



Carnegie Mellon  
Software Engineering Institute  
Pittsburgh, PA 15213-3890



# Lessons Learned from Adopting CMMI for Small Organizations

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

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# Agenda

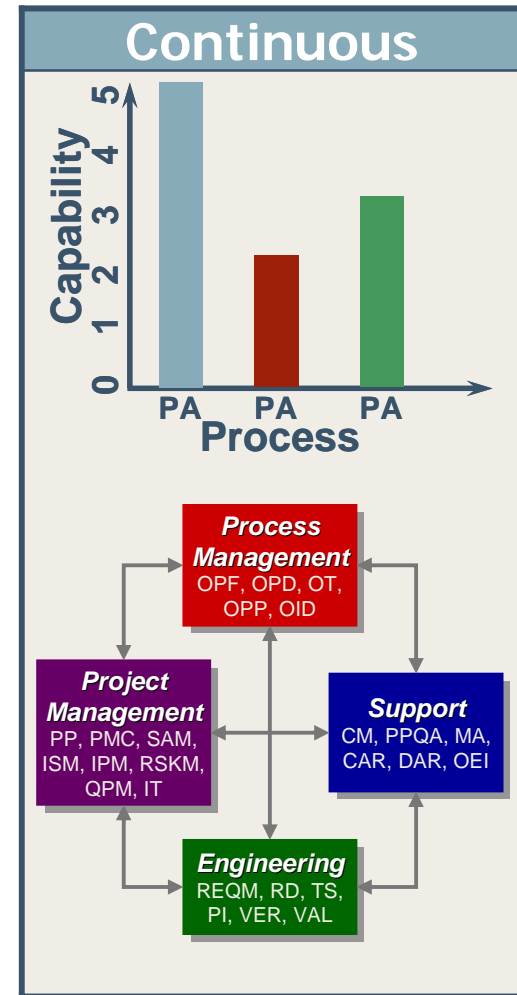
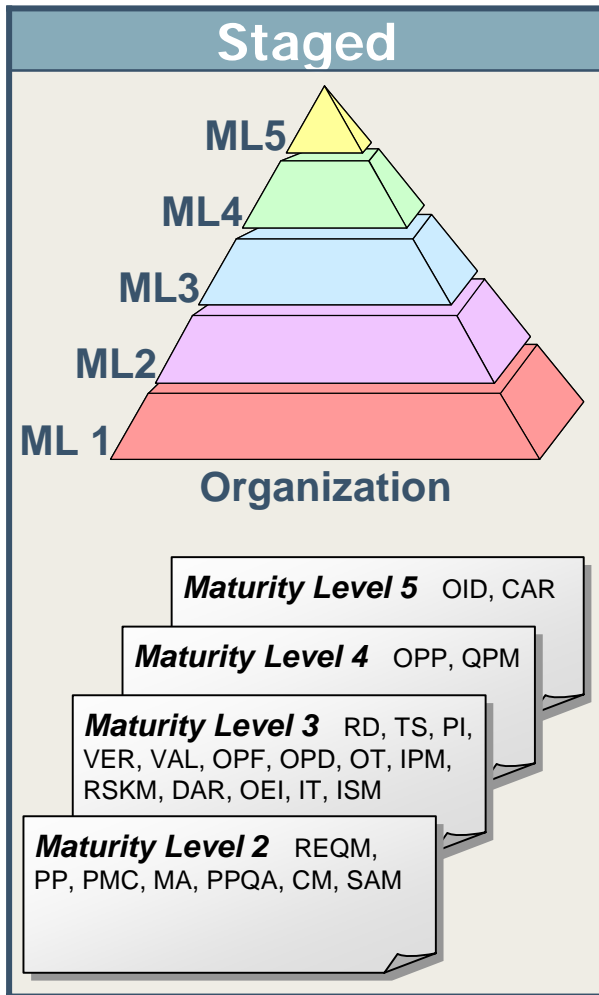
- CMMI Overview
- Pilot Overview
- Adoption of CMMI by ASI and Lessons Learned
- How Pilot Artifacts Can Help Small Businesses



# 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 In A Nutshell



➤ *Two Representations Per CMMI Model*  
 ➤ *One Appraisal Method (SCAMPI<sup>SM</sup>)*



# Pilot Overview



# 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)

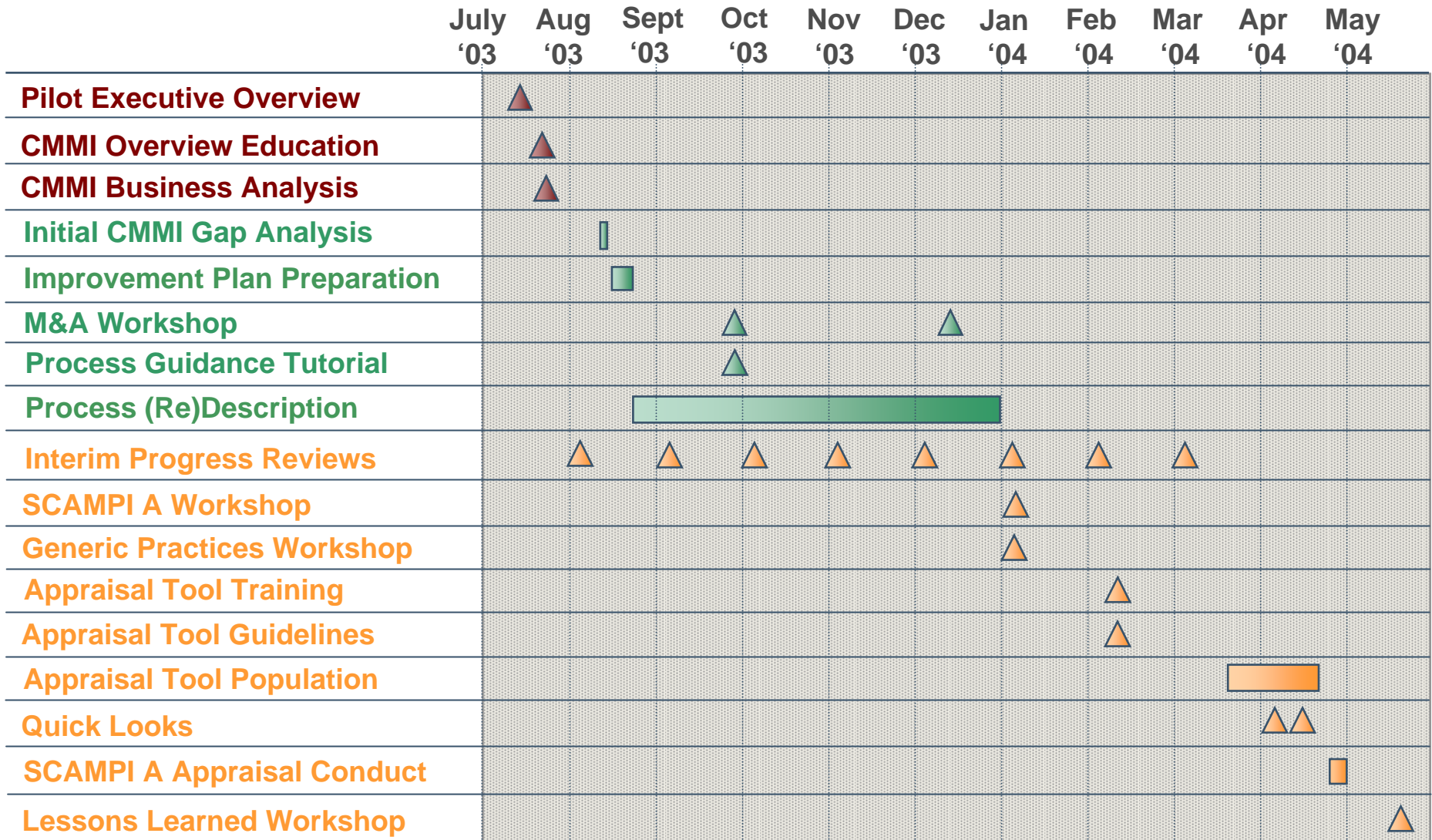
Selected 2 Pilot companies: Analytical Services, Inc. (ASI) and Cirrus Technology, Inc. (CTI)

- Presentation today focuses on ASI lessons learned

Pilot artifacts will be available at the SEI website by the end of the year

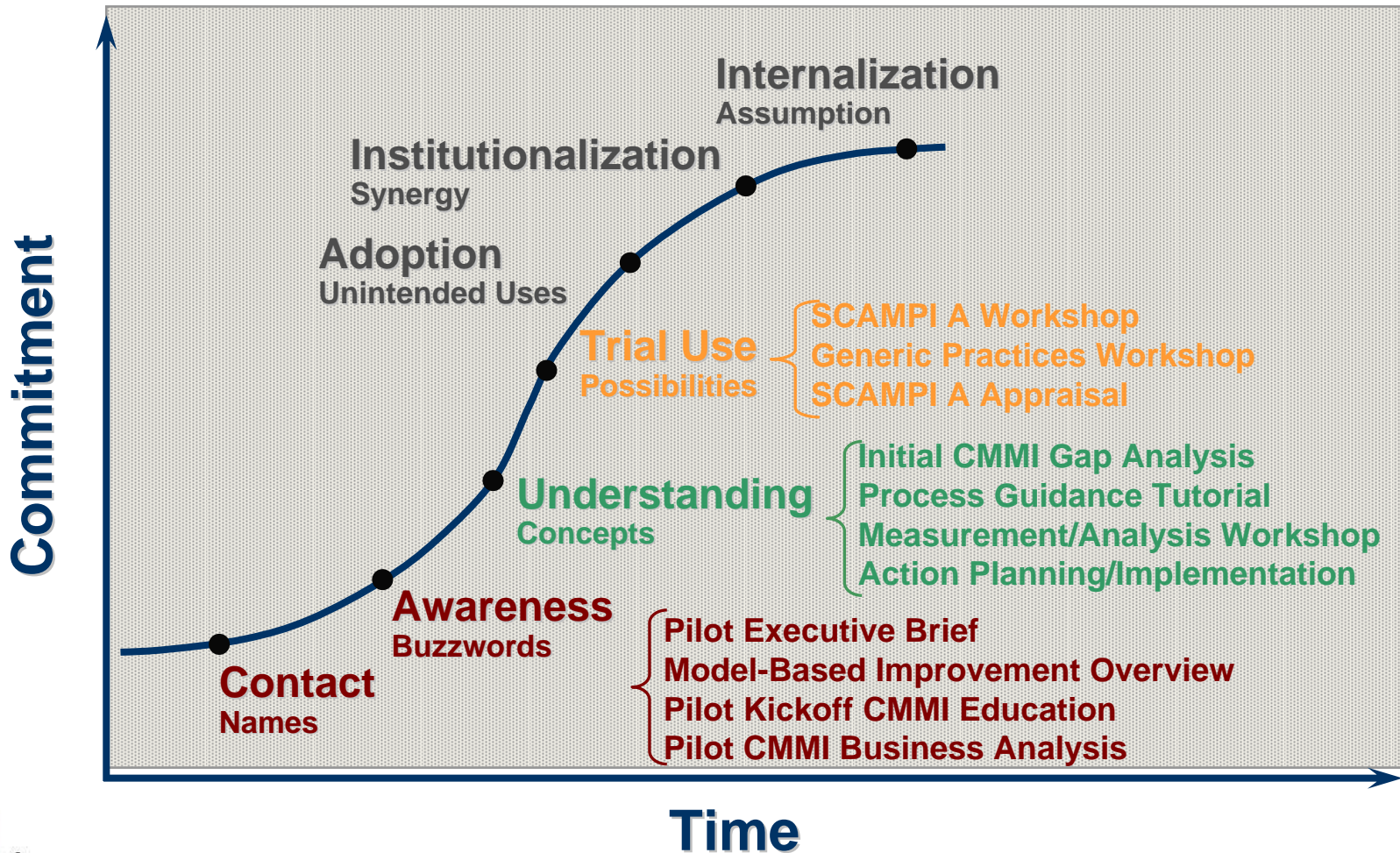
- Toolkit
- Experience reports (one for each company)

# CMMI Small Business Pilot Schedule





# Summary of Materials Provided by Pilot







Carnegie Mellon  
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# *Adoption of CMMI by ASI and Lessons Learned*



# **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

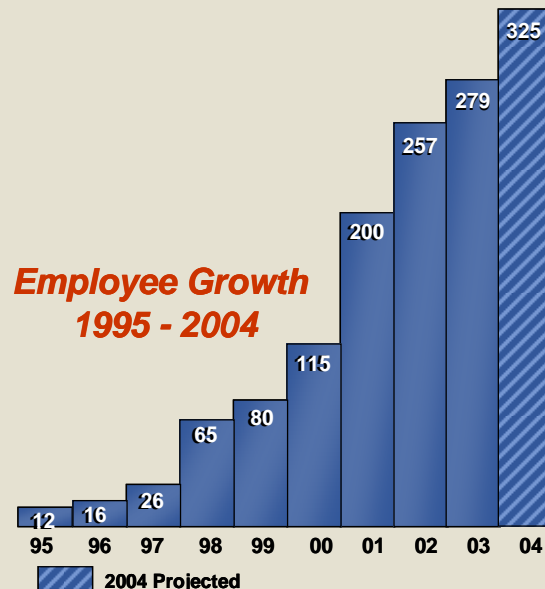
**Information  
Technology**

**Systems Engineering/  
Program Management**

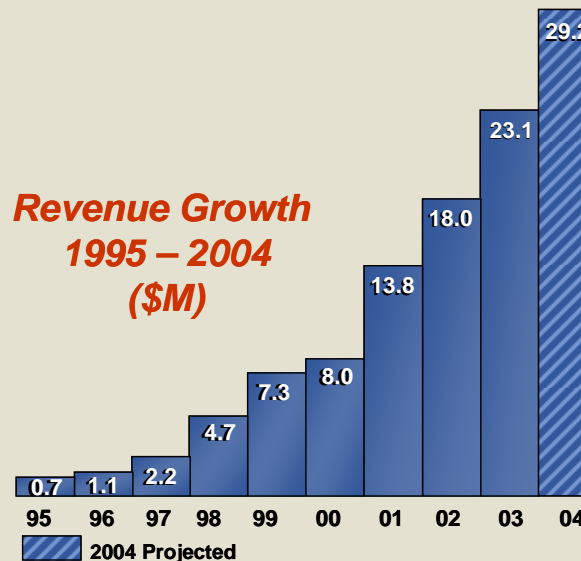
**Core  
Competencies**

**Engineering and  
Scientific Analysis**

**Professional and  
Organizational Development**



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



# 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

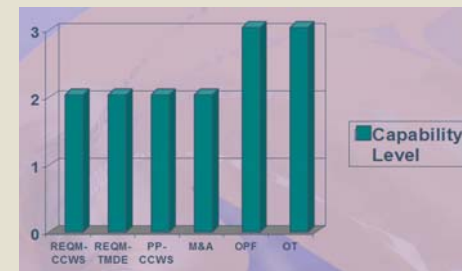
## Development of our Quality System

- 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 Adoption



- 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
<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>

# 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 the company to the next level

# Lessons Learned – Small Business Implementation



- 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

# Lessons Learned –Small Business Implementation



- ISO 9001-2000 and CMMI can be compatible and complementary
- “The customer rules” – Many small organizations adopt/adapt business practices directly from their customers or primes
- 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
- Eliminating intimidation factor of CMMI is essential



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# *How Pilot Artifacts Can Help Small Businesses*



# 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 on 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



# Contact Information

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