



**Carnegie Mellon**  
**Software Engineering Institute**  
Pittsburgh, PA 15213-3890



# **SCAMPI A Applied to Small Settings – A Success Story**

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

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# Agenda

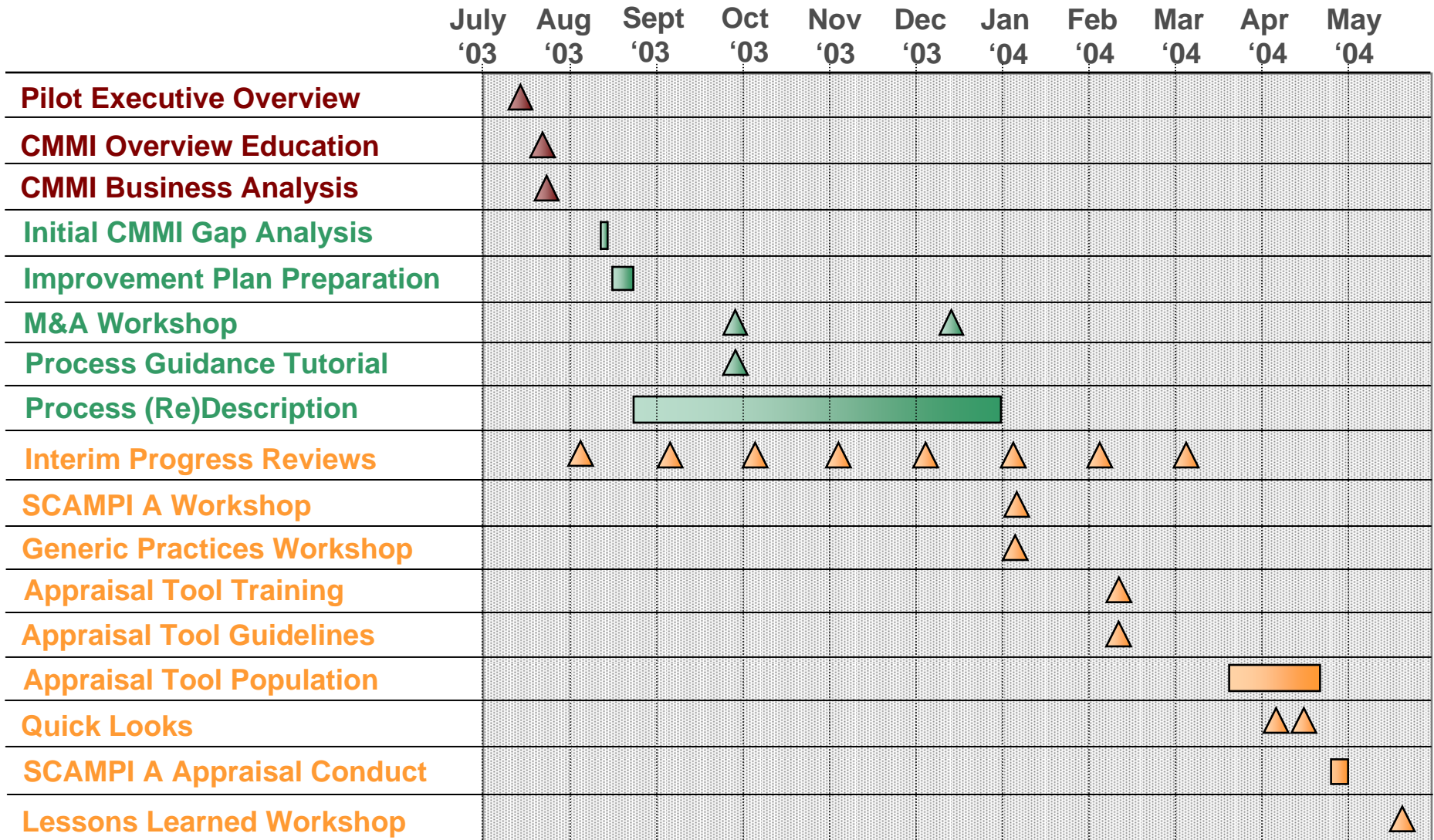
- Pilot Overview
- ASI - Company Profile
- Appraisal Preparation - Success Factors
- Appraisal Conduct - Leveraging MDD Tailoring Options
- ASI's Perspective
  - Appraisal Preparation
  - Appraisal Conduct
- Lessons Learned
  - ASI's Perspective
  - Lead Appraiser's Perspective
- How Pilot Artifacts Can Help Small Businesses



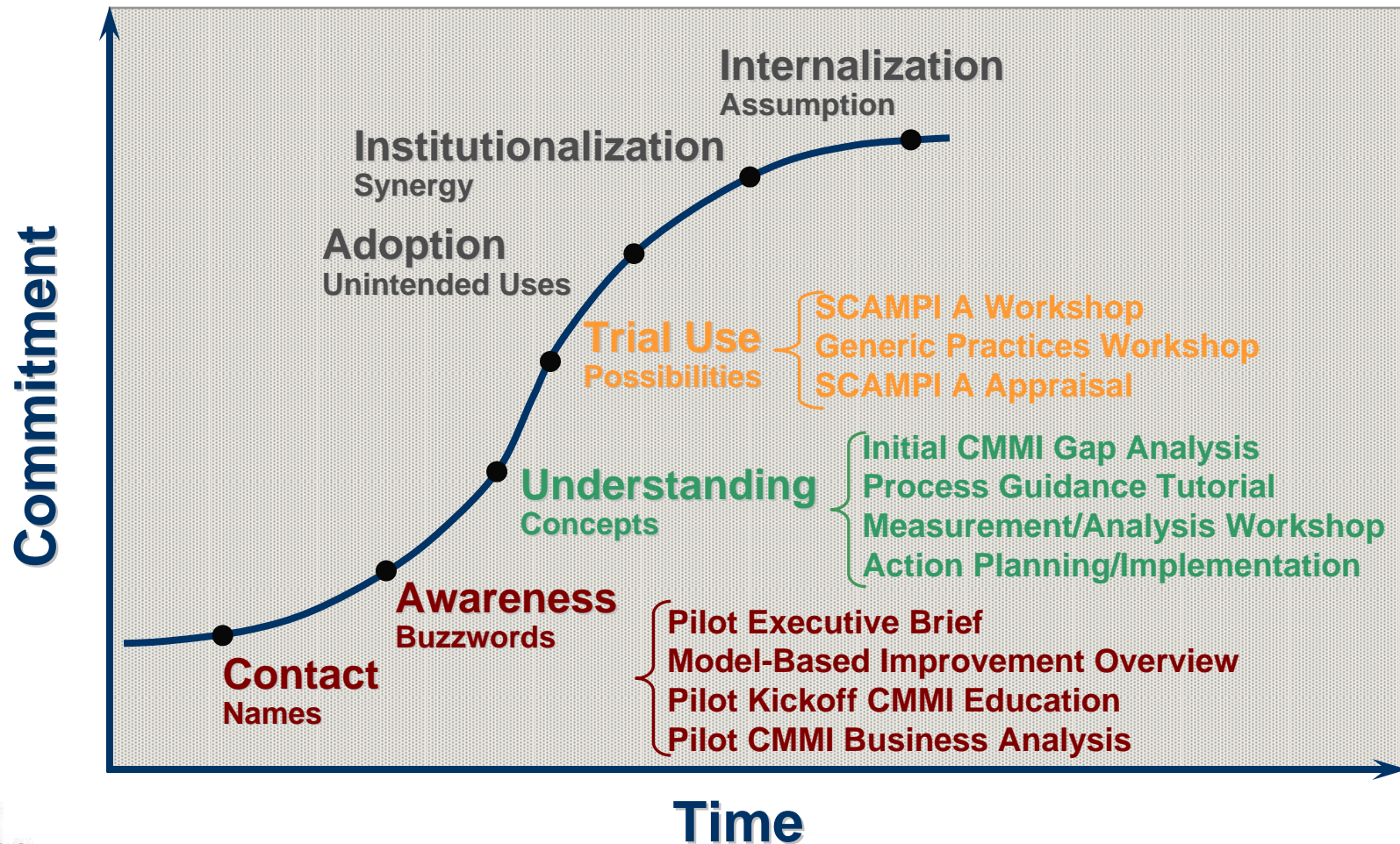
## Pilot Project Overview

- A Joint Project Performed by the Partnership Between the Software Engineering Institute (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** (25 to 250 Employees in Huntsville)
- Selected 2 Pilot Companies: Analytical Services, Inc. (ASI) and Cirrus Technology, Inc. (CTI)
  - Presentation Today Focuses on ASI Appraisal
- Pilot Artifacts Will Be Available at the SEI Website by the End of the Year
  - Toolkit
  - ASI Experience Report

# CMMI Small Business Pilot Schedule



# Summary of Materials Provided by Pilot





# 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**

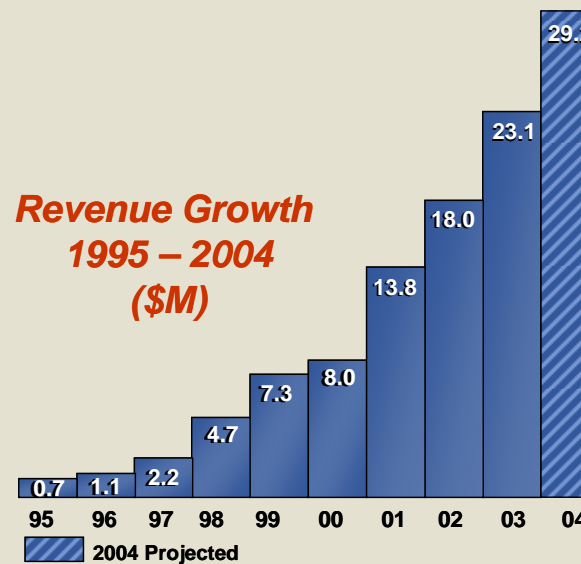
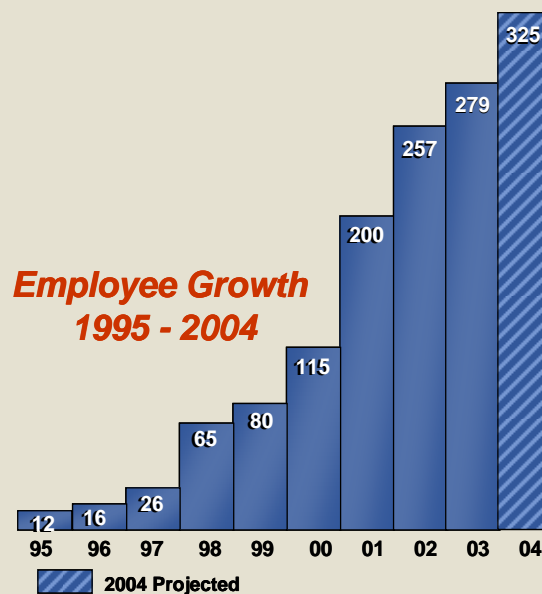
**Systems Engineering/  
Program Management**

**Core**

**Competencies**

**Engineering and  
Scientific Analysis**

**Professional and  
Organizational Development**





# 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



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# Appraisal Preparation Success Factors





# Initial Gap Analysis

- Collaborative Sessions Between ASI and Lead Appraiser to Identify Gaps Between ASI's Practices and the CMMI
- Gap Analysis Used SCAMPI C Techniques
- In Each Session, ASI's Practitioner/SME and the Lead Appraiser Walked Through the CMMI Practices to
  - Determine How Well the Practice Was Implemented
  - Identify Gaps
  - Develop Actions Required to Close the Gaps

- ✓ ***Significantly Increased ASI's Understanding of CMMI***
- ✓ ***Helped ASI Interpret CMMI for Their Environment***
- ✓ ***Provided the Basis for the Development of an Improvement Plan***
- ✓ ***Ensured That New Process Implementation Was Compliant With the CMMI***



# SCAMPI A Workshop

- Lead Appraiser Provided a SCAMPI A Workshop to ASI
  - Described Method
  - Addressed Appraisal Preparation and Conduct Activities
  - Provided Overview of Appraisal Plan and Schedule
  - Clearly Identified Roles and Responsibilities During Appraisal Preparation and Conduct
    - Appraisal Team Members
    - Appraisal Sponsor
    - Appraisal Organizational Unit Coordinator
    - Appraisal Participants

- ✓ ***Helped Set Expectations (ASI Understood What They Were Getting Themselves Into)***
- ✓ ***Resulted in No Surprises During Appraisal Preparation or Conduct***



# Generics Workshop

- Objective Was to Reduce the Risk Associated With Misinterpretation of Generic Practices
- Workshop Scope
  - Overview of Generic Practices
  - Exercise Applying Each of the CL 2 Generic Practices to ASI's Requirements Management Process
- Generic Practice Application Was Reinforced During Subsequent Meetings

- ✓ ***Helped ASI Understand and Interpret Generic Practices for Their Environment***
- ✓ ***Ensured That Implementation of Generic Practices Was Consistent With CMMI Requirements***



# Guided Practice Implementation Indicator Descriptions Population

- Recommended Use of a Database Tool (Tracker) to Capture Mappings of ASI Evidence to the CMMI Practices
- Provided Very Specific Guidelines for the Population of PIDDs Using the Tracker Tool
- Held PIDDs Workshop to Ensure Guidelines Were Understood and Rules of SCAMPI Method Were Clear
- Performed Quick-Looks (Database Content Reviews) Prior to the Appraisal

- ✓ ***Ensured That PIDDs Were Readily Available for the Appraisal Team***
- ✓ ***Significantly Reduced the Duration of the Readiness Review and Appraisal***



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# Appraisal Conduct





# Appraisal Scope

- ***CMMI Model Scope***
  - PP, CL 2 (CCWS)
  - REQM, CL 2 (CCWS, TMDE)
  - M&A, CL 2 (System Management Group)
  - OPF, CL 3 (ASI Huntsville)
  - OT, CL 3 (ASI Huntsville)
- ***Application Domain Characterization***
  - Services
- ***Model/Version/Representation***
  - CMMI-SE/SW Version 1.1 (Continuous)



# Key Appraisal Personnel

- **Team Leader:** Sandra Cepeda, CSSA
- **Team Members:**
  - Scott Reed, SEI (Mini-Team 1 Lead)
  - Beth Smith, ASI (Mini-Team 1)
  - Miguel Serrano, CIMAT (Mini-Team Lead 2)
  - Jeff Kauffman, SED (Mini-Team 2)
- **Organizational Unit Coordinator:** John Sullivan
- **Tool Support:** Annette Hughes, Jimmi Hendrix
- **Infrastructure:** Darin Rushing and Luis Torres
- **Executive Support:** Jack Conway, ASI Systems Management VP
- **Appraisal Sponsor:** Irma Tuder, ASI President and CEO



# Leveraging MDD Tailoring Options

- Team Training
  - Method: Focused, Hands-On, First Pass for OE Review
  - Reinforce Complex Model Concepts (GP -> PA Relationships, Content Overlap, etc.)
- Presentations by the Organization
  - Useful to Set Context and Familiarize Team With Organization
  - Opportunity to Get Affirmations
- Depth of Readiness Review
  - Characterize Practices as Much as Possible -> Key Risk Mitigation Activity
  - Use to Optimize Team Dynamics



# Leveraging MDD Tailoring Options

- Re-Planning
  - To Address Lack of Objective Evidence
  - To Capitalize on High States of Readiness
  - To Ensure Expectations Are Met
- Structured Approach
  - Help Appraisal Team Stay Focused
  - Drive Efficient Method Execution
  - Meet Schedule
- Interviews
  - Run Concurrent Sessions (Assumes Highly Capable Mini-Teams)
  - Perform Concurrently With OE Review, if Possible
  - Capitalize on Resources



# Scaling Down SCAMPI A

	Tuesday	Wednesday	Thursday		Friday					
8:00	Team	Tracker Training	Team 1: Finish RM CCWS/TMDE and PP CCWS Characterizations	Team 2: Finish M&A, OPF, OT Characterizations		8:00				
8:30	Introductions						Draft Findings Presentation	8:30		
9:00	Team Training				Project Characterization Example	Team 1: Hold Senior Management, Pilot Project Leads, Infrastructure/QA Interviews and update Tracker	Team 2: Hold Senior Management, OT, OPF, M&A Interviews and Update Tracker	OU Level Characterizations, Goal Ratings, Prepare Final Findings Presentation	9:00	
9:30										
10:00										10:00
10:30						10:30				
11:00						11:00				
11:30						11:30				
12:00	Lunch	Lunch				12:00				
12:30						12:30				
13:00	Team Training	Mini-Teams Evaluate OE and do Characterizations	Hold Pilot Project Practitioners, Organization Practitioners, and Senior Management Interviews and Update Tracker		Lessons Learned, Lunch, and Feedback Forms	13:00				
13:30										13:30
14:00										14:00
14:30						14:30				
15:00	Opening Briefing						15:00			
15:30							15:30			
16:00	ASI Briefings and Demo's					Brief RR Results to Organization	16:00			
16:30							16:30			
17:00							17:00			
17:30	Homework						17:30			
18:00						18:00				

- 415 Documents Reviewed
- Conducted Team Training, Readiness Review and Appraisal in 4 Days (Two 1-Week Events Initially Planned)



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# ASI'S PERSPECTIVE



# Challenges/Surprises

## *SCAMPI Appraisal*

- Challenges:

- Level of Detail Required for Appraisal
- Thoroughness of Appraisal
- Documentation Required
- Preparation Required

- Surprises

- Appraisal Was Positive
- Tools Provided Really Worked to Prepare for Appraisal
- Preparation Efforts Paid Off
- ISO 9001-2000 Was Excellent Preparation to SCAMPI Appraisal

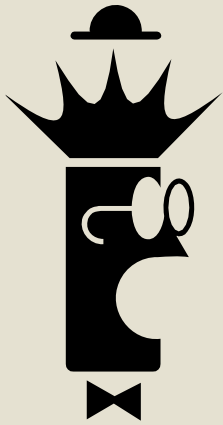




# Appraisal Preparation

## *ASI Experience & Perspective*

- Initial Confidence/Optimism
- Intimidation Factor - Overwhelming
- Tracker Tool Provided
- Initial Reaction – Overwhelming
- Problems With Tracker Tool
- Get Serious
- Organize Artifacts
- Populate Data in Tool
- Develop Confidence
- Preparation for Appraisal Readiness Review

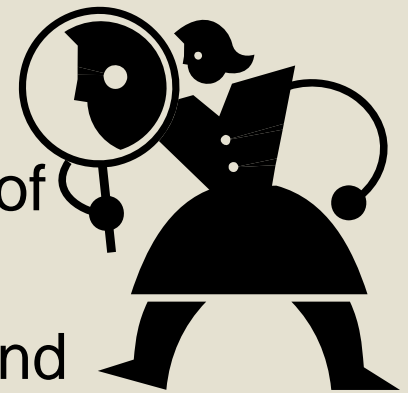


# Appraisal Conduct



## *ASI Experience & Perspective*

- Appraisal Well Organized and Non Intrusive
- Appraisal Team Established Schedule and List of Resources Required
- Information Required for Appraisal Was Clear and Definitive
- Appraisal Reviewed Tracker Tool and Artifacts Provided
- No Surprises
- Positive Experience



# Adoption Activities & Statistics

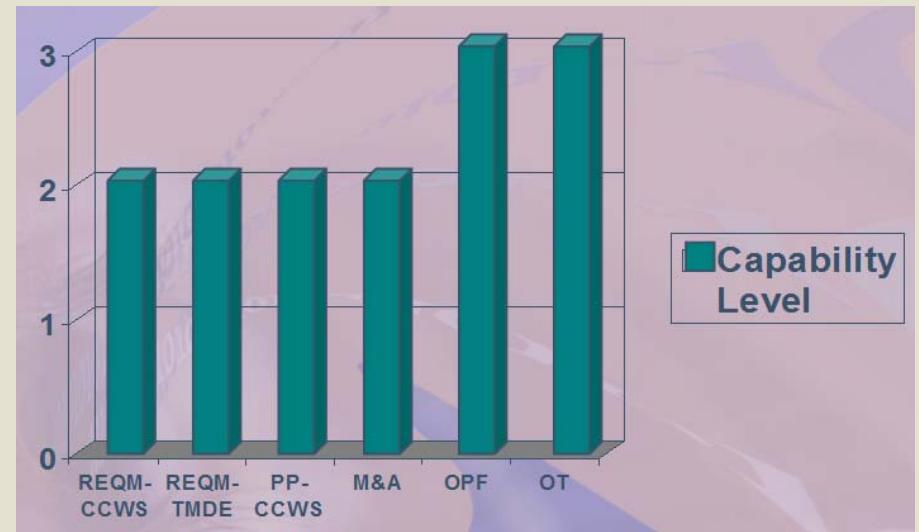
## ASI Pilot Program

	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
<b>Total Hours</b>	<b>1941</b>	<b>718</b>	<b>520</b>	<b>200</b>	<b>84</b>	<b>183</b>	<b>132</b>	<b>104</b>
<b>% of Hours</b>		<b>37%</b>	<b>27%</b>	<b>10%</b>	<b>4%</b>	<b>9%</b>	<b>7%</b>	<b>5%</b>
<b>Total Cost</b>	<b>\$138,833</b>	<b>\$52,219</b>	<b>\$36,662</b>	<b>\$15,621</b>	<b>\$5,510</b>	<b>\$13,348</b>	<b>\$8,753</b>	<b>\$6,719</b>
<b>% of Cost</b>		<b>38%</b>	<b>26%</b>	<b>11%</b>	<b>4%</b>	<b>10%</b>	<b>6%</b>	<b>5%</b>

# Results of SCAMPI

## *ASI Perspective*

- Achieved Target Profile Capability Level Profile
- CL2 for 3 Process Areas From Pilot Program
- CL3 for 2 Process Areas
- Compatible With ISO 9001-2000
- Processes Are Incorporated Into QMS
- Pilot Program, CMMI Adoption and SCAMPI Appraisal Were All Beneficial and Worth Investment

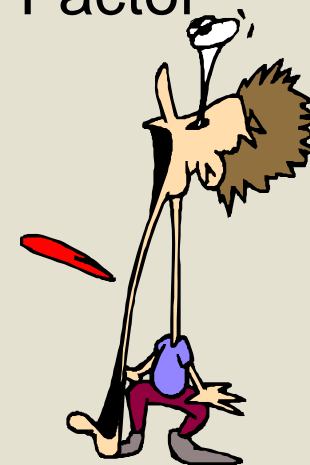




# Lessons Learned – ASI Perspective

## *SCAMPI Appraisal*

- Preparation Is Critical
- Consultants Required (First Time)
- Listen to the Consultants
- Set Schedule and Keep It Moving
- Experience With Quality Audits (ISO 9001-2000) Is Helpful
- State of Quality Management System Big Factor
- Use Tools to Prepare
- Organize Artifacts
- Leadership Involvement Is Essential





# Appraiser's Perspective - Preparation

- Existing Quality Management Systems Should Be Leveraged
  - Organizational Process Focus and Organizational Training Goals Were Met by the Existing ISO 9000:2001 Implementation
- Organization's Understanding of the SCAMPI A Method Is Critical in Setting Expectations for Appraisal Preparation and Conduct
- Quick Looks (B's and C's) Significantly Improve the Chances for a Successful SCAMPI A
- Well-Populated PIDDS Are Critical for Appraisal Success - a Collaborative Approach Between the SLA and the Organization Is Recommended
- Misinterpretation of Generic Practices Is a Major Cause for Appraisal Failures – Generic Practices Workshops Can Help Prevent Misinterpretation
- Using the Same Tool for the Initial Gap Analysis, the Incremental Quick Looks, and the SCAMPI A Appraisal Increases the Efficiency of the Appraisal
- Using the Same Tool for PIIDs Population and the Appraisal Can Also Increase the Efficiency of the Appraisal



# Appraiser's Perspective – Appraisal

- Leveraging SCAMPI A MDD Tailoring Options Can Significantly Decrease the Duration of the Appraisal
- A Consistent Understanding of Generic Practice Interpretation for the Organization Being Appraised Is Critical for an Appraisal Team
- A Documented, Well-Defined Appraisal Process That Integrates Tool Usage Simplifies the Implementation of the Appraisal Method for Appraisal Team Members
- Applying the Method as a Team, to One Instance in the Scope of the Appraisal, Is a Powerful Training Exercise for the Appraisal Team
- Ensuring Consistency Across Appraisal Mini-Teams Early in the Appraisal Simplifies the Team Consensus Activities

✓ ***Both CMMI and SCAMPI A Scale Down to Fit Small Settings***



# 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

Two Artifacts From the Pilot Are/Will Be Available on the SEI Website

- Toolkit
- ASI Experience Report

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



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