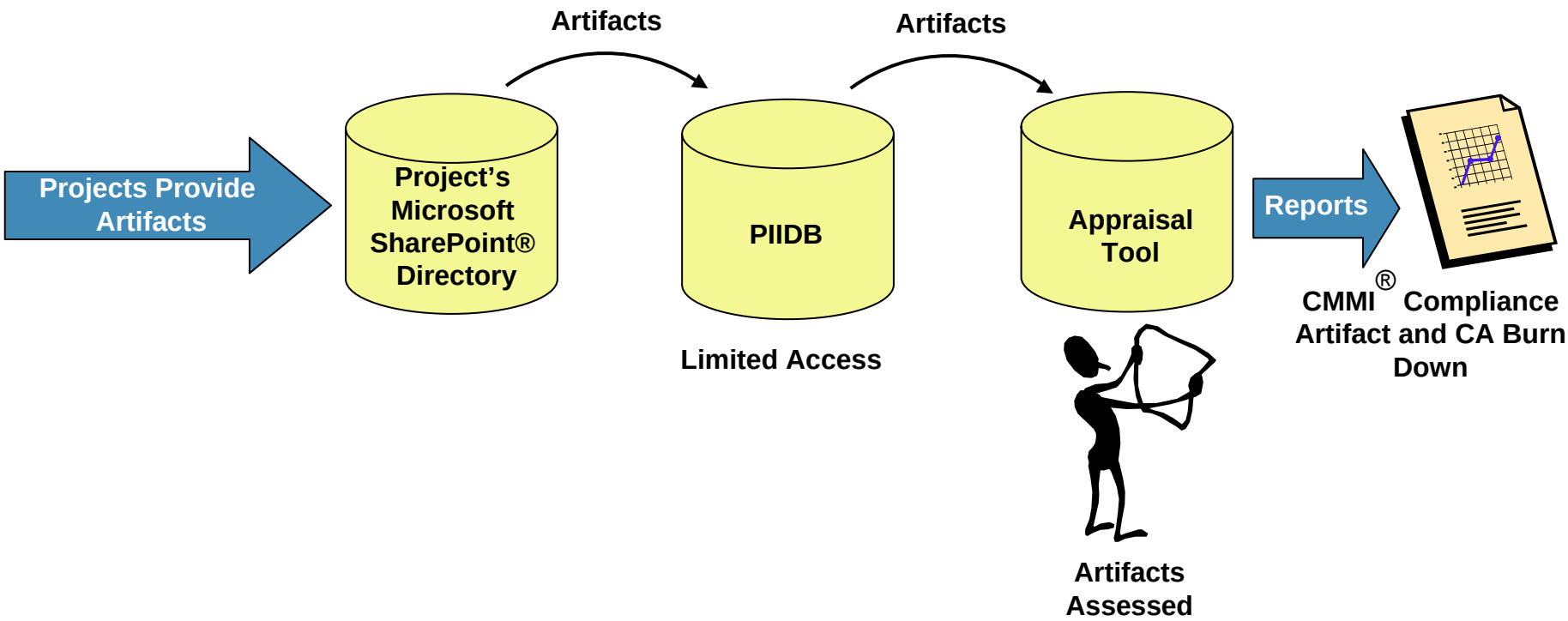
Automation Approach



Automation Approach

Manual approach proven ineffective and resulted in significant errors

- Automated the movement of artifacts
  - From projects Microsoft SharePoint® site (via librarian notification)
  - To the Practice Implementation Indicator Data Base (PIIDB) (limited access)
  - Linked to the appraisal tool (created load file for appraisal tool)
- Automated status reporting
  - Detailed progress reports to monitor performance and efficiency of appraisal preparation activities
  - CMMI® Compliance Reports (Red Yellow Green)
  - Artifact delivery and corrective action burn down status

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Automated Approach - Status Reporting

		Model Coverage - Level 2 Process Areas							Model Coverage - Level 3 Process Areas										
		REQM	PP	PMC	SAM	M&A	PPQA	CM	RD	TS	PI	VER	VAL	IPPD	RSKM	DAR	OPF	OPD	OT
Project 1	G																		
	Y	0%	0%	0%		0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%			
	R	0%	0%	0%		0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%			
	NY	0%	0%	0%		0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	58%			
Project 2	G																		
	Y	0%			0%	0%			0%	0%	0%	0%	6%			5%			
	R	0%			0%	0%			0%	0%	0%	0%	0%			0%			
	NY	0%			0%	0%			0%	0%	0%	0%	0%			0%			
Project 3	G																		
	Y				0%	0%	0%												
	R				0%	0%	0%												
	NY				0%	0%	0%												
Project 4	G																		
	Y	6%							4%										
	R	6%							0%										
	NY	0%							0%										
Project 5	G																		
	Y		0%	0%			0%	0%						0%	5%	0%			
	R		0%	0%			0%	0%						0%	0%	0%			
	NY		0%	0%			0%	0%						0%	0%	0%			
Project 6	G																		
	Y							0%											
	R							0%											
	NY							0%											
Project 7	G																		
	Y		0%	0%	0%					0%	5%	0%	6%	0%	0%	5%			
	R		0%	0%	0%					0%	0%	0%	0%	0%	0%	0%			
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Project 8	G																		
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Automation Benefits

- No lost data
- Significant reduction of effort (moving artifacts, creating reports)
- Continuous (vs. stagnant or periodic) status and compliance reports
- Easy to change links to PIIDB (load file) when organizational scope changes
- Feedback from projects very positive

Other BAE Systems sites using this automation have also achieved success

Summary

- Project Selection
  - Plan for project availability to support the appraisal to change
- Continuous Class C Appraisal
  - Adopt an approach that results in maintenance of PIIDB
- Artifact Collection Sampling
  - Take advantage of sampling to broaden the organizational coverage
- Communication
  - Avoid “Bring me a rock” syndrome
- Automation
  - Automate, Automate, Automate!

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Questions

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