



Adopting CMMI for Small Organizations

Sponsored by the U.S. Army Aviation and Missile Research, Development & Engineering Center (AMRDEC) Software Engineering Directorate (SED)

Authors:

SuZ Garcia, SEI
Sandra Cepeda, SED/CSSA
Mary Jo Staley, SED/CSC
Gene Miluk, SEI

Presenters:

Sandra Cepeda, SED, CSSA
Jack Conway, ASI



Agenda

- Pilot Project Overview
- CMMI Overview
- Pilot Process and Review of Selected Pilot Materials
- Experiences From Small Companies
- Summary and Recommendations
- Q/A Session



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Pilot Project Overview



Pilot Project Purpose

- A joint project performed by the partnership between the SEI and AMRDEC SED to establish the technical feasibility of developing guidance and other special-purpose transition mechanisms to support adoption of CMMI by **small and medium enterprises (SMEs)**
- SMEs defined as Huntsville companies with 25 to 250 Huntsville employees



Pilot Project Goals

- Exercise at least 3 CMMI Process Areas in a small company
- Work with at least 2 companies
- Codify recommendations for how to package, sell, appraise, train, implement CMMI for SME's to extent reasonable based on our pilots
- Be able to articulate business case for small companies similar to those in HSV to adopt CMMI
- Generate "follow-on" path to extend initial pilots
- Present project results at SE2 2004 and the Annual CMMI User Technology Conference
- Provide SEI CMMI/SCAMPI projects w/appropriate change requests/feedback



Project Stakeholders

Sponsor

- Mr. Bill Craig, SED

SEI Leadership

- Scott Reed, SEI

Core Team Members

- Sandra Cepeda (SED/CSSA), SuZ Garcia (SEI), Mary Jo Staley (SED/CSC), Gene Miluk (SEI)

Extended Team Members

- Jackie Langhout, SED SEPG

Stakeholders

- ASI and Cirrus (the two selected SME's)
- CMMI/SCAMPI/SEI ASP Teams
- HSV Chamber of Commerce, HSV Small Business Development, HSV SPIN



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CMMI Overview



CMMI Provides a Path to a Better Way

“The Purpose of CMM Integration is to provide guidance for improving your organization’s processes and your ability to manage the development, acquisition and maintenance of products and services.”

CMMI Version 1.1



What is the CMMI Model?

- CMMI Is a Process-Improvement Model that provides a set of Best Practices that address productivity, performance, costs, and stakeholder satisfaction
- CMMI Is *NOT* a set of “Bolt-On Processes” that last only as Long as the wheel is squeaking. CMMI provides a consistent, enduring framework that accommodates new initiatives
- CMMI focuses on the total-system problem, unlike other predecessor CMMs
- CMMI facilitates enterprise-wide process improvement, unlike single-discipline models



CMMI Scope & Coverage

Multiple Disciplines

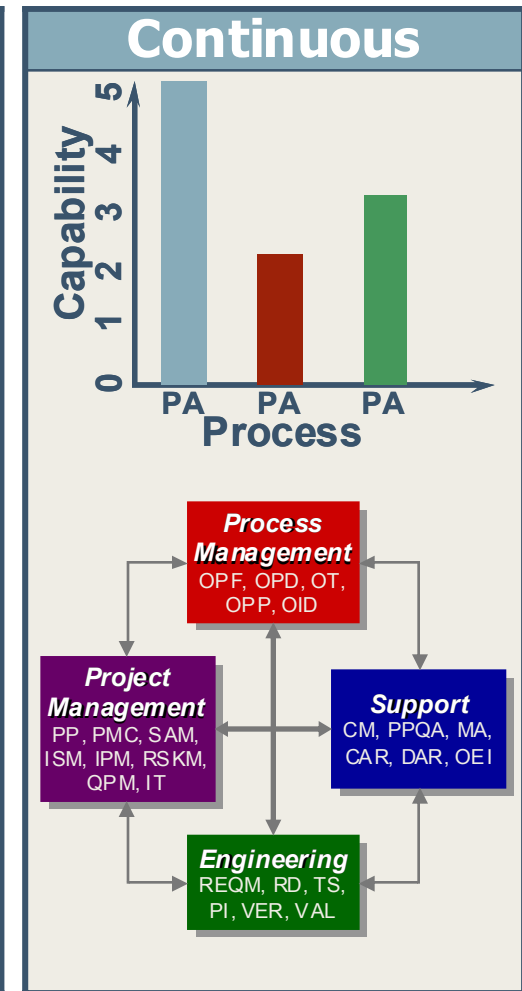
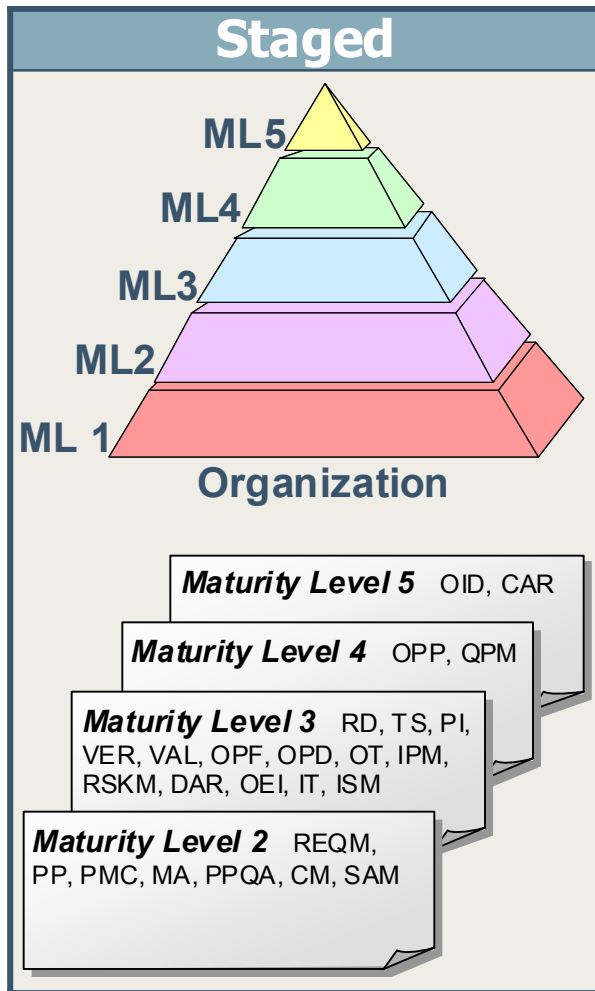
- Engineering Development
 - Software Engineering
 - Systems Engineering
 - Concurrent Engineering
 - Hardware Engineering
 - “Assurance” Engineering
- Program Management
 - Project Management
 - Quality Assurance
 - Configuration and Data Management

Multiple Life Cycle Phases

- Architecture
- Design
 - Systems
 - Electrical
 - Mechanical
 - Software
- System Integration and Test
- Logistics
- Operations
- Maintenance

Total Product Life Cycle

CMMI In A Nutshell



- **Two Representations Per CMMI Model**
- **One Appraisal Method (SCAMPISM)**



How Can CMMI Level the Playing Field for Small Companies?

- 3 Major Elements Involved in CMMI-based Improvement:
 - Appraisal
 - Definition/Infrastructure Support
 - Deployment
- Larger companies typically have a resource (though not necessarily skill(!)) advantage with Appraisal and Definition, but have a distinct *disadvantage* in deployment
- Smaller companies typically have disadvantage with resources for appraisal and definition, but have a distinct *advantage* in deployment



The Appraisal Challenge

- “Official” CMMI appraisals (called SCAMPI A Appraisals) consume a larger percent of the budget for a small company than a large one
 - \$ to hire lead appraisers
 - Time away from work for staff to be interviewed
 - Time away from work for internal appraisal team
- Mitigation suggestions for small businesses:
 - Find/get involved with the DoD Mentoring program with a company that has internal appraisal resources or partner with a prime who has internal appraisal resources and arrange for them to do your appraisal as part of your relationship
 - Use less expensive methods (SCAMPI B and C) to do a “pre-appraisal” to be sure that your money for a SCAMPI A will be worth your while
 - If your staff is not already familiar with CMMI, we strongly advise *against* just doing a self assessment



The Definition/Infrastructure Challenge

- Defining/redefining processes to adhere to CMMI goals requires
 - Model knowledge
 - Process definition knowledge/skills
 - Knowledge of the organization/company
- Many large organizations have all 3; most small organizations are missing the model knowledge at least, and often the process definition knowledge and skills are not emphasized
- Mitigation suggestions:
 - Use DoD Mentoring relationship to build knowledge and skills needed
 - Use the artifacts from this pilot and watch for SEI and other industry publications on implementing CMMI for Small Businesses
 - If not pressured to implement CMMI fast, take one Process Area per month and read it, connect it to your business issues, and see if you can find simple changes to your existing practices that would adhere to the model and give you more benefit than your current practice



The Deployment Challenge

- The Challenge for Large Organizations:
 - The larger the organization and the greater the variety of business contexts, the more difficult it is to find the “right” level of standard processes/tailoring guidelines
 - Often deployment is not only multi-project, but multi-site and multi-customer type
- The Challenge for Small Organizations:
 - “The customer rules” – Many small organizations adopt/adapt their business practices directly from their customers or primes
 - Some people self-select into small businesses because they want to “do their own thing” rather than follow corporate norms
- Mitigation suggestions:
 - Just like with large organizations, *demonstrating your ability to deliver what the customer wants* using your local business practices usually keeps them from forcing their practices on you
 - Depending on the number of customer contexts, you may want to create a standard process for each customer type as your starting point



The Deployment *Advantage* of Small Businesses

- The complexity and cost of training employees, creating/using metrics, deploying new templates and job aids is MUCH smaller for small companies than large
 - Even approaches like “one on one” sessions incorporated into other meeting contexts is feasible in small businesses
 - People who work in small businesses are often, by definition, more flexible than those who have worked a long time in large companies
 - Adopting new practices isn't as much of a challenge for them

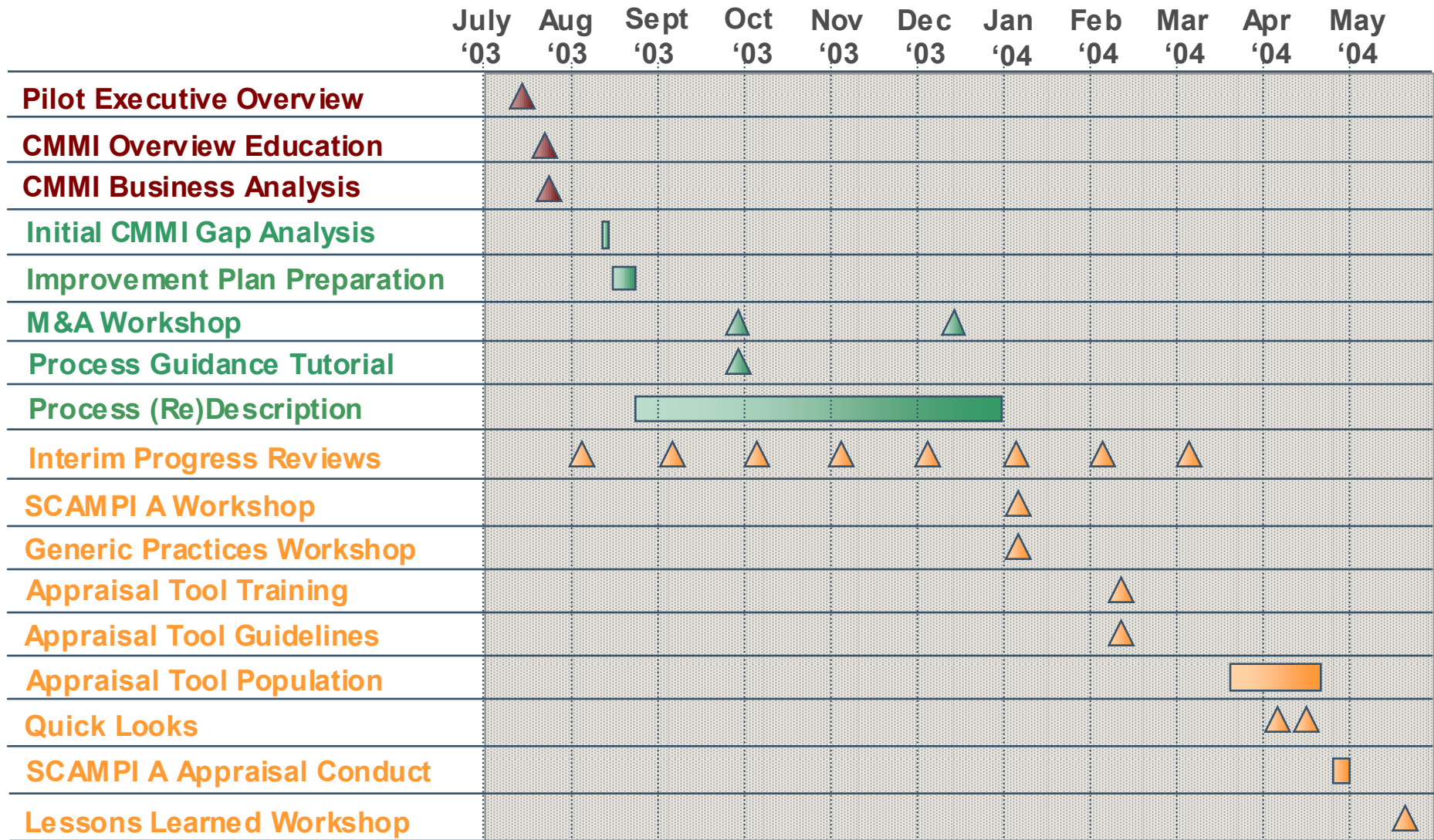


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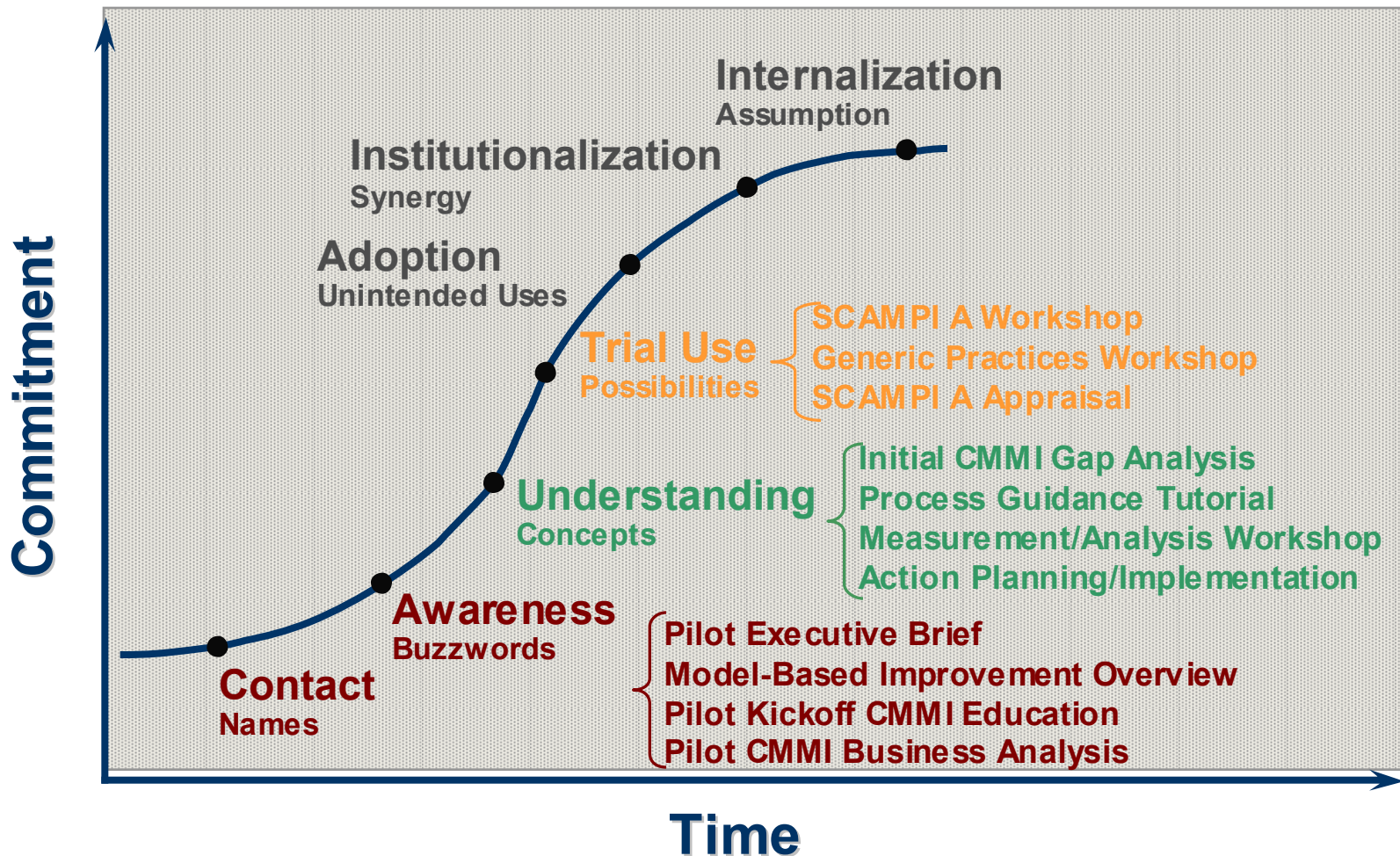


Pilot Process and Review of Selected Pilot Materials

CMMI Small Business Pilot Schedule



Summary of Materials Provided by Pilot





Note About Pilot Materials

All pilot materials will be posted on SEI website

- Toolkit
- ASI Experience Report
- Cirrus Experience Report

Today we will just be going through the agenda and a few highlights for each of the main pilot events

Focus of presentation will be on elements of the Toolkit

Three primary modes are anticipated for Toolkit

- Document: to gain understanding and insight into the pilot experiences
- Live Consulting Tool: portions of the toolkit are downloaded and used in helping a small organization adopt CMMI
- Live Learning Tool: portions of the toolkit are downloaded and used to try some aspect of CMMI adoption within a small organization



Approach

- Remember, we investigated:
 - *technical feasibility* of implementing CMMI in small companies/projects
 - nevertheless, we tried to provide an amount of support that would be reasonable for other small companies to duplicate
- Minimal onsite consulting to try to be more realistic about what a company not involved in the pilot would do:
 - 2 days of training at the beginning of the pilot
 - 2 days for gap analysis activity
 - 1 day per month onsite consulting
- Extra mentoring time via weekly telecons and occasional onsite meetings from local staff



Completed Pilot Activities

Site Kickoff Meeting

Gap Analysis Session

Action Plan Implementation

Execute New Processes

Close Interaction Between Pilot And Consultants

Appraise Pilot Projects

- CMMI Overview Tutorial that covered Process Areas of Maturity Levels 2 & 3 and focused upon the typical business impacts related to the area
- Business Analysis to capture high impact/high need Process Areas
 - Had simple “thumbs-up” voting technique to determine level of impact/need
 - Also polled participants for the level of impact (H M L)
 - The high impact areas were obvious and it was easy to select the Process Areas to focus on for the pilot



Completed Pilot Activities

Site Kickoff Meeting

Gap Analysis Session

Action Plan Implementation

Execute New Processes

Close Interaction Between Pilot And Consultants

Appraise Pilot Projects

- 3 Process Areas were selected by the joint SED/SEI/Pilot Company team :
 - ASI: Project Planning, Requirements Management, Measurement & Analysis
 - Cirrus: Project Planning, Requirements Management, Project Monitoring & Control



Pilot Executive Brief

- A briefing to introduce the executives in the pilots to the concepts of model-based improvement and the planned sequence of events for the pilot
- Topics included:
 - CMMI Overview
 - Business Value
 - Adoption Statistics
 - Transition Approach
 - Transition Schedule and Cost
 - Adoption Risks



Pilot Kickoff - Topics

- Introductions
- Context—material about the pilot process/reason for the pilots (similar to introduction charts presented earlier today)
- CMMI Overview---more detail than in pilot executive brief
- Business Issues Analysis---workshop setting to connect the CMMI material to the pilot's business
 - Looked at CMMI topics from the viewpoint of *impact* on the business and *problem level* currently being experienced in that area
- Path Forward---selected 3 Process Areas, assigned next steps, selected potential pilot projects for each Process Area



Example Process Area Materials

- We used basic information about each Process Area, supplemented by a discussion of what tends to happen if that process isn't performed well, something NOT currently included in introductory training materials
- The Requirements Management Process Area is shown here...



Engineering (ML 2)

Requirements Management

Purpose: Manage the Requirements of the Project's Products and Product Components and Identify Inconsistencies Between Those Requirements and the Project's Plans and Work Products.

Requirements are Managed and Inconsistencies With Project Plans and Work Products are Identified



Engineering (ML 2)

Requirements Management

Manage Requirements

Obtain an Understanding of Requirements

- List of Criteria for Distinguishing Appropriate Requirements Providers
- Criteria for Evaluation and Acceptance of Requirements
- Results of Analysis Against Criteria

Obtain Commitment to Requirements

- Requirements Impact Assessments
- Documented Commitments to Requirements and Requirements Changes

Manage Requirements Changes

- Requirements Status
- Requirements Database
- Requirements Decision Database

Maintain Bidirectional Traceability of Requirements

- Requirements Traceability Matrix
- Requirements Tracking System

Identify Inconsistencies Between Project Work and Requirements

- Documentation of Inconsistencies Including Sources, Conditions, and Rationale
- Corrective Actions



Goals



Practices



Typical Work Products





When Requirements Management isn't done well....

Symptoms:

- High levels of re-work throughout the project
- Requirements accepted by staff from any source they deem to be authoritative
- “Gallop” requirements creep
- Inability to “prove” that the product meets the approved requirements

Why Should You Care? Because....

- Lack of agreement among stakeholders as to what are the “real” requirements increases time and cost to complete the project
- You're highly likely to deliver an incorrect or incomplete product
- Revisiting requirements changes over and over is a waste of resource highly visible to the customer



Business Analysis - Two-Pronged Approach (1)

Incorporate symptoms that are often seen when practices for a particular Process Area (PA) are missing into the Process Area education portion of an orientation session

- Get a 1st level reading for each PA using “thumb votes” that are recorded on a flip chart:
 - Do the practices of this PA have High/Medium/Low impact on your business if they aren't done well? (select only one)
 - What level of problem are you experiencing in this topic/Process Area? High/Medium/Low



Business Analysis - Two-Pronged Approach (2)

After education session is over, go back through the PAs, asking participants to write specific problems they are experiencing in their work related to each PA.

Post these sticky notes with the correct PA on flip charts, one PA per flip chart (consultant can help to allocate a particular issue to a CMMI PA, if needed)

Review the types/volume of problems posted for each PA and use dot voting, dialogue, or other prioritization technique to finalize the list of PAs that will be worked on first.



Benefits of CMMI-based Business Analysis

Participants in the implementation process have a chance to advocate to help get their problems solved

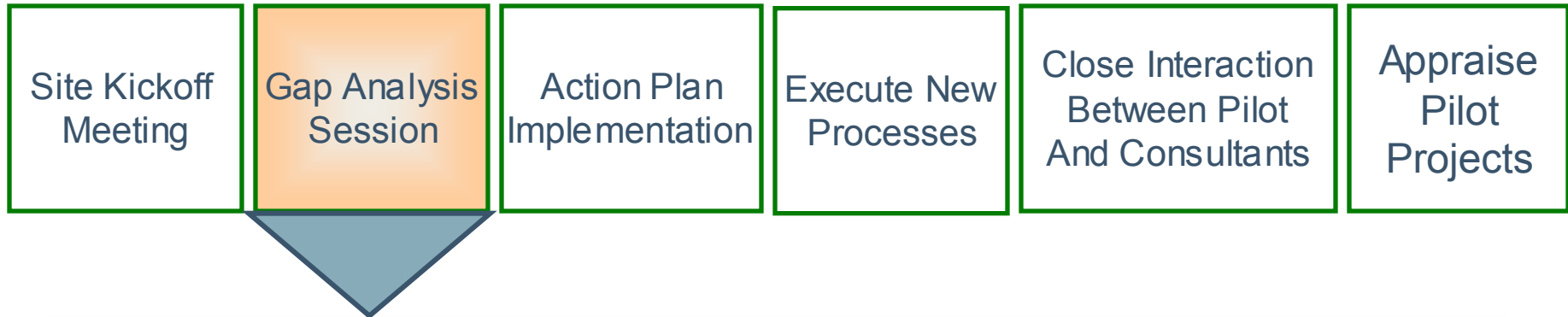
Participants who have been involved in selecting the PAs tend to have more commitment to working with them

Instructor/facilitator gets a very strong sense of how much of the overview education is “sticking” with students

Many of the problems posted via sticky notes give a starting point for more in-depth gap analysis

Tie between implementing CMMI and business goals and issues is much clearer to participants after this exercise

Completed Pilot Activities



- Workshop to analyze the process areas selected - the concepts/methods used for the SCAMPI B/C development project were adapted for this project:
 - Current practices documented and mapped to relevant CMMI model components
 - Interpretation of model intent for pilot's environment made and gaps documented
 - Developed Action Plan for Pilot Team to address gaps found



Initial CMMI Gap Analysis

- Experimental SCAMPI B/C techniques were used with both pilots to get a better perspective on the strengths and weaknesses in the chosen process areas chosen by the pilots
- The PIIDs (Practice Implementation Indicator Descriptions) developed by the CMMI Product Development Team were used to
 - capture the “as-is” state
 - identify the action plan to address the gaps
 - track progress

					Current activities	Activities	Responsibility
Goal ID	PMC SG1 Actual performance and progress of the project are monitored against the project plan.						
Practice ID	PMC SP 1.1-1 <i>Monitor the actual values of the project planning parameters against the project plan.</i>	AS IS Manufacturing Projects: Schedules are somewhat monitored, based upon the scheduling of machines in the production process.	This is not done as the practice should be done as defined by the SP.. But was discussed by the team as an item that needs to be implemented	Red	See PP SP 2.3-1 Plan for the management of project data	Bob will monitor once data is input	
Practice ID	PMC SP 1.2-1 <i>Monitor commitments against those identified in the Project plan.</i>	AS IS Manufacturing: Have commitments and do status with follow up in status meetings each Monday.	In general o.k.	Green			
Practice ID	PMC SP 1.3-1 <i>Monitor risks against those identified in the Project plan .</i>	AS IS Manufacturing: Risks are not identified formally (see above SPs) Monday status meetings discuss potential problems. <u>Some</u> proactive look at risks here.		Yellow overall		Develop checklist for risk identification and mitigation	Bob Portney/James
Practice ID	PMC SP 1.4-1 <i>Monitor the management of Project data against the project plan .</i>	AS IS Manufacturing: Data items are contained in the project folders –	Note: Inventory control is potential problem since lack of management of this data	Mostly green			
Practice ID	PMC SP 1.5-1 <i>Monitor stakeholder involvement against the Project plan .</i>	As Is for manufacturing: Weekly meetings are the mechanism,...	Note: the size of the organization makes for a short list of stakeholders and therefore a very lean process for monitoring each other. In the future it may be good to put a formal agenda item in the status meetings to address this.	Green			
Practice ID	PMC SP 1.6-1 <i>Periodically review the Project's progress, performance, and issues.</i>	AS IS for manufacturing: Weekly status meetings do some of this practice. Limited visibility due to lack of actual data.	Performance measures do not exist to compare against the plan. Are doing progress review	Red for performance (cost) Yellow for schedule & progress & issues		See PP SP 2.3-1 Plan for the management of project data	
Practice ID	PMC SP 1.7-1 <i>Review the accomplishments and results of the Project at selected Project milestones.</i>	AS IS for manufacturing: Have projects scheduled with milestones for the larger govt. projects.	Note: Bob has a separate milestone driven plan for major projects. Need to do more post action reports	Yellow Jan 30, 2004 changed to GREEN		Future item TBD	



Completed Pilot Activities

Site Kickoff Meeting

Gap Analysis Session

Action Plan Implementation

Execute New Processes

Close Interaction Between Pilot And Consultants

Appraise Pilot Projects

- Pilot Team Members developed Project-Specific Process Descriptions
 - Project Planning
 - Requirements Management
 - Measurement and Analysis
 - Project Monitoring & Control
- Companies evaluated impact at the organizational level and relationship to existing Quality Management Systems and ISO implementations



Completed Pilot Activities

Site Kickoff Meeting

Gap Analysis Session

Action Plan Implementation

Execute New Processes

Close Interaction Between Pilot And Consultants

Appraise Pilot Projects

- Baselined Process Descriptions
- Executed processes in Pilot Projects
- Collected metrics
- Gathered lessons learned (including benefits) and process improvements
- Updated processes to reflect process improvements
- Evaluated processes for standardization at the Organizational Level



Completed Pilot Activities

Site Kickoff Meeting

Gap Analysis Session

Action Plan Implementation

Execute New Processes

Close Interaction Between Pilot And Consultants

Appraise Pilot Projects

- 1 day monthly Face-to-Face sessions to status progress and get help/guidance from Consultants
 - Tutorial on writing process guidance documentation
 - Tutorial on business-oriented metrics
 - Tutorial on process capturing techniques
 - Consulting on CMMI institutionalization concepts
 - Feedback on Action Plans and Process Descriptions



Completed Pilot Activities

Site Kickoff Meeting

Gap Analysis Session

Action Plan Implementation

Execute New Processes

Close Interaction Between Pilot And Consultants

Appraise Pilot Projects

- Weekly teleconferences to keep the project progressing
 - Reviewed action items
 - Provided feedback on recently reviewed material
 - Provided guidance on any issues/problems encountered



Process Guidance Tutorial

- A 2 hour mini-tutorial providing guidance on writing user-oriented process descriptions
- Used at a pilot team meeting to help pilots understand different ways to express process descriptions
 - Conducted after initial drafts of new process descriptions started
 - Conducted as a problem-solving “clinic”
 - Topics Covered Include
 - Background/Typical problems in writing process descriptions
 - Information Mapping™ principles—an “engineering” approach to writing procedures
 - Exercise in recognizing different process guidance information types and problems in procedure writing



Measurement & Analysis Workshop

- A one day event to apply the *Goal/Question/Indicator* approach to helping determine areas of the business related to the chosen Process Areas that can and should be measured
 - *GOAL*: what objective does the business have in this area?
 - *QUESTION*: what question(s) need to be answered to know if the goal has been met or not
 - *INDICATOR*: what measurement indicators are needed to credibly answer the question needed to determine goal satisfaction?



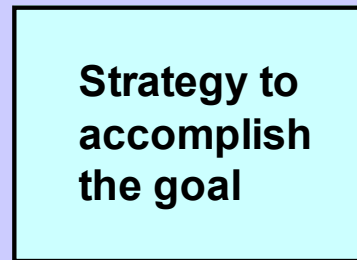
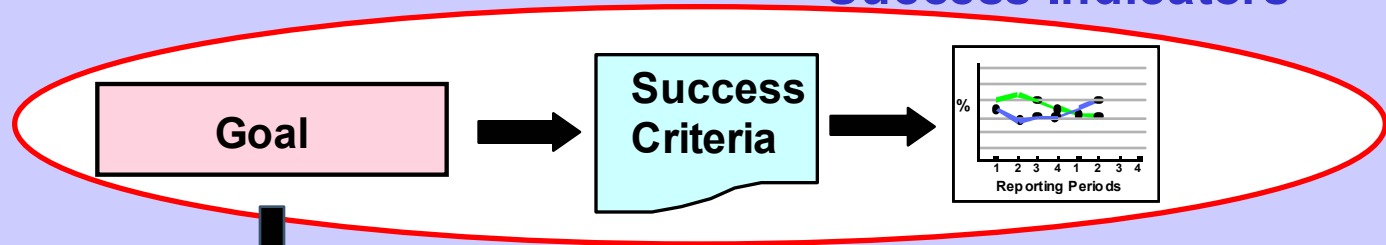
Failure of SW Measurement Programs

- **2/3** of SW Measurement Programs fail within the first **12-18** months of introductions
- Failure is primarily due to organizational reasons rather than technical reasons:
 - not tied to business goals
 - irrelevant or not understood by key players
 - perceived to be unfair, resisted
 - motivated wrong behavior
 - expensive, cumbersome
 - no action based on the numbers
 - no sustained management sponsorship



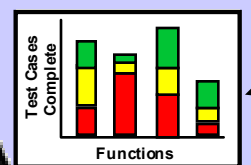
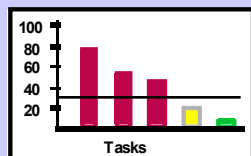
Workshop Focus

Success Indicators



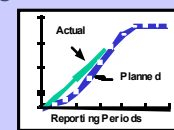
GQ(I)M Methodology to derive Indicators

Analysis Indicators



Progress Indicators

For Project Manager





Completed Pilot Activities

Site Kickoff Meeting

Gap Analysis Session

Action Plan Implementation

Execute New Processes

Close Interaction Between Pilot And Consultants

Appraise Pilot Projects

- Prepared for SCAMPI-A Appraisal
 - Defined scope and provided SCAMPI A seminar to set expectations
 - Had regular preparation sessions with Lead Appraiser (short, but in addition to 1 day monthly team meetings)
 - Gathered objective evidence to support appraisal activities
 - Performed Quick Looks
- Conducted Appraisal
 - Trained Appraisal Team Members
 - Performed Readiness Review
 - Conducted On-Site appraisals
 - Both companies achieved their Target Capability Level Profiles



SCAMPI A Overview Workshop

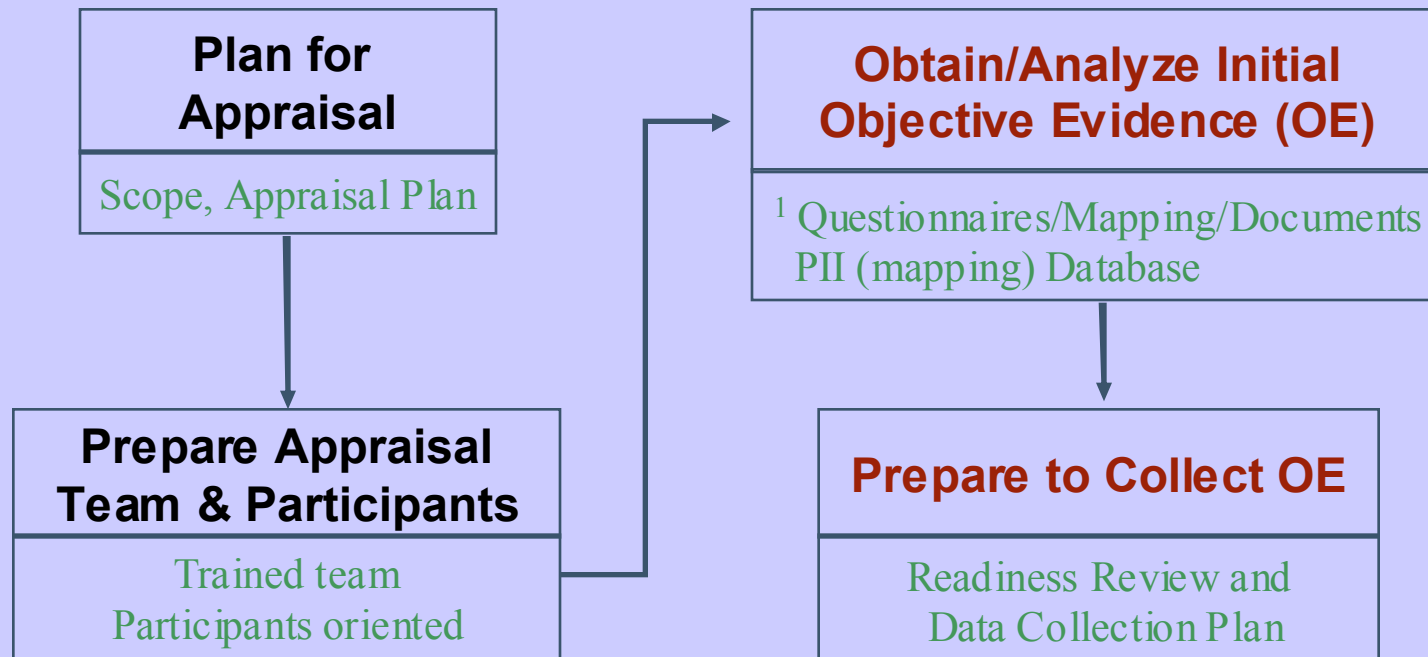
- Overview of ARC (Appraisal Requirements & Criteria) v1.1
- Comparison of SCAMPI A, B, and C appraisals
- Details of SCAMPI A appraisal
- Readiness Review
- On-site Appraisal

ARC APPRAISAL METHOD CLASSES

Characteristics	Class A	Class B	Class C
Amount of Objective Evidence Gathered (Relative)	High	Medium	Low
Ratings Generated	Yes	No	No
Resources Needs (Relative)	High	Medium	Low
Team Size (Relative)	Large	Medium	Small
Appraisal Team Leader Requirements	Lead Appraiser	Lead Appraiser or Person Trained & Experienced	Person Trained & Experienced



SCAMPI PROCESS FLOW – PLAN & PREPARE



¹ Questionnaires Optional



Generic Practices Workshop

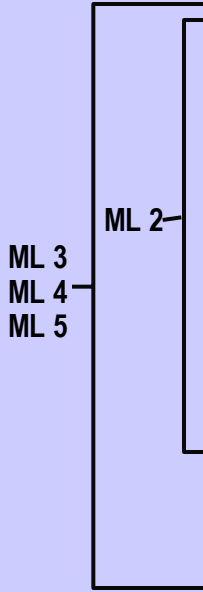
- Workshop where we probed how generic practices apply and might be implemented for the process areas in the pilot
- We mainly used the model itself as the job aid for this workshop along with materials from the pilots' process assets
- We focused on one Process Area and walked through each of the generic practices to understand what the generic practices meant when applied to the particular Process Area



Generic Goals and Practices

Level Generic Goals Generic Practices Common Features Mapping

Level	Generic Goals	Generic Practices
CL 1	GG1: Achieve Specific Goals	GP 1.1: Perform Base Practices
CL 2	GG2: Institutionalize a Managed Process	GP 2.1: Establish an Organizational Policy GP 2.2: Plan the Process GP 2.3: Provide Resources GP 2.4: Assign Responsibility GP 2.5: Train People GP 2.6: Manage Configurations GP 2.7: Identify and Involve Relevant Stakeholders GP 2.8: Monitor and Control the Process GP 2.9: Objectively Evaluate Adherence GP 2.10: Review Status with Higher Level Management
CL3	GG3: Institutionalize a Defined Process	GP 3.1: Establish a Defined Process GP 3.2: Collect Improvement Information
CL4	GG4: Institutionalize a Quantitatively Managed Process	GP 4.1: Establish Quantitative Objectives for the Process GP 4.2: Stabilize Subprocess Performance
CL5	GG5: Institutionalize an Optimizing Process	GP 5.1: Ensure Continuous Process Improvement GP 5.2: Correct Root Causes of Problems





Quick Looks and SCAMPI A

- Each pilot company used a different set of tools for the Quick Looks and the SCAMPI A Appraisal
 - Cirrus
 - Excel Spreadsheets
 - ASI
 - Appraisal Tracker Tool
 - Excel Spreadsheets
 - Data Collection Template
 - Interview Plan Template
 - Face-to-Face Affirmation Count Tool



Appraisal Tracker Tool Example

The screenshot displays the Appraisal Tracker Tool interface. On the left, a tree view shows the CMMI version 1.1 structure. The 'Instantiation' is set to 'Organization-wide Entity'. The tree includes:

- Technical Solution TS
- Product Integration PI
- Verification VER
- Validation VAL
- Organizational Process Focus OPF
- SG 1 Determine Process-Improvement Opportunities
 - SP 1.1 Establish Organizational Process Needs
 - SP 1.2 Appraise the Organization's Processes
 - SP 1.3 Identify the Organization's Process Improvements
- SG 2 Plan and Implement Process-Improvement Activities
- Generic Practices
 - GP 2.1 Establish an Organizational Policy
 - GP 2.2 Plan the Process
 - GP 2.3 Provide Resources
 - GP 2.4 Assign Responsibility
 - GP 2.5 Train People
 - GP 2.6 Manage Configurations
 - GP 2.7 Identify and Involve Relevant Stakeholders
 - GP 2.8 Monitor and Control the Process
 - GP 2.9 Objectively Evaluate Adherence
 - GP 2.10 Review Status with Higher Level Management
 - GP 3.1 Establish a Defined Process

The right pane shows the 'Evidence' view for 'SP 1.2 Appraise the Organization's Processes'. It includes:

- Overall Evidence Rating: Not Examined
- Notes:
 - QL-1: Internal Audit Schedule and Audit Reports are good (DIRECT)
 - QL-2: Third Party ISO Audit Results (DIRECT)
 - QL-3: CMMI Gap Analysis (In CD, ma_pidd, reqm_pidd, pp_pidd) (Direct)
 - QL-4: Quick Look Report (Direct)
- Mappings:
 - Electronic - Internal Audit Report
 - Electronic - Internal Audit Schedule (ASI Intranet)
 - Electronic and Paper: NQA Audit Reports
 - Paper: ASI response to NQA audits (Corrective/Preventive Action plans)
 - \\Asiserv11\Public Folder\CMMI\Tracker Tool\AuditDocuments\ma_p



F2F Affirmation Count Tool

M&A										
									Remaining Totals	
50% Rule	The minimum number of questions needed for the PA:							10	5	
One Column, One Row	The minimum number of questions needed for the PA:							19	6	
									Remaining Totals	
SG 1	The minimum number of questions needed to satisfy the "50% Rule" for this goal:							2	0	
	The minimum number of questions needed to satisfy the "One Column, One Row" for this goal:							4	1	
	Appraisers Area		Projects:							
			ORG			Actual for Row	Required for Row	Remaining for Row		
	Practice(s)	SP 1.1	1	Appraiser Input						
		SP 1.2	1							
		SP 1.3	1							
		SP 1.4	None							
	<p>Note: Select from list, or enter a number greater than 0 for each practice. Do Not enter 0. Type "None" or select it from the list.</p>									
					Totals for all projects					
50% Rule Calculator	Actual per project	3	Actual	3						
				Required	2					
				Remaining	0					
				Projects:						
				ORG			Column Totals			
				Actual for Column	1			1		
				Required for Column	1			1		
				Remaining for Column	0			0		





Current Pilot Activities

Share
Lessons
Learned

Publish
Pilot Results

- Pilot companies presented at Huntsville SE2 Conference
 - Half-day tutorial – March 29, 2004
 - Shared materials and activities conducted with ASI and Cirrus with interested members of HSV small business community
 - Opportunity for each company to share their lessons learned
 - CMMI Panel – March 31, 2004
 - Provided Small Business Perspective for CMMI Implementation
 - Shared Lessons Learned
- 5 NDIA conference presentations scheduled
- 1 presentation at SEPG and SSTC scheduled



Current Pilot Activities

Share
Lessons
Learned

Publish
Pilot Results

- Toolkit used (i.e., tutorials, pilot processes) to jumpstart other small businesses in their process improvement activities- Release planned for November 2004
- Huntsville Experience Reports:
 - One for each of the companies
 - Address process used, activities performed, and lessons learned
 - Other companies will be able to leverage from the experience report details
 - Releases planned for first quarter in 2005



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Pilot Company Experiences: Cirrus



Corporate Overview



- ▶ **Cirrus Technology Inc. (CTI)**
 - ▶ **Incorporated May 1998**
 - ▶ **Headquarters: Huntsville, AL**
 - ▶ **Satellite offices at: Ft Rucker; Ft Bragg; Warner Robins, GA; Atlanta, GA; Ft Belvoir; Eglin/Hulbert AFB; Crystal City & Hampton, VA; Rock Island, IL; Albuquerque, NM; Langley, VA (AFB & NASA); Patrick AFB; Buckley AFB; MacDill AFB**

Certifications

- ▶ **Small Business**
- ▶ **Small Disadvantaged Business**
- ▶ **8(a)**
- ▶ **HUBZone**
- ▶ **Service Connected Disabled Veteran Owned**



Corporate Capabilities

- Logistics
- Engineering
- **Manufacturing (ISO 9000 compliant)**
- Test & Evaluation
- Information Technology
- Security
- **Intelligence**
- Support Services



Realized and Expected Benefits To Cirrus (1 of 3)

- **Bill Clemons, Project Lead**
- Our project is VERY small (2 persons) to research and catalog information from the WWW
- Things we added to our project as result of the pilot include:
 - Set up a central data server for all artifacts,
 - Developed an action item data base to track and maintain customer decisions and other project information
 - saving minutes of project meetings and telephone/email logs
- A follow-on to the project is currently in planning stage and we are using CMMI as a guide
 - We are using activities in the PP Process Area
- **It does not cost any more to create a well defined management structure than to use an ad-hoc method for small programs---makes change management much easier**
- We now have added confidence in the quality of our product since we are using some activities from the CMMI model

24 March 2003

01-001-12-WC-3/13/02



Realized and Expected Benefits To Cirrus (2 of 3)

- **Bill Clemons, Project Lead**
- As the pilot proceeded, our emphasis of wanting to embrace CMMI changed from an original desire to “get certified” to a focus of improving in smaller “chunks” in areas identified by business analysis
- The Pilot Business and Gap Analysis activities helped us interpret the practices in a way that makes sense to our organization
- The implementation of specific process areas without the overriding goal of Level attainment makes the use of the model more meaningful for our small organization
- We realize now that we can use the CMMI in the areas that naturally add value to our organization and quality to our end products by improving activities where we need them the most



Realized and Expected Benefits To Cirrus (3 of 3)

- **Bob Portney, VP Manufacturing Operations**
- When the pilot began, we had in place some ISO-9000 Standard Operating Procedures and Work Instructions
- The CMMI complemented the ISO procedures:
 - PP and PMC practices led us to improved management processes of keeping records of staff meetings, and documenting and tracking action items
 - **More formal planning and tracking processes have been of great benefit – we realize now that our recent growth in the manufacturing business demanded a repeatable process**
 - The CMMI PMC activity of tracking performance with actual data against Planned parameters provided additional emphasis and urgency to development of an enterprise financial data management system which communicates these data to the projects (this activity is still under development)

24 March 2003

01-001-12-WC-3/13/02



Carnegie Mellon
Software Engineering Institute
Pittsburgh, PA 15213-3890



Pilot Company Experiences: ASI



Jack Conway

Vice President Systems Management
CMMI Pilot Project Coordinator

Analytical Services, Inc.
Huntsville, Alabama





Company Profile

Analytical Services, Inc.

- Management and Technical Services Company
- Incorporated in 1992
- Hispanic, Woman-Owned, Small Disadvantaged Business
- ISO 9001:2000 Registered/Successful CMMI SCAMPI A Appraisal
- Top Secret Facility

**Information
Technology**

**Systems Engineering/
Program Management**

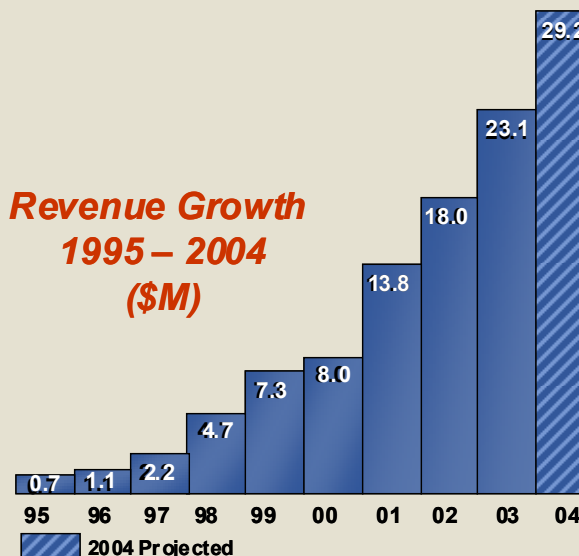
**Core
Competencies**

**Engineering and
Scientific Analysis**

**Professional and
Organizational Development**



**Revenue Growth
1995 - 2004
(\$M)**



Analytical Services, Inc.

About ASI



- **Customer base:**

- Army
- Air Force
- National Aeronautics and Space Administration (NASA)
- Defense Information Systems Agency (DISA)
- Defense Finance and Accounting Services (DFAS)
- Missile Defense Agency (MDA)
- Office of the Secretary of Defense (OSD)

2003 - NASA's Woman Owned Business of the Year

2002 - BBB Torch Award for Marketplace Ethics

2001 - National Minority Business of the Year by the U.S. Small Business Administration in Washington D.C.



ASI's Process Improvement History

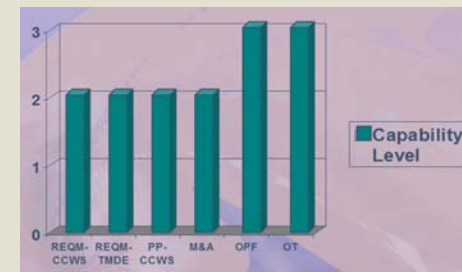
Development of our Quality System

- Until '02, written corporate policies - few written processes
- 2002 - Began investigation of Quality Systems – ISO 9001-2000
 - Worked with consultants from local university
 - Mentor Protégé Program provided guidance
- Nov '02 – Mar '03 - Established Quality Management System (QMS)
- Feb '03 - Pre- Assessment NQA Audit (external)
- Mar '03 - External certification audit for ISO 9001-2000 Registration -NQA
- May '03 - Selected to participate in CMMI Small Business Pilot Project
- Jun '03 - ISO Audit - 3 Month Registration Surveillance Audit
- Aug '03 - Initiated CMMI Pilot Project – (Continuous Representation)
- Apr '04 - ISO Audit - 2nd Surveillance Audit
- Apr/May '04 - Completed Pilot - SCAMPI A Appraisal of 5 process areas.
 - Achieved Target Capability Level Profile
- Oct '04 - ISO Audit - Oct '04 - 3rd Surveillance Audit

ASI CMMI Implementation



- Selected to participate in CMMI Small Business Pilot Project – May '03
- Initiated CMMI Pilot Project – Aug '03
 - Project Planning (PP)
 - Requirements Management (REQM)
 - Measurement and Analysis (M&A)
- Completed Pilot in May '04 – Culminated with SCAMPI A Appraisal
- Appraisal of **5** process areas with addition of:
 - Organizational Training (OT)
 - Organizational Process Focus (OPF)
- Achieved Target Capability Level Profile



ASI Adoption Objectives



- Must be affordable!
- Fit with Quality Management System (QMS)
- Adopt without dedicated overhead
- Useful for mission objectives and customer work
- Non interference with customer projects
- Recognized by customers
- Benefits and measurable pay-off
- Achievable within time frame
- Broader application than just software
- Long term benefit
- Additional revenue

Adoption Approach

Used for Pilot Project

- Assigned to single business unit with multiple direct customer programs
- Focus on systems engineering and application development
- Multi-level team: technical, managers, quality coordinator and executive
- Develop processes to address real situations, using real data
- Listen to the consultants!
- Experiment with tools offered
- Action, action, action
- Stay on schedule!
- Regular sessions – weekly phone cons/monthly sessions
- Use action lists and minutes to hold ourselves accountable
- Readjust when overcome by events

Adoption Activities & Statistics

ASI Pilot Program

	Total	Team Mtngs.	Telecons	Process Develop	Training & Awareness	Implementation	Appraisal Prep	Appraisal
Exec. Lead	286	96	80	40	24	10	20	16
PM	240	80	60	40	24	20	12	4
PM	252	96	80	40		20	12	4
SW Eng.	312	96	80	60		30	40	6
Prog Analyst	144	60	50	20		10		4
SW Developer	124	60	50			10		4
SW Eng.	134	80	50					4
QA	206	60	50		24		40	32
QA	50	30	20					
Prog Control	30					20	4	6
SW Developer	42				12	30		
Executive	76	35				33	4	4
Workforce	45	25						20
Total Hours	1941	718	520	200	84	183	132	104
% of Hours		37%	27%	10%	4%	9%	7%	5%
Total Cost	\$138,833	\$52,219	\$36,662	\$15,621	\$5,510	\$13,348	\$8,753	\$6,719
% of Cost		38%	26%	11%	4%	10%	6%	5%

Benefits from CMMI Adoption



- Participation in Pilot extremely beneficial for ASI
- CMMI Adoption has been worth investment
 - CMMI adoption enhanced and improved our QMS
 - Natural follow-on to ISO and provides continuous improvement
 - Improved ability to organize and communicate status of projects to customers and other stakeholders
 - Addresses customer projects with processes
 - Reduced training time for new employee
 - Prevented requirements creep and ensured on-time and below budget project completion
 - Supports company objectives
 - Provides path for taking company to next level



Summary And Recommendations



Lessons Learned (1 of 2)

- Small Business *needs* to realize pay off quickly
- Customer driven requirements are significant (de)motivator
- Small businesses do not have staff dedicated solely to CMMI implementation – customer requirements take priority and can cause delays
- There is not a lot of functional organization to leverage from in a small business
- CMMI is easier to interpret for product development than for services – Small Businesses are typically more service oriented
- “The customer rules” – Many small organizations adopt/adapt their business practices directly from their customers or primes

Lessons Learned (2 of 2)

- State of company quality systems has major impact on implementation effort, for good or ill
- Less formal organizational structure means fewer barriers to “knock down”;
- leadership involvement is not difficult to obtain
- Just In Time Training is critical for small organizations
- ISO 9000:2001 compliant processes can meet CMMI goals
 - For one of the pilot companies, Organizational Process Focus and Organizational Training goals were met by the existing ISO 9000:2001 Implementation
- Quick Looks significantly improve the chances for a successful SCAMPI A
- Eliminating intimidation factor of CMMI is essential



Using CMMI in Small Businesses

- CMMI provides a set of best practices from which small businesses can benefit
- The Continuous Representation of the CMMI allows small companies to focus on improvements that have the highest payoff for the company
- Aligning improvement with business goals is particularly important for small businesses
- Simple CMMI-based improvements can have a significant impact in small organizations
- “Changing” the practices isn’t necessary in most cases; finding alternative practices is often relevant
- Both CMMI and SCAMPI A scale down to fit small settings

The greatest challenge for small businesses is the affordability of subject matter experts, and the implementation and appraisal costs



How the Pilot Artifacts Can Help Small Businesses

- Three artifacts from the pilot will be available in the SEI website
 - Toolkit
 - 2 Experience reports
- The CMMI for Small Business Pilot artifacts should prove useful in helping small businesses
 - Focus their improvement efforts
 - Figure out how and where to get started
 - Tie their improvements to business goals
 - Train their staff
 - Realize payoffs early in the improvement
 - Improve their ability to prepare for appraisals



And finally....THANK YOU!

The Huntsville CMMI-SME pilots have contributed a tremendous amount of learning for the SEI and the process improvement community in relation to implementing CMMI in small settings

- SED's continuing leadership in supporting process improvement within the Huntsville community benefits us all
- The pilot companies have each gone the extra mile to accommodate constraints in the pilot team's schedule and pilot materials that were prototypes



Contact Information

Sandra Cepeda (CSSA / SED)

Voice: (256) 876-0317

Email: sandra.cepeda@us.army.mil

SuZ Garcia (SEI)

Voice: (412) 268-9143

Email: smg@sei.cmu.edu

Jack Conway (ASI)

Voice: (256) 890-0083 Ext 132

Email: conwayj@asi-hsv.com