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9th ANNUAL TECHNOLOGY CONFERENCE

“Investigation, Measures, and Lessons Learned About the Relationship Between CMMI Process Capability and Project or Program Performance”

Denver, CO

16 - 19 November 2009

Agenda

Tuesday, November 17, 2009

EXECUTIVE PANEL

Moderator: Mr. Bob Rassa, Director, Engineering Programs, Raytheon Company

- Mr. Mike Twyman, VP of the Integrated Command and Control Business Unit, Northrop Grumman Corp.
- Mr. David J. Tyler, Sr. Manager, IIS Enterprise Process Effectiveness, Raytheon Company
- Mr. Wesley Covell, President of Defense Programs, Harris Corp.
- Ms. Lynn Penn, Director of Process Management, Lockheed Martin Corporation
- Mr. Girish Seshagiri, CEO, Advanced Information Services, Inc.

LUNCHEON SPEAKER:

- Mr. Hal Wilson, Director, Engineering Defense Systems Division, Northrop Grumman Information Systems

Concurrent Sessions

TRACK 1- GRAND MESA D/E- CMMI AND PROCESS IMPROVEMENT

Session Chair: Mr. Jack Ferguson, Software Engineering Institute

- 9386 - CMMI for Large Scale/Systems of Systems Engineering Projects, Mr. Patrick McCusker, Booz Allen Hamilton
- Making the CMMI Sing - A Framework for Performance Excellence, Mr. Jeff Dutton, Jacobs Technology, Inc
- 9312 - CMMI in a Small Company: The Cobbler’s Children Can Have Shoes (And Best Practices_, Mr. Michael Knox, TECHSOFT, Inc

TRACK 2 - GRAND MESA F - PRACTICAL GUIDANCE

Session Chair: Mr. Gene Miluk, Software Engineering Institute

- 9179 - Work On Your Engineering Business, Not In It, Mr. Rolf Reitzig, Cognence, Inc
- Process-Performance Base Reliability, Mr. William Winkel, Northrop Grumman Corporation
- 9391 - Choices to be Made in CMMI Adoption, Dr. Rick Hefner, Northrop Grumman Corporation
- 9298 - Assurance for CMMI: A Toolbox for Multiple Cyber Challenges, Mrs. Michele Moss, Booz Allen Hamilton

TRACK 3 - HIGHLANDS- CMMI ECONOMICS & BUSINESS VALUE

Session Chair: Mr. Geoff Draper, Harris Corporation & Mr. Bob Ferguson, Software Engineering Institute

- 9147 - Dynamic Program Schedule, Cost and Returns Analysis, Mr. Phillip Fahringer, Lockheed Martin Corporation
- 9184 - The Economics of CMMI, Mr. Mick Campo, Raytheon Company
- 9185 - CMMI Economics 101: CMMI for Executives, Mr. Geoff Draper, Harris Corporation

TRACK 4 - CHASM CREEK - HIGH MATURITY

Session Chair: Mr. Dennis Goldensen, Software Engineering Institute & Mr. Fred Schenker, Software Engineering Institute

- 9146 - Goal Question - Model, Mr. Michael Campo, Raytheon Company
- 9389 - Marking CMMI Level 5 Statistical Principles Palatable to an Employee-Wide Demographic, Ms. Deepti Sharma, OST
- 9116 - Changing Behavior: The Key to Adoption Complex Process Technology, Dr. Gene Miluk, SEI
- 9401 - Achieving Quality QPPO via Effective Usage of PPBs and PPMs, Dr. Bin Cong, CRS

TRACK 5 - MESA VERDE - CMMI GOVERNMENT & ACQUISITION

Session Chair: Ms. Lorraine Adams, Software Engineering Institute & Mr. Mike Phillips, Software Engineering Institute

- 8806 - Benefits to the Evolution of High Maturity Software Development: A 15 Year Case Study, Mr. Daniel Drew, United Space Alliance
- 9306 - Directive Documents and ITAR Made Easy, Mr. Kenneth Weinberg, Raytheon Corporation
- 8907 - How CMMI was Used for Process Improvement in the Support of Government-Wide Acquisition Contract (GWAC) Vehicles, Mrs. Sharon Cobb, Flanagan, SAIC
- 9403 - Tailoring CMMI for an Enterprise Resource Planning COTS Software Environment, Ms. Alison L. Schwier, U.S. Army

TRACK 6 - WIND RIVER - APPRAISALS

Session Chair: Mr. Ken Nidiffer, Software Engineering Institute & Mr. Kenneth Weinberg, Raytheon Corporation

- 9398 - Hocus Pocus, What's With All the Issues About Non-Focus?, Mr. Paul Byrnes, Integrated Systems Diagnostics, Inc.
- 9136 - Making the Most of GP3.2, Ms Susan Byrnes, Natural SPI, Inc
- 9130 - Supporting the High Maturity Process Improvement and Understanding the Application SCAMPISM Method To It., Mr. Kobi Vidar, K.V.P. Consulting
- 9385 - Reducing the Cost and Increasing the Value of CMMI Re-Appraisals, Mrs. Beth Layman, Layman and Layman

TRACK 7 - WIND STAR - CMMI V1.3 TOPIC & CMMI-SVCS, LEAN

Session Chair: Ms. Susan Bassham, U.S. Army Aviation & Missile Command

- CMMI V1.3 - From the Past to the Future, Mr. Mike Phillips, Software Engineering Institute
- 9167 - Lessons Learned Piloting the CMMI for Services, Ms. Diane Mizukami (Williams), Northrop Grumman Information Systems
- 9126 - CMMI for Services: An Approach to Improve Your Program Management Office, Ms. Patricia Mitryk, Cognence, Inc
- 9299 - Creatively Apply CMMI SVC in a Very Small Consulting Firm, Mr. Bill Smith, Leading Edge Process Consultants

Wednesday, November 18, 2009

Concurrent Sessions

TRACK 1 - GRAND MESA D/E - CMMI AND PROCESS IMPROVEMENT

Session Chair: Mr. Jack Ferguson, Software Engineering Institute

- 9304 - Sustainment and Continued Institutionalization of Best Practices and CMMI at SPAWAR, Mr. Michael Kutch, Space & Naval Warfare Systems Center - Atlantic
- 9178 - CMMI Process Improvement, Its not a technical Problem, It's a People Problem!, Mr. Rolf Reitzig, Cognence, Inc
- 9106 - The Uses of the Peer Review beyond CMMI, Mr. Paul Nugent, General Dynamics Corporation
- 9246 - Integrating Corporate Goals and Processes Using the Engineering Lifecycle Vee Model, Dr. Keven Forsberg, The Center for Systems Management
- 9379 - NAVAIR's Process Asset Library (PAL), A Step Toward A Corporate Organizational Set of Standard Processes (OSSP), Ms. Judy Overhauser-Duett, NAVAIR
- 9153 - After 13 years, I have learned …. Tools do not solve your problems, Mr. John Bethmann, Concurrent Technologies Corporation.
- 9387 - 10.5 Process Improvement, Mistakes From Top Executives?, Mr. Carlos Caram, CSD Brasil
- 9144 - Transitioning From a CMMI Implementer to an Appraiser, Mr. Warren Scheinin, Northrop Grumman Corporation

TRACK 2 - GRAND MESA F -PRACTICAL GUIDANCE

Session Chair: Mr. Gene Miluk, Software Engineering Institute

- 9138 - High Velocity Performance Improvement, Mr. Jeff Dutton Jacobs Technology, Inc
- 9202 - Statistical Tune-Up of the Peer Review Process, Mr. Tom Lienhard, Raytheon Missile Systems
- Everything You Wanted to Know About CMMI and Six Sigma but Did Not Know Who to Ask, Tom Lienhard, Raytheon Missile System
- 9275 - CMMI® in the Social Media (For the Social Media-Challenged!), Mr. Bill Smith, Leading Edge Process Consultants
- 9214 - Hi, my name is Root Cause Analysis. Have we met?, Mr. Craig Hale, Esterline Control Systems - AVISTA
- 8787 - Improving Process Institutionalization Through Process Training, Ms. Ellen Chilikas, Raytheon Company
- 9291 - "You Say Tomato, I Say Eggplant: Comparing Process References for Systems Engineers and Project Managers in a CMMI®-Compliant Organization", Mr. Peter Henry, BAE Systems
- 9354 - Strategies for Process Definition and Deployment Part 1, Mr. Fred Schenker, SEI
- Strategies for Process Definition and Deployment Part 2 , Mr. Fred Schenker, SEI
- Shrinking the Elephant: If Implementing CMMI Practices Looks Like More Effort than it's Worth, Let'/s Look Again, Sam Fogle, ACE Guides, LLC

TRACK 3 - HIGHLANDS - CMMI® ECONOMICS & BUSINESS VALUE

Session Chair: Mr. Geoff Draper, Harris Corporation & Mr. Bob Ferguson, Software Engineering Institute

- 9213 - QPMing Your SEPG, Mr. Craig Hale, Esterline Control Systems - AVISTA
- 9223 - We're Already There: Matching Existing High Maturity Behaviors to the CMMI® Model, Mr. Bradley Bittorf Raytheon Company
- 9190 - CMMI® Economics 501: High Maturity, Mr. Mike Campo, Raytheon Company
- 9378 - Using Corporate Finance Principles to Easily Determine Return on Investment (ROI), Ms. Deepti Sharma, OST
- 8909 - Consistency in Quality Assessments, Mrs. Debra Perry, Harris Corporation
- 8871 - MSI Execution: Change Happens, How to Deal with It, Ms. Jill Brooks, Raytheon Company
- 9177 - Lessons Learned Using Earned Value Management System to Track Effort and Schedule Weekly at the Individual and Team Level and Be Able to Detect a One-Day Schedule Slip, Mr. Girish Seshagiri, Advanced Information Services Inc.
- 9188 - CMMI Economics 203: Model Tailoring, Mr. Jeff Dutton, Jacob Technologies, Inc

TRACK 4 - CHASM CREEK - HIGH MATURITY

Session Chair: Mr. Dennis Goldenson, Software Engineering Institute & Mr. Fred Schenker, Software Engineering Institute

- 9217 - A Taxonomy of CMMI® High Maturity Performance Models, Dr. Richard Welch, Northrop Grumman Corporation

- 9245 - The Selection and Deployment of a Standard COTS Monte Carlo Software Tool, Mr. Fred Oleson, BAE Systems, Inc.
- 9232 - Piloting a Hybrid Requirements Engineering Process for Translating Qualitative Information into Quantitative Performance Measures, Mr. Dennis Goldenson, SE
- 9168 - How I Created Our Peer Review Baselines and Models, Ms. Diane Mizukami (Williams), Northrop Grumman Information Systems
- 9216 - ABCs of Process Performance Models, Dr. Richard Welch, Northrop Grumman Corporation
- 9294 - Using Hidden Markov Models as a Statistical Process Control Technique: An Example from a ML 5 Organization, Mr. Robert Moore, Business Transformation Institute, Inc.
- 9407 - Multi-Attribute Modeling and Practical Use, Mr. David Sobetski, General Dynamics Land Systems
- 9390 - Discrete Event Simulation for QPM – Can it really be that easy?, Ms. Deepti Sharma, OST

TRACK 5 -MESA VERDE - CMMI® GOVERNMENT & ACQUISITION

Session Chair: Ms. Lorraine Adams, Software Engineering Institute & Mr. Mike Phillips, Software Engineering Institute

- 0000 - Using CMMI® for Acquisition in Integration Organizations, Mr. Steve Kelley, Northrop Grumman Corporation
- 8741 - Leveraging CMMI® for Acquisition to Improve Organizational Workforce Performance, Dr. Kenneth Nidiffer, SEI
- 9301 - Improving Processes the NSA Way, Mr. Robert Moore, Business Transformation Institute, Inc
- 9114 - Implementing Requirements Management To Deliver Life Cycle Software Solutions That Ensure Warfighting Superiority and Information Dominance: How We Moved The Rock, Mr. Harlan Black, U.S. Army CECOM
- 8764 - Predicting Quality, Mr. Donald Beckett, Quantitative Software Mgt.
- 9326 - “Patience is a Virtue”- A Day in the Life of a SEPG Lead, Ms. Tammye Thornton, Department of Navy
- 9321 - Enterprise Architecting and the Incorporation of Early Systems Engineering Data Into the Leadership Decision Making Process During Concept Development, Mr. George Freeman, United States Air Force
- 9154 - Simplifying Lifecycle Definition Process, Mr. John Bethmann; Concurrent Technologies , Corp
- CMMI Economics 203: Model Tailoring, Mr. Jeffrey L. Dutton, NDIA Systems Engineering Division

TRACK 6 - WIND RIVER - APPRAISALS

Session Chair: Mr. Ken Nidiffer, Software Engineering Institute & Mr. Ken Weinberg, Raytheon Corporation

- 9371 - Appraisals and CMMI® Gotchas - Lessons in CMMI® Use and Appraisal Preparation, Mr. Neil Potter, The Process Group
- 9311 - Piloting Results-Based Appraisals, Mr. Larry McCarthy Global Software Group
- 9129 - Using the SCAMPI Method to lead CMMI® Multi-Constellations with Additional Standards Progress Check and Appraisal, Mr. Kobi Vidar, K.V.P. Consulting
- 9234 - A View from the Trenches: Practical Guidance for Appraisal Artifact Management, Mr. David Dickinson, Northrop Grummon Corporation
- 9287 - How to Prepare for a CMMI® SCAMPI A: Applying Agile Concepts to Save Time and Money, Ms. Michele Shaw. Fraunhofer Center, Maryland
- 9365 - Streamlining Processes and Appraisals, Mr. Gary Natwick, Harris Corporation
- 9189 - CMMI® Economics 202: Appraisals, Mr. Geoff Draper, Harris Corporation
- 9227 - The ABC’s of Class C, Class B, Class A’s: Metrics and Lessons Learned from Appraisal Event Scheduling, Mr. Bradley Bittorf, Raytheon Company

TRACK 7 - WIND STAR- CMMI® - SVCS, LEAN, SMSETTINGS, ETC.

Session Chair: Ms. Susan Bassham, U.S. Army Aviation & Missile Command

- 9396 - Applying the CMMI® for Services to the Process Group (Physician, Heal Thyself!), Dr. Rick Hefner, Northrop Grumman Corporation
- 9274 - An Overview of CMMI®-SVC for CMMI®-DEV Enthusiasts, Mr. Bill Smith, Leading Edge Process Consultants
- 9137 - ITIL V3.0 Compliance Benchmarking with CMMI-SVC SCAMPI A, Mr. Jeff Dutton, Jacobs Technology, Inc.
- 9397 - Strategies for Transitioning to CMMI-SVC, Dr. Rick Hefner, Northrop Grumman Corporation
- 9196 - Interpretation and Lesson Learned from High Maturity Implementation of CMMI-SVC, Mr. Kobi Picker, K.V.P. Consulting
- 9264 - Applying Lean Principles to the CMMI® for Services and ITIL, Mr. Tim Olson, Lean Solutions Institute, Inc.
- 9203 - How Rocket Scientist Implement High Maturity, Mr. Tom Lienhard, Raytheon Missile Systems

Thursday, November 19, 2009

NDIA Systems Engineering Division CMMI Working Group
CMMI v1.3 Planned Improvements

Concurrent Sessions

TRACK 1 - GRAND MESA D/E - CMMI® AND PROCESS IMPROVEMENT

Session Chair: Mr. Jack Ferguson, Software Engineering Institute

- 9313 - Mission Readiness Through Integrated Decision Making … BIM, BAM and POW!, Mr. James Watson, Facility Lifecycle Group Div. of MACTEC E & C
- 9165 - Make PIIDs Easy -- No Surprises!, Ms. Vicki Galanko, Lockheed Martin, IS&GS-Civil

TRACK 2 - GRAND MESA F- PRACTICAL GUIDANCE

Session Chair: Mr. Gene Miluk, Software Engineering Institute

- 9308- Post Merger Process Syndrome: Integrating & Refining Organizational , Processes, Mr. Michael Kutch, Space & Naval Warfare Systems Center - Atlantic

- 9141 - Tools and Implementation Strategies for Process Improvement via CMMI® for Comprehensive Software Lifecycle Management, Mrs. Denise Padilla, Sandia National Laboratories
- 9346 - Exploiting Decision to Requirements Traceability, Mr. John Fitch, SAIC
- Strategies for Process Definition and Deployment Part 2, Mr. Alfred Schenker, SEI

TRACK 3 - HIGHLANDS CMMI® ECONOMICS & BUSINESS VALUE

Session Chair: Mr. Geoff Draper, Harris Corporation & Mr. Bob Ferguson, Software Engineering Institute

- 9181 - Are You Doing R&D, or Catch-up & D? Are you Building Software, or Hopeware?, Mr. Rolf Reitzig, Cognence, Inc.
- 9283 - CMMI® Measurement and Metrics, Dr. Elliot Lynn, CECOM SEC
- 9324 - Measuring True Agility in Agile Software Development, Mr. Robert Moore, Business Transformation Institute, Inc.

TRACK 4 - CHASM CREEK- HIGH MATURITY

Session Chair: Mr. Dennis Goldenson, Software Engineering Institute & Mr. Fred Schenker, Software Engineering Institute

- 9143 - Using Moving Average Models to Predict Process Performance, Mr. Robert Tuthill, Northrop Grumman Corporation
- 9148 - Use of Monte Carlo Simulation for a Peer Review Process Performance Model, Ms. Emerald Russo, BAE Systems
- 9163 - Picking the Right Process Improvements, Mr. Joseph Vandeville, Northrop Grumman Corporation
- 9244 - Perspectives on Use and Organizational Impact of Measurement and Analytical Methods in CMMI® High Maturity Organizations, Dr. Dennis Goldenson, SEI

TRACK 5 - MESA VERDE - CMMI® GOVERNMENT & ACQUISITION

Session Chair: Ms. Lorraine Adams, Software Engineering Institute & Mr. Mike Phillips, Software Engineering Institute

- 9359 - Moving your Security, Business Continuity, and IT Activities to the Next Level with the CERT® Resiliency Management Model, Ms. Gibbie Lu Hart, SEI
- 9366 - Enjoy the Scenery on the Path to High Maturity Ms. Susan Bassham, U.S. Army Aviation and Missile Command
- 9211 - Transforming Your Way to Control Charts that Work, Mr. Richard Welch, Northrop Grumman Corporation
- 9292 - Systems Engineering Processes Improvement using the CMMI® in large System of Systems Space Programs, Ms. Revital Goldberg, Israel Aerospace Industries

TRACK 6 - WIND RIVER - APPRAISALS

Session Chair: Mr. Ken Nidiffer, Software Engineering Institute & Mr. Ken Weinberg, Raytheon Corporation

- 9373 - Lockheed Martin Aeronautics Appraisal Project Management Strategy, Ms. Pam Hudson, Lockheed Martin Aeronautics
- 9369 - Lockheed Martin Aero Standard Approach – A Strategy to Select Objective Evidence for the PIID, Mrs. Pam Hudson, Lockheed Martin Aeronautics
- 9187 - Level 5 the Hard Way – Persevering through Organizational Changes, Ms. Dorna Witkowski, Lockheed Martin Corporation
- 9383 - What? I Need to Create an Appraisal Database Containing Thousands of Artifacts! HELP!… Sensible PIID Strategies, Mr. Sam Fogle, ACE Guides, LLC

TRACK 7 - WIND STAR MULTI-MODELS

Session Chair: Ms. Susan Bassham, U.S. Army Aviation & Missile Command

- 9257 - The Next Step in Process Evolution: CMMI® and TSP/PSP, Mr. Jeffrey Schwalb, Naval Air Systems Command

  Panel - The Next Step In Process Evolution: CMMI and TSP/PSP
  1. Mr. Jeff Schwalb, NAVAIR
  2. Ms. Kathy Smith, EDS
  3. Mr. Girish Seshagiri, CEO, Advanced Information Services, Inc.
  4. Mr. Dave Webb, Hill AFB
- 9204 - Everything You Wanted to Know About CMMI® and Six Sigma but Did Not Know Who to Ask, Mr. Tom Lienhard, Raytheon Missile Systems
- How Rocket Scientist Implement High Maturity, Tom Lienhard, Raytheon Missile Systems
- 9266 - Rapidly Implementing Lean CMMI® Processes That Meet Business Needs, Mr. Tim Olson, Lean
- Solutions Institute, Inc.
- 9394 - Comparing Scrum and CMMI® How Can They Work Together Mr. Neil Potter, The Process Group

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CMMI® TECHNOLOGY CONFERENCE AND USER GROUP

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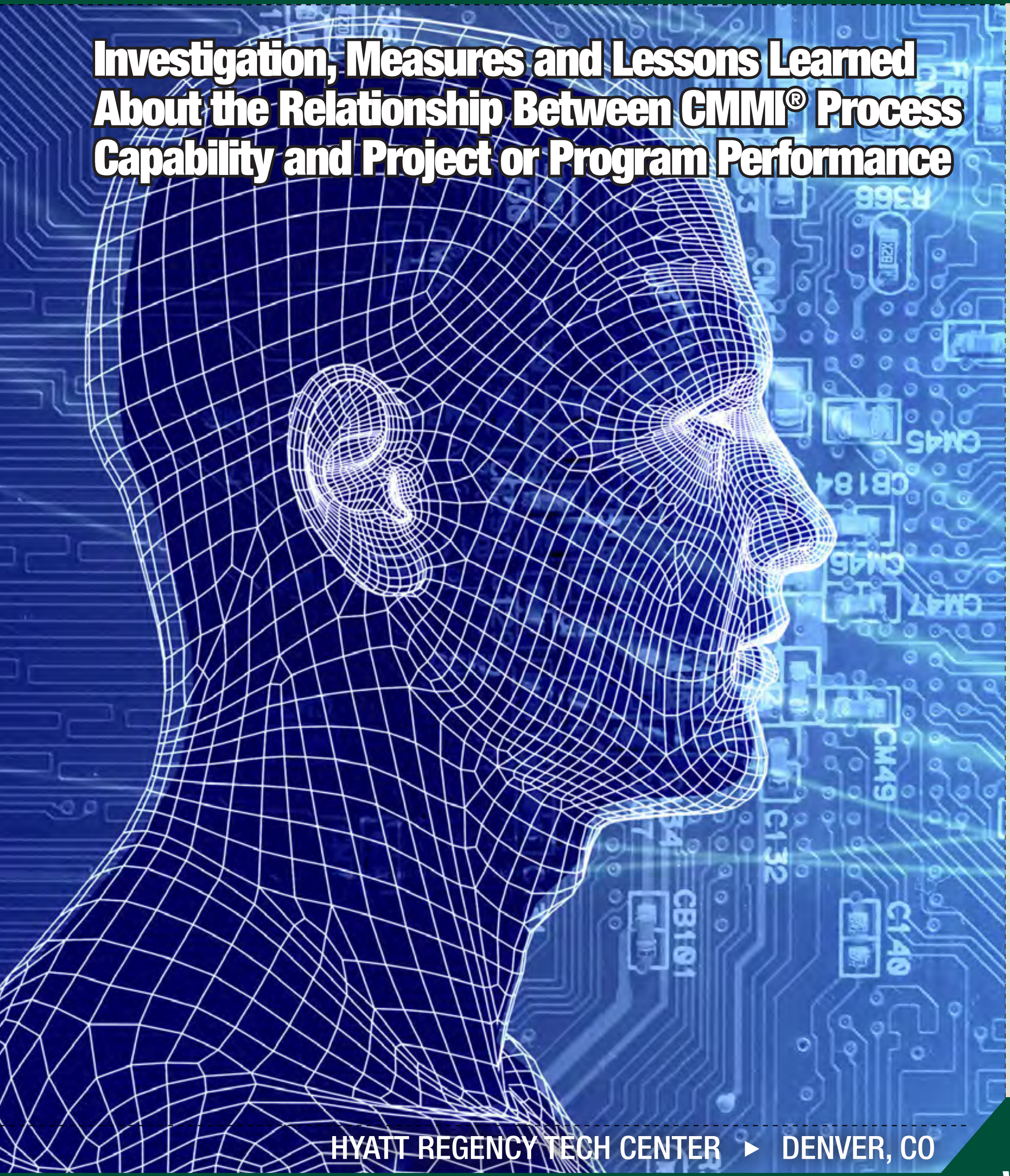


Investigation, Measures and Lessons Learned About the Relationship Between CMMI® Process Capability and Project or Program Performance

HYATT REGENCY TECH CENTER ▸ DENVER, CO

SPONSORED BY:
NATIONAL DEFENSE INDUSTRIAL ASSOCIATION SYSTEMS ENGINEERING DIVISION
IN CONJUNCTION WITH:

Software Engineering Institute
Carnegie Mellon University

This conference brings together the managers and professionals involved in Acquisition Management, Systems Engineering, Program Management, Software Development, Process Improvement, Six Sigma and related activities for the purpose of advancing the state-of-the-art in process improvement and achieving a higher state of process capability in engineering development in order to reduce cost, schedule and risk, and improve overall quality.

Who Should Attend?
Defense, aerospace and commercial companies, CMMI® Transition Partners, Department of Defense organizations, small companies specializing in software and systems engineering development, tools and processes, acquisition, or services, and other government agencies.

What will be presented?
A wide variety of presentations, including the new CMMI for Services, integrated process improvement, Lean/Agile and Six Sigma approaches, and evolving approaches and lessons learned involving SCAMPISM appraisal methods. The latest state of the CMMI V.3 release will be presented and questions answered.

NOVEMBER 16-19, 2009
WWW.NDIA.ORG/MEETINGS/0110

EVENT #0110

ANNOUNCEMENT

The National Defense Industrial Association, Systems Engineering Division, in conjunction with the Software Engineering Institute, Carnegie Mellon University, is pleased to announce the 9th Annual CMMI® (Capability Maturity Model Integration) Technology Conference & User Group. This premier conference will be held November 16-19, 2009, at the Hyatt Regency Tech Center in Denver, Colorado.

The purpose of the conference is to exchange ideas, concepts and lessons learned concerning the continuing evolution, adoption and use of the CMMI® and its associated appraisal (assessment and evaluation) methods. This conference brings together CMMI® adopters, users, developers and appraisers, as well as those with general interest in process improvement. It provides a forum for the free exchange of ideas and affords a unique opportunity to meet with the sponsors, developers and stewards of the CMMI®, as well as those offering CMMI® training and implementation assistance. Emphasis will be placed on CMMI® implementation methods and strategies, return on investment and program/project performance benefits.

PLAN TO STAY FOR THE THURSDAY AFTERNOON REVIEW OF CMMI V1.3!

CONTACTS

Ms. Kelly Seymour, Meeting Planner, kseymour@ndia.org, (703) 247-2583

Conference Chair: Mr. Bob Rassa, Director, Engineering Programs, Raytheon Space & Airborne Systems or Raytheon SAS, rcrassa@raytheon.com, (310) 985-4962

Technical Program Chairs: Mr. Jeffrey Dutton, Jacobs Technology ITSS, jeff.dutton@jacobs.com, and Mr. Rick Barbour, Software Engineering Institute, reb@sei.cmu.edu

CMMI® TECHNOLOGY CONFERENCE AND USER GROUP

HYATT REGENCY TECH CENTER ▶ DENVER, COLORADO

NOVEMBER 16-19, 2009

The CMMI® was developed in cooperation with the Department of Defense, Industry and the Software Engineering Institute, and has become the defacto standard for integrated process improvement across multiple disciplines within commercial, Department of Defense and government organizations. Although sponsored by the Department of Defense and NDIA, the CMMI® is used by commercial as well as government and industry organizations, and this conference will address all applications. The purpose of CMMI® is to provide for improvements in cost, schedule and overall performance of projects in engineering, acquisition, and services by eliminating "stovepipe" maturity models and allowing organizations to integrate their process improvement efforts. CMMI® has been shown to reduce costs, to implement internal process improvement, including appraisals (assessments & evaluations) and provide a common baseline and lexicon for process improvement.

CONFERENCE OBJECTIVE

This conference brings together the managers and professionals involved in Acquisition Management, Systems Engineering, Program Management, Software Development, Process Improvement, Six Sigma and related activities for the purpose of advancing the state-of-the-art in process improvement and achieving a higher state of process capability in engineering development in order to reduce cost, schedule and risk, and improve overall quality.

CONFERENCE ATTIRE

Appropriate dress for this conference is business for civilians (coat and tie) and class A uniform or uniform of the day for military.

CONFERENCE PROCEEDINGS

Proceedings will be available on the web through the Defense Technical Information Center (DTIC), and will be available one to two weeks after the conference. You will receive notification via e-mail once proceedings are posted and available on the web

SUNDAY, NOVEMBER 15, 2009

3:00 pm - 6:00 pm	**Registration Open** *Located in Grand Mesa Foyer, 2nd floor*

MONDAY, NOVEMBER 16, 2009

7:00 am - 6:00 pm	**Registration Open** *Located in Grand Mesa Foyer, 2nd floor*
7:00 am - 8:00 am	**Continental Breakfast (Tutorial Attendees Only)** *Located in Grand Mesa Foyer, 2nd floor*
8:00 am - 5:00 pm	**Tutorial Sessions (Tutorial Attendees Only)**
9:45 am - 10:15 am	**Break (Tutorial Attendees Only)** *Located in Atrium Display Area, 2nd floor*
12:00 pm - 1:00 pm	**Lunch (Tutorial Attendees Only)** *Located in Grand Mesa ABC*
2:45 pm - 3:15 pm	**Break (Tutorial Attendees Only)** *Located in Atrium Display Area, 2nd floor*
5:00 pm - 6:00 pm	**Reception (Open to ALL ATTENDEES)** *Located in Atrium Display Area, 2nd floor*

TUESDAY, NOVEMBER 17, 2009

7:00 am - 6:30 pm	**Registration Open** *Located in Grand Mesa Foyer, 2nd floor*
7:00 am - 8:15 am	**Continental Breakfast** *Located in Atrium Display Area, 2nd floor*
8:15 am - 8:30 am	**Welcome and Opening Remarks** *Located in Grand Mesa DEF, 2nd floor* ▸ Mr. Sam Campagna, *Director, Operations, NDIA* ▸ Mr. Bob Rassa, *Director, Engineering Programs, Raytheon Space & Airborne Systems or Raytheon SAS*
8:30 am - 9:10 am	**Keynote Address** *Located in Grand Mesa DEF, 2nd floor* ▸ Maj Gen Paul Nielsen, *USAF (Ret), Director, Software Engineering Institute*
9:10 am - 9:45 am	**CMMI® - State of the Model: The Issue of High Maturity** *Located in Grand Mesa DEF, 2nd floor* ▸ Mr. Clyde Chittister, *COO, Software Engineering Institute* ▸ Mr. Bob Rassa, *Director, Engineering Programs, Raytheon Space & Airborne Systems*
9:45 am - 10:15 am	**Break** *Located in Atrium Display Area, 2nd floor*
10:15 am - 12:00 pm	**Executive Panel** *Located in Grand Mesa DEF, 2nd floor* **Moderator:** Mr. Bob Rassa, *Director, Engineering Programs, Raytheon Company* ▸ Mr. Mike Twyman, *VP of the Integrated Command and Control Business Unit, Northrop Grumman Corp.* ▸ Mr. David J. Tyler, *Sr. Manager, IIS Enterprise Process Effectiveness, Raytheon Company* ▸ Mr. Wesley Covell, *President of Defense Programs, Harris Corp.* ▸ Ms. Lynn Penn, *Director of Process Management, Lockheed Martin Corporation* ▸ Mr. Girish Seshagiri, *CEO, Advanced Information Services, Inc.*
12:00 pm - 1:30 pm	**Lunch** *Located in Grand Mesa ABC* ▸ Mr. Hal Wilson, *Director, Engineering Defense Systems Division, Northrop Grumman Information Systems*

1:30 pm - 3:00 pm	**Concurrent Sessions**
3:00 pm - 3:30 pm	**Break** *Located in Atrium Display Area, 2nd floor*
3:30 pm - 5:00 pm	**Concurrent Sessions**
5:00 pm - 6:30 pm	**Reception** *Located in Atrium Display Area, 2nd floor*

WEDNESDAY, NOVEMBER 18, 2009

7:00 am - 4:30 pm	**Registration Open** *Located in Grand Mesa Foyer, 2nd floor*
7:00 am - 8:00 am	**Continental Breakfast** *Located in Atrium Display Area, 2nd floor*
8:00 am - 9:30 am	**Concurrent Sessions**
9:30 am - 10:00 am	**Break** *Located in Atrium Display Area, 2nd floor*
10:00 am - 11:30 am	**Concurrent Sessions**
11:30 am - 1:00 pm	**Awards Lunch** *Located in Grand Mesa ABC*
1:00 pm - 2:30 pm	**Concurrent Sessions**
2:30 pm - 3:00 pm	**Break** *Located in Atrium Display Area, 2nd floor*
3:00 pm - 4:30 pm	**Concurrent Sessions**
4:30 pm	**Conference adjourns for the day**

THURSDAY, NOVEMBER 19, 2009

7:00 am - 2:30 pm	**Registration Open** *Located in Grand Mesa Foyer, 2nd floor*
7:00 am - 8:00 am	**Continental Breakfast** *Located in Atrium Display Area, 2nd floor*
8:00 am - 9:30 am	**Concurrent Sessions**
9:30 am - 10:00 am	**Break** *Located in Atrium Display Area, 2nd floor*
10:00 am - 11:30 am	**Concurrent Sessions**
11:30 am - 1:00 pm	**Lunch** *Located in Grand Mesa ABC* ▸ CMMI® LIVE!
1:00 pm - 2:30 pm	**CMMI® V1.3 Focus Group Sessions** *Located in Grand Mesa F* Members of the CMMI® user community will be afforded a chance to influence the content of the next release, V1.3. By November, the major elements of V1.3 will have been identified. The Focus Group, led by the NDIA CMMI® Working Group, and supported by the SEI, will provide a summary of the major changes for V1.3. Conference attendees will then be invited to discuss and provide feedback on some of the key ingredients. Immediately after the Focus Group, this feedback will be briefed to CMMI® Steering Group members to help guide prudent change.
2:30 pm - 5:00 pm	**Display Dismantle**
2:30 pm	**Conference adjourns**

MONDAY, NOVEMBER 16, 2009

	Track 1 **Grand Mesa D/E**	**Track 2** **Grand Mesa F**	**Track 3** **Highlands**	**Track 4** **Chasm Creek**	**Track 5** **Mesa Verde**	**Track 6** **Wind River**	**Track 7** **Wind Star**
8:00 am - 9:45 am **Session A**	1A1 - Tutorial 9377 - CMMI®, ISO, Six Sigma and ANSI 748: Soulmates that Should to be Together – Quite Easily! *Ms. Nishi Narula, OST*	1A2 - Tutorial 9182 - An Agile View of the CMMI®? *Mr. Tim Kasse, Kasse Initiatives, LLC*	1A3 - Tutorial 9174 - How to build and Maintain a Software Center of Excellence Based on Seamless Integration of SEI Models of Excellence – CMMI®, TSP, PSP *Mr. Girish Seshagiri, Advanced Information Services Inc.*	1A4 - Tutorial 9128 - Building Statistical Support for Organizational Innovation and Deployment Without Impacting the Innovation 'Freedom' *Mr. Kobi Vider, K.V.P Consulting*	1A5 - Tutorial 9296 - Unintended Consequences of Measurement - Causes and Cures *Mr. Riley Rice, Booz Allen Hamilton*	1A6 - Tutorial 9105 - A Step-by-step Tutorial on Planning and Implementing a Credible CMMI Appraisal *Mr. Robert Moore, Business Transformation Institute, Inc.*	1A7 - Tutorial 9282 - Identify the Best Leading Indicators for Your Program *Mr. Robert Ferguson, SEI*
10:15 am - 12:00 pm **Session B**	1B1 - Tutorial 9377 - CMMI®, ISO, Six Sigma and ANSI 748: Soulmates that Should to be Together – Quite Easily! *Ms. Nishi Narula, OST*	1B2 - Tutorial 9182 - An Agile View of the CMMI®? *Mr. Tim Kasse, Kasse Initiatives, LLC*	1B3 - Tutorial 9174 - How to build and Maintain a Software Center of Excellence Based on Seamless Integration of SEI Models of Excellence – CMMI®, TSP, PSP *Mr. Girish Seshagiri, Advanced Information Services, Inc.*	1B4 - Tutorial 9128 - Building Statistical Support for Organizational Innovation and Deployment without impacting the innovation 'freedom' *Mr. Kobi Vider, K.V.P Consulting*	1B5 - Tutorial 9296 - Unintended Consequences of Measurement - Causes and Cures *Mr. Riley Rice, Booz Allen Hamilton*	1B6 - Tutorial 9105 - A Step-by-step Tutorial on Planning and Implementing a Credible CMMI® Appraisal *Mr. Robert Moore, Business Transformation Institute, Inc.*	1B7 - Tutorial 9282 - Identify the Best Leading Indicators for Your Program *Mr. Robert Ferguson, SEI*
1:00 pm - 2:45 pm **Session C**	1C1 - Tutorial 9376 - The CERT® Resiliency Management Model: Process Improvement for Enterprise Security, Business Continuity, and IT operations to Enable and Sustain Operational Resiliency *Mr. David White, SEI*	1D2 - Tutorial 9226 -Software Estimation Bootcamp *Mr. William Deibler, Software Systems Quality Consulting*	1C3 - Tutorial 9174 - How to build and Maintain a Software Center of Excellence Based on Seamless Integration of SEI Models of Excellence – CMMI®, TSP, PSP *Mr. Girish Seshagiri, Advanced Information Services, Inc.*	1C4 - Tutorial 9258 - How to Achieve Measurable ROI Using Early Defect Detection and Defect Prevention *Mr. Tim Olson, Lean Solutions Institute, Inc.*	1C5 - Tutorial 9254 - Multi-Model Enhancement of Project Management *Mr. Tim Kasse, Kasse Initiatives, LLC*	1C6 - Tutorial 9105 - A Step-by-step Tutorial on Planning and Implementing a Credible CMMI® Appraisal *Mr. Robert Moore, Business Transformation Institute, Inc.*	1C7 - Tutorial
3:15 pm - 5:00 pm **Session D**	1D1 - Tutorial 9376 - The CERT® Resiliency Management Model: Process Improvement for Enterprise Security, Business Continuity, and IT operations to Enable and Sustain Operational Resiliency *Mr. David White, SEI*	1D2 - Tutorial 9226 -Software Estimation Bootcamp *Mr. William Deibler, Software Systems Quality Consulting*	1D3 - Tutorial 9174 - How to build and Maintain a Software Center of Excellence Based on Seamless Integration of SEI Models of Excellence – CMMI®, TSP, PSP *Mr. Girish Seshagiri, Advanced Information Services, Inc.*	1D4 - Tutorial 9258 - How to Achieve Measurable ROI Using Early Defect Detection and Defect Prevention *Mr. Tim Olson, Lean Solutions Institute, Inc.*	1C5 - Tutorial 9254 - Multi-Model Enhancement of Project Management *Mr. Tim Kasse, Kasse Initiatives, LLC*	1D6 - Tutorial 9105 - A Step-by-step Tutorial on Planning and Implementing a Credible CMMI Appraisal *Mr. Robert Moore, Business Transformation Institute, Inc.*	1D7 - Tutorial

TUESDAY, NOVEMBER 17, 2009

	Track 1 Grand Mesa D/E	Track 2 Grand Mesa F	Track 3 Highlands	Track 4 Chasm Creek	Track 5 Mesa Verde	Track 6 Wind River	Track 7 Wind Star
	CMMI® and Process Improvement Session Chair: Mr. Jack Ferguson, Software Engineering Institute	Practical Guidance Session Chair: Mr. Gene Miluk, Software Engineering Institute	CMMI® Economics & Business Value Session Chair: Mr. Geoff Draper, Harris Corporation & Mr. Bob Ferguson, Software Engineering Institute	High Maturity Session Chair: Mr. Dennis Goldenson, Software Engineering Institute & Mr. Fred Schenker, Software Engineering Institute	CMMI® Government & Acquisition Session Chair: Ms. Lorraine Adams, Software Engineering Institute & Mr. Mike Phillips, Software Engineering Institute	Appraisals Session Chair: Mr. Ken Nidiffer, Software Engineering Institute & Mr. Ken Weinberg, Raytheon Corporation	CMMI V1.3 Topic & CMMI-SVCs, Lean Session Chair: Ms. Susan Bassham, U.S. Army Aviation & Missile Command
1:30 pm - 2:15 pm	9386 - CMMI® for Large-Scale/ Systems of Systems Engineering Projects *Mr. Patrick McCusker, Booz Allen Hamilton*	9179 - Work On Your Engineering Business, Not In It *Mr. Rolf Reitzig, Cognence, Inc.*	9147 - Dynamic Program Schedule, Cost and Returns Analysis *Mr. Philip Fahringer, Lockheed Martin Corporation*	9146 - Goal - Question - Model *Mr. Michael Campo, Raytheon Company*	8806 - Benefits to the Evolution of High Maturity Software Development: A 15 Year Case Study *Mr. Daniel Drew, United Space Alliance*	9398 - Hocus Pocus, What's With All The Issues About Non-Focus? *Mr. Paul Byrnes, Integrated Systems Diagnostics, Inc.*	CMMI V1.3 -- From the Past to the Future *Mr. Mike Phillips, Software Engineering Institute*
2:15 pm - 3:00 pm	Making the CMMI® Sing – A Framework for Performance Excellence Part 1 *(Part 2 is to be given on Tuesday - Track 1 at 3:30 - 4:15 p.m.)* *Mr. Jeff Dutton, Jacobs Technology, Inc.*	Process-Performance Based Reliability *Mr. William Winkel, Northrop Grumman Corporation*	9184 - The Economics of CMMI® *Mr. Mike Campo, Raytheon Company*	9389 - Making CMMI® Level 5 Statistical Principles Palatable to an Employee-Wide Demographic *Ms. Deepti Sharma, OST*	9306 - Directive Documents and ITAR Made Easy *Mr. Kenneth Weinberg, Raytheon*	9136 - Making the Most of GP3.2 *Ms. Susan Byrnes Natural SPI, Inc.*	9167 - Lessons Learned Piloting the CMMI® for Services *Ms. Diane Mizukami (Williams), Northrop Grumman Information Systems*
	CMMI® and Process Improvement Session Chair: Mr. Jack Ferguson, Software Engineering Institute	Practical Guidance Session Chair: Mr. Gene Miluk, Software Engineering Institute	CMMI® Economics & Business Value Session Chair: Mr. Geoff Draper, Harris Corporation & Mr. Bob Ferguson, Software Engineering Institute	High Maturity Session Chair: Mr. Dennis Goldenson, Software Engineering Institute & Mr. Fred Schenker, Software Engineering Institute	CMMI® Government & Acquisition Session Chair: Ms. Lorraine Adams, Software Engineering Institute & Mr. Mike Phillips, Software Engineering Institute	Appraisals Session Chair: Mr. Ken Nidiffer, Software Engineering Institute & Mr. Ken Weinberg, Raytheon Corporation	CMMI®-SVCs, Lean, SmSettings, etc. Session Chair: Ms. Susan Bassham, U.S. Army Aviation & Missile Command
3:30 pm - 4:15 pm	Making the CMMI® Sing – A Framework for Performance Excellence Part 2 (*Part 1 was given on Tuesday - Track 1 at 2:15 - 3:30 p.m.*) *Mr. Jeff Dutton, Jacobs Technology, Inc.*	9391 - Choices to be Made in CMMI® Adoption *Dr. Rick Hefner, Northrop Grumman Corporation*	9185 - CMMI® Economics 101: CMMI® for Executives *Mr. Geoff Draper, Harris Corporation*	9116 - Changing Behavior: The Key to Adoption Complex Process Technology *Dr. Gene Miluk, SEI*	8907 - How CMMI® was Used for Process Improvement in the Support of Government-Wide Acquisition Contract (GWAC) Vehicles *Mrs. Sharon Cobb Flanagan, SAIC*	9130 - Supporting the High Maturity Process Improvement and Understanding the Application SCAMPISM Method To It *Mr. Kobi Vidar, K.V.P. Consulting*	9126 - CMMI® for Services: An Approach to Improve Your Program Management Office *Ms. Patricia Mitryk, Cognence, Inc.*
4:15 pm - 5:00 pm	9312 - CMMI® in a Small Company: The Cobbler's Children Can Have Shoes (And Best Practices) *Mr. MIchael Knox, TECHSOFT, Inc.*	9298 - Assurance for CMMI®: A Toolbox for Multiple Cyber Challenges *Mrs. Michele Moss, Booz Allen Hamilton*		9401 - Achieving Quality QPPO via Effective Usage of PPBs and PPMs *Dr. Bin Cong, CRS Tech*	9403 - Tailoring CMMI® for an Enterprise Resource Planning COTS Software Environment Ms. *Alison L. Schwier, U.S. Army*	9385 - Reducing the Cost and Increasing the Value of CMMI Re-Appraisals *Mrs. Beth Layman, Layman & Layman*	9299 - Creatively Applying CMMI®-SVC in a Very Small Consulting Firm *Mr. Bill Smith, Leading Edge Process Consultants*

WEDNESDAY, NOVEMBER 18, 2009

	Track 1 Grand Mesa D/E	Track 2 Grand Mesa F	Track 3 Highlands	Track 4 Chasm Creek	Track 5 Mesa Verde	Track 6 Wind River	Track 7 Wind Star
	CMMI® and Process Improvement Session Chair: Mr. Jack Ferguson, Software Engineering Institute	Practical Guidance Session Chair: Mr. Gene Miluk, Software Engineering Institute	CMMI® Economics & Business Value Session Chair: Mr. Geoff Draper, Harris Corporation & Mr. Bob Ferguson, Software Engineering Institute	High Maturity Session Chair: Mr. Dennis Goldenson, Software Engineering Institute & Mr. Fred Schenker, Software Engineering Institute	CMMI® Government & Acquisition Session Chair: Ms. Lorraine Adams, Software Engineering Institute & Mr. Mike Phillips, Software Engineering Institute	Appraisals Session Chair: Mr. Ken Nidiffer, Software Engineering Institute & Mr. Ken Weinberg, Raytheon Corporation	CMMI® - SVCs, Lean, SmSettings, etc. Session Chair: Ms. Susan Bassham, U.S. Army Aviation & Missile Command
8:00 am - 8:45 am	9304 - Sustainment and Continued Institutionalization of Best Practices and CMMI® at SPAWAR *Mr. Michael Kutch, Space & Naval Warfare Systems Center - Atlantic*	9138 - High Velocity Performance Improvement *Mr. Jeff Dutton Jacobs Technology, Inc.*	9213 - QPMing Your SEPG *Mr. Craig Hale, Esterline Control Systems - AVISTA*	9217 - A Taxonomy of CMMI® High Maturity Performance Models *Dr. Richard Welch, Northrop Grumman Corporation*	0000 - Using CMMI® for Acquisition in Integration Organizations *Mr. Steve Kelley, Northrop Grumman Corporation*	9371 - Appraisals and CMMI® Gotchas - Lessons in CMMI® Use and Appraisal Preparation *Mr. Neil Potter, The Process Group*	9396 - Applying the CMMI® for Services to the Process Group (Physician, Heal Thyself!) *Dr. Rick Hefner, Northrop Grumman Corporation*
8:45 am - 9:30 am	9178 - CMMI® Process Improvement: Its not a technical Problem, It's a People Problem! *Mr. Rolf Reitzig, Cognence, Inc.*	9202 - Statistical Tune-Up of the Peer Review Process *Mr. Tom Lienhard, Raytheon Missile Systems*	9223 - We're Already There: Matching Existing High Maturity Behaviors to the CMMI® Model *Mr. Bradley Bittorf Raytheon Company*	9245 - The Selection and Deployment of a Standard COTS Monte Carlo Software Tool *Mr. Fred Oleson, BAE Systems, Inc.*	8741 - Leveraging CMMI® for Acquisition to Improve Organizational Workforce Performance *Dr. Kenneth Nidiffer, SEI*	9311 - Piloting Results-Based Appraisals *Mr. Larry McCarthy Global Software Group*	9274 - An Overview of CMMI®-SVC for CMMI®-DEV Enthusiasts *Mr. Bill Smith, Leading Edge Process Consultants*
	CMMI® and Process Improvement Session Chair: Mr. Jack Ferguson, Software Engineering Institute	Practical Guidance Session Chair: Mr. Gene Miluk, Software Engineering Institute	CMMI® Economics & Business Value Session Chair: Mr. Geoff Draper, Harris Corporation & Mr. Bob Ferguson, Software Engineering Institute	High Maturity Session Chair: Mr. Dennis Goldenson, Software Engineering Institute & Mr. Fred Schenker, Software Engineering Institute	CMMI® Government & Acquisition Session Chair: Ms. Lorraine Adams, Software Engineering Institute & Mr. Mike Phillips, Software Engineering Institute	Appraisals Session Chair: Mr. Ken Nidiffer, Software Engineering Institute & Mr. Ken Weinberg, Raytheon Corporation	CMMI® - SVCs, Lean, SmSettings, etc. Session Chair: Ms. Susan Bassham, U.S. Army Aviation & Missile Command
10:00 am - 10:45 am	9106 - The Uses of the Peer Review beyond CMMI® *Mr. Paul Nugent, General Dynamics Corportation*	9275 - CMMI® in the Social Media (For the Social Media-Challenged!) *Mr. Bill Smith, Leading Edge Process Consultants*	9190 - CMMI® Economics 501: High Maturity *Mr. Mike Campo, Raytheon Company*	9232 - Piloting a Hybrid Requirements Engineering Process for Translating Qualitativem Information into Quantitative Performance Measures *Mr. Dennis Goldenson, SEI*	9301 - Improving Processes the NSA Way *Mr. Robert Moore, Business Transformation Institute, Inc.*	9129 - Using the SCAMPI Method to lead CMMI® Multi-Constellations with Additional Standards Progress Check and Appraisal *Mr. Kobi Vidar, K.V.P. Consulting*	9137 - ITIL V3.0 Compliance Benchmarking with CMMI-SVC SCAMPI A *Mr. Jeff Dutton, Jacobs Technology, Inc.*
10:45 am - 11:30 am	9246 - Integrating Corporate Goals and Processes Using the Engineering Lifecycle Vee Model Dr. Kevin Forsberg, The Center for Systems Management	9214 - Hi, my name is Root Cause Analysis. Have we met? *Mr. Craig Hale, Esterline Control Systems - AVISTA*	9378 - Using Corporate Finance Principles to Easily Determine Return on Investment (ROI) *Ms. Deepti Sharma, OST*	9168 - How I Created Our Peer Review Baselines and Models *Ms. Diane Mizukami (Williams), Northrop Grumman Information Systems*	9114 - Implementing Requirements Management To Deliver Life Cycle Software Solutions That Ensure Warfighting Superiority and Information Dominance: How We Moved The Rock *Mr. Harlan Black, U.S. Army CECOM*	9234 - A View from the Trenches: Practical Guidance for Appraisal Artifact Management *Mr. David Dickinson, Northrop Grummon Corporation*	9397 - Strategies for Transitioning to CMMI-SVC Dr. Rick Hefner, Northrop Grumman Corporation

	Track 1 **Grand Mesa D/E**	**Track 2** **Grand Mesa F**	**Track 3** **Highlands**	**Track 4** **Chasm Creek**	**Track 5** **Mesa Verde**	**Track 6** **Wind River**	**Track 7** **Wind Star**
	CMMI® and Process Improvement Session Chair: Mr. Jack Ferguson, Software Engineering Institute	Practical Guidance Session Chair: Mr. Gene Miluk, Software Engineering Institute	CMMI® Economics & Business Value Session Chair: Mr. Geoff Draper, Harris Corporation & Mr. Bob Ferguson, Software Engineering Institute	High Maturity Session Chair: Mr. Dennis Goldenson, Software Engineering Institute & Mr. Fred Schenker, Software Engineering Institute	CMMI® Government & Acquisition Session Chair: Ms. Lorraine Adams, Software Engineering Institute & Mr. Mike Phillips, Software Engineering Institute	Appraisals Session Chair: Mr. Ken Nidiffer, Software Engineering Institute & Mr. Ken Weinberg, Raytheon Corporation	CMMI® - SVCs, Lean, SmSettings, etc. Session Chair: Ms. Susan Bassham, U.S. Army Aviation & Missile Command
1:00 pm - 1:45 pm	9379 - NAVAIR's Process Asset Library (PAL), A Step Toward A Corporate Organizational Set of Standard Processes (OSSP) *Ms. Judy Overhauser-Duett, NAVAIR*	8787 - Improving Process Institutionalization Through Process Training *Ms. Ellen Chilikas, Raytheon Company*	8909 - Consistency in Quality Assessments *Mrs. Debra Perry, Harris Corporation*	9216 - ABCs of Process Performance Models *Dr. Richard Welch, Northrop Grumman Corporation*	8764 - Predicting Quality *Mr. Donald Beckett, Quantitative Software Mgt.*	9287 - How to Prepare for a CMMI® SCAMPI A: Applying Agile Concepts to Save Time and Money *Ms. Michele Shaw. Fraunhofer Center, Maryland*	9196 - Interpretation and Lesson Learned from High Maturity Implementation of CMMI-SVC *Mr. Kobi Picker, K.V.P. Consulting*
1:45 pm - 2:30 pm	9153 - After 13 years, I have learned… Tools do not solve your problems *Mr. John Bethmann, Concurrent Technologies Corporation*	9291 - "You Say Tomato, I Say Eggplant: Comparing Process References for Systems Engineers and Project Managers in a CMMI®- Compliant Organization" *Mr. Peter Henry, BAE Systems*	8871 - MSI Execution: Change Happens, How to Deal with It *Ms. Jill Brooks, Raytheon Company*	9294 - Using Hidden Markov Models as a Statistical Process Control Technique: An Example from a ML 5 Organization *Mr. Robert Moore, Business Transformation Institute, Inc.*	9326 - "Patience is a Virtue"- A Day in the Life of a SEPG Lead *Ms. Tammye Thornton, Department of Navy*	9365 - Streamlining Processes and Appraisals *Mr. Gary Natwick, Harris Corporation*	9264 - Applying Lean Principles to the CMMI® for Services and ITIL *Mr. Tim Olson, Lean Solutions Institute, Inc.*
	CMMI® and Process Improvement Session Chair: Mr. Richard Barbour, Software Engineering Institute	Practical Guidance Session Chair: Mr. Gene Miluk, Software Engineering Institute	CMMI® Economics & Business Value Session Chair: Mr. Geoff Draper, Harris Corporation & Mr. Bob Ferguson, Software Engineering Institute	High Maturity Session Chair: Mr. Dennis Goldenson, Software Engineering Institute & Mr. Fred Schenker, Software Engineering Institute	CMMI® Government & Acquisition Session Chair: Ms. Lorraine Adams, Software Engineering Institute & Mr. Mike Phillips, Software Engineering Institute	Appraisals Session Chair: Mr. Ken Nidiffer, Software Engineering Institute & Mr. Ken Weinberg, Raytheon Corporation	Multi-Models Session Chair: Ms. Susan Bassham, U.S. Army Aviation & Missile Command
3:00 pm - 3:45 pm	9387 - 10.5 Process Improvement Mistakes from Top Executives? *Mr. Carlos Caram, CSD BRASIL*	9354 - Strategies for Process Definition and Deployment Part 1 *(Part 1 is to be given on Wednesday - Track 2 at 3:45 - 4:30 p.m.)* *Mr. Fred Schenker, SEI*	9177 - Lessons Learned Using Earned Value Management System to Track Effort and Schedule Weekly at the Individual and Team Level and Be Able to Detect a One-Day Schedule Slip *Mr. Girish Seshagiri, Advanced Information Services Inc.*	9407 - Multi-Attribute Modeling and Practical Use *Mr. David Sobetski, General Dynamics Land Systems*	9321 - Enterprise Architecting and the Incorporation of Early Systems Engineering Data Into the Leadership Decision Making Process During Concept Development *Mr. George Freeman, United States Air Force*	9189 - CMMI® Economics 202: Appraisals *Mr. Geoff Draper, Harris Corporation*	9203 - How Rocket Scientist Implement High Maturity *Mr. Tom Lienhard, Raytheon Missile Systems*
3:45 pm - 4:30 pm	9144 - Transitioning From a CMMI® Implementer to an Appraiser *Mr. Warren Scheinin, Northrop Grumman Corporation*	Strategies for Process Definition and Deployment Part 2 *(Part 1 was given on Wednesday - Track 2 at 3:00 - 3:45 p.m.)* *Mr. Fred Schenker, SEI*	9188 - CMMI Economics 203: Model Tailoring *Mr. Jeff Dutton, Jacob Technologies, Inc.*	9390 - Discrete Event Simulation for QPM – Can it really be that easy? *Ms. Deepti Sharma, OST*	9154 - Simplifying Lifecycle Definition Process *Mr. John Bethmann; Concurrent Technologies , Corp*	9227 - The ABC's of Class C, Class B, Class A's: Metrics and Lessons Learned from Appraisal Event Scheduling *Mr. Bradley Bittorf, Raytheon Company*	

THURSDAY, NOVEMBER 19, 2009

	Track 1	**Track 2**	**Track 3**	**Track 4**	**Track 5**	**Track 6**	**Track 7**
	Grand Mesa D/E	**Grand Mesa F**	**Highlands**	**Chasm Creek**	**Mesa Verde**	**Wind River**	**Wind Star**
	CMMI® and Process Improvement Session Chair: Mr. Jack Ferguson, Software Engineering Institute	Practical Guidance Session Chair: Mr. Gene Miluk, Software Engineering Institute	CMMI® Economics & Business Value Session Chair: Mr. Geoff Draper, Harris Corporation & Mr. Bob Ferguson, Software Engineering Institute	High Maturity Session Chair: Mr. Dennis Goldenson, Software Engineering Institute & Mr. Fred Schenker, Software Engineering Institute	CMMI® Government & Acquisition Session Chair: Ms. Lorraine Adams, Software Engineering Institute & Mr. Mike Phillips, Software Engineering Institute	Appraisals Session Chair: Mr. Ken Nidiffer, Software Engineering Institute & Mr. Ken Weinberg, Raytheon Corporation	Multi-Models Session Chair: Ms. Susan Bassham, U.S. Army Aviation & Missile Command
8:00 am - 8:45 am	9313 - Mission Readiness Through Integrated Decision Making … BIM, BAM and POW! *Mr. James Watson, Facility Lifecycle Group Div. of MACTEC E & C*	9308- Post Merger Process Syndrome: Integreating & Refining Organizational Processes *Mr. Michael Kutch, Space & Naval Warfare Systems Center - Atlantic*	9181 - Are You Doing R&D, or Catch-up & D? Are you Building Software, or Hopeware? *Mr. Rolf Reitzig, Cognence, Inc.*	9143 - Using Moving Average Models to Predict Process Performance *Mr. Robert Tuthill, Northrop Grumman Corporation*	9359 - Moving your Security, Business Continuity, and IT Activities to the Next Level with the CERT® Resiliency Management Model *Ms. Gibbie Lu Hart, SEI*	9373 - Lockheed Martin Aeronautics Appraisal Project Management Strategy *Ms. Pam Hudson, Lockheed Martin Aeronautics*	9257 - The Next Step in Process Evolution: CMMI® and TSP/PSP *Mr. Jeffrey Schwalb, Naval Air Systems Command*
8:45 am - 9:30 am	9165 - Make PIIDs Easy -- No Surprises! *Ms. Vicki Galanko, Lockheed Martin, IS&GS-Civil*	9141 - Tools and Implementation Strategies for Process Improvement via CMMI® for Comprehensive Software Lifecycle Management *Mrs. Denise Padilla, Sandia National Laboratories*	9283 - CMMI® Measurement and Metrics *Dr. Elliot Lynn, CECOM SEC*	9148 - Use of Monte Carlo Simulation for a Peer Review Process Performance Model *Ms. Emerald Russo, BAE Systems*	9366 - Enjoy the Scenery on the Path to High Maturity *Ms. Susan Bassham, U.S. Army Aviation and Missile Command*	9369 - Lockheed Martin Aero Standard Approach – A Strategy to Select Objective Evidence for the PIID *Mrs. Pam Hudson, Lockheed Martin Aeronautics*	9204 - Everything You Wanted to Know About CMMI® and Six Sigma but Did Not Know Who to Ask *Mr. Tom Lienhard, Raytheon Missile Systems*
9:30 AM - 10:00 AM BREAK IN ATRIUM DISPLAY AREA							
10:00 am - 10:45 am		9346 - Exploiting Decision to Requirements Traceability *Mr. John Fitch, SAIC*	9324 - Measuring True Agility in Agile Software Development *Mr. Robert Moore, Business Transformation Institute, Inc.*	9163 - Picking the Right Process Improvements *Mr. Joseph Vandeville, Northrop Grumman Corporation*	9211 - Transforming Your Way to Control Charts that Work *Mr. Richard Welch, Northrop Grumman Corporation*	9187 - Level 5 the Hard Way – Persevering through Organizational Changes *Ms. Dorna Witkowski, Lockheed Martin Corporation*	9266 - Rapidly Implementing Lean CMMI® Processes That Meet Business Needs *Mr. Tim Olson, Lean Solutions Institute, Inc.*
10:45 am - 11:30 am		Strategies for Process Definition and Deployment Part 2 *(Part 1 was given on Wednesday - Track 7 at 3:45 - 4:30 p.m.)* *Mr. Alfred Schenker, SEI*		9244 - Perspectives on Use and Organizational Impact of Measurement and Analytical Methods in CMMI® High Maturity Organizations *Dr. Dennis Goldenson, SEI*	9292 - Systems Engineering Processes Improvement using the CMMI® in large System of Systems Space Programs *Ms. Revital Goldberg, Israel Aerospace Industries*	9383 - What? I Need to Create an Appraisal Database Containing Thousands of Artifacts! HELP!… Sensible PIID Strategies *Mr. Sam Fogle, ACE Guides, LLC*	9394 - Comparing Scrum and CMMI® - How Can They Work Together *Mr. Neil Potter, The Process Group*

ADDITIONAL AUTHORS

ABSTRACT	ABSTRACT TITLE	AUTHOR
0000	Using CMMI® for Acquisition in Integration Organizations	Mr. Brian Gallagher
8806	Benefits to the Evolution of High Maturity Software Development: A 15 Year Case Study	Mr. Erik Likeness
8811	CMMI® Risk Management Practices in Small - Medium Businesses	Ms. Sandra Salars
8871	MSI Execution: Change Happens, How to Deal with It	Mr. Sanjeev Venkatesan
9114	Implementing Requirements Management To Deliver Life Cycle Software Solutions That Ensure Warfighting Superiority and Information Dominance: How We Moved The Rock	Mr. Harlan Black
9116	Changing Behavior: The Key to Adoption of Complex Process Technology	Mr. James McHale, Dr. William Nichols
9128	Building Statistical Support for Organizational Innovation and Deployment Without Impacting the Innovation 'Freedom'	PhD Mike Konrad
9129	Using the SCAMPI Method to lead CMMI® Multi-Constellations with Additional Standards Progress Check and Appraisal	Mr. Rusty Young
9130	Supporting the High Maturity Process Improvement and Understanding the Application of SCAMPISM Method to it	Mr. Rusty Young
9131	Using the SEI Models and Practices to Assure the Contractor 'Qualifications' with Cross Constellations and Multi-Models for Evaluation	PhD Mike Phillips
9140	Continuous Process Improvement Using Lean Six Sigma and CMMI®	Mr. Michael D. Barnett
9143	Using Moving Average Models to Predict Process Performance	Mr. Robert M. Tuthill, Mr. Steve Tennant
9146	Goal - Question - Model	Dr. Neal Mackertich
9163	Picking the Right Process Improvements	Mr. Robert Tuthill, Mr. Robert Sabatino
9165	Make PIIDs Easy -- No Surprises!	Mr. Stephen Austin, Ms. Elaine Heligman, Mr. Mark Dowson, Ms. Perla Unpingco
9185	CMMI® Economics 101: CMMI® for Executives	Mr. Wendell Mullison
9186	CMMI® Economics 201: Practical CMMI® Implementation Strategies	Mr. Wendell Mullison
9187	Level 5 the Hard Way – Persevering Through Organizational Changes	Ms. Lynn Penn
9194	Life Cycle Configuration Management	Mr. Russ Roseman
9196	Interpretation and Lesson Learned from High Maturity Implementation of CMMI®-SVC	Ms. Eileen Forrester
9211	Transforming Your Way to Control Charts that Work	Mr. Robert Sabatino
9216	ABCs of Process Performance Models	Mr. Joseph V. Vandeville
9224	Appraisal Data Preparation and Management - A Data-Centric and Tool-Based View of the Appraisal Process	Mr. Robert C. Bamford
9226	Software Estimation Bootcamp	Mr. Robert C. Bamford
9227	The ABC's of Class C, Class B, Class A's: Metrics and Lessons Learned from Appraisal Event Scheduling	Miss Courtney Walsh
9228	Appraisal Data Preparation and Management - Process, Automated Tools and Technology to Get Ready for a SCAMPI	Mr. Robert C. Bamford
9231	Integrating Value-Added Audits for Process Improvement – A Pragmatic Approach for Implementing Product And Process Quality Assurance (PPQA)	Mr. Robert C. Bamford
9232	Piloting a Hybrid Requirements Engineering Process for Translating Qualitative Information intoQuantitative Performance Measures	Mr. Ira A. Monarch

ADDITIONAL AUTHORS CONT'D...

9234	A View from the Trenches: Practical Guidance for Appraisal Artifact Management	Mr. Robert Sabatino, Mr. Joseph Vandeville
9235	Software Measurement Bootcamp - Toward Quantitative Management of Engineering Processes	Mr. Robert C. Bamford
9238	Integrated Project Management (IPM) – The CMMI® and Collaborative Product Development	Mr. Robert C. Bamford
9242	Requirements Engineering: A Practical Approach to Modeling and Managing Requirements	Mr. Robert C. Bamford
9244	Perspectives on Use and Organizational Impact of Measurement and Analytical Methods in CMMI® High Maturity Organizations	Mr. James McCurley, Mr. Robert W. Stoddard
9246	Integrating Corporate Goals and Processes using the Engineering Lifecycle Vee Model	Mr. Al Truesdale, Mr. Robert Pomietto
9249	Agile Systems Engineering and Software Engineering	Dr. Suzette S. Johnson
9257	The Next Step in Process Evolution: CMMI® and TSP/PSP	Ms. Kathy Smith, Mr. Girish Seshagiri, Mr. David Webb, Dr. Gene Miluk
9266	Presentation: "Rapidly Implementing Lean CMMI® Processes That Meet Business Needs"	Mr. Tim Olson
9267	Process Mapping - Applying Visual Roadmaps and the Unified Modeling Language (UML) to Build Consensus	Mr. Robert Bamford
9268	Streamlining Documentation - An Agile Approach to Writing Procedures	Mr. Robert Bamford
9278	A View from the Trenches: Practical Guidance for Appraisal Artifact Management	Mr. Robert Sabatino, Mr. Joseph Vandeville
9283	CMMI® Measurement and Metrics	Dr. Elliott S. Lynn
9285	Process Improvement via CMMI®	Dr. Elliott S. Lynn
9287	How to prepare for a CMMI® SCAMPI A: Applying Agile Concepts to Save Time and Money	Ms. Kathleen Mullen
9291	You Say Tomato, I Say Eggplant: Comparing Process References for Systems Engineers and Project Managers in a CMMI®-Compliant Organization	Mr. Glen T. Welsh
9292	Systems Engineering Processes Improvement Using the CMMI® in Large System of Systems Space Programs	Ms. Revital Goldberg
9294	Using Hidden Markov Models as a Statistical Process Control Technique: An Example from a ML 5 Organization	Mr. Ray Luke, Mr. Tony Fields
9298	Assurance for CMMI®: A Toolbox for Multiple Cyber Challenges	Mrs. Debbie McCoy
9301	Improving Processes the NSA Way	Ms. Sue Lafortune
9304	Sustainment and Continued Institutionalization Of Best Practices and CMMI®® at SPAWAR	Mr. Michael J. Knox
9308	Post Merger Process Syndrome: Integrating & Re-Defining Organizational Processes	Mr. Michael J. Knox
9309	Maritime Surveillance Systems: An Acquisition Program Office's Approach to Continuous Process Improvement	Mr. Joseph W. Darwood
9312	CMMI® in a Small Company: The Cobbler's Children Can Have Shoes (And Best Practices)	Mrs. Cara Smith
9321	Enterprise Architecting and the Incorporation of Early Systems Engineering Data Into the Leadership Decision Making Process During Concept Development	Mr. William J. Urschel
9354	Strategies for Process Definition and Deployment	Ms. Kursten Szabos
9358	Performance Driven Collaboration Strategies for Complex System Development	Mr. Byran Moser, Dr. Ralph Wood, Dr. Willy Magill

ADDITIONAL AUTHORS CONT'D...

9359	Moving your Security, Business Continuity, and IT Activities to the Next Level with the CERT® Resiliency Management Model	Mr. Richard Barbour, Ms. Julia H. Allen, Mr. Richard Caralli, Ms. Lisa Young
9370	Making Process Improvement Work – Tying Improvement and CMMI® Directly to What You Care About	Mr. Neil Potter
9371	Appraisals and CMMI® Gotchas - Lessons in CMMI® Use and Appraisal Preparation	Mr. Neil Potter
9376	The CERT® Resiliency Management Model: Process Improvement for Enterprise Security, Business Continuity, and IT Operations to Enable and Sustain Operational Resiliency	Ms. Gibbie Lu Hart, Mr. Richard Barbour, Mr. Richard Caralli, Ms. Julia A. Allen
9377	CMMI®, ISO, Six Sigma and ANSI 748: Soulmates That Should to be Together – Quite Easily!	Ms. Deepti Sharma
9378	Using Corporate Finance Principles to Easily Determine Return on Investment (ROI)	Ms. Nishi Narula
9385	Reducing the Costs and Increasing the Value of CMMI® Re-Appraisals	Ms. Janiene Pape, Ms. Robin Hurst
9388	Software Estimations Made Transparent and Simple! Even an Intern Can Do It	Ms. Nishi Narula
9389	Making CMMI® Level 5 Statistical Principles Palatable to an Employee-Wide Demographic	Ms. Nishi Narula
9390	Discrete event simulation for QPM – Can it Really be that Easy?	Ms. Nishi Narula
9394	Comparing Scrum and CMMI® - How Can They Work Together	Mr. Neil Potter
9403	Tailoring of CMMI® for an Enterprise Resource Planning COTS Software Environment	Ms. Alison Schwier, Mr. Lawrence Osiecki
9405	CMMI® on the Web	Mr. Deen Blash
9407	Multi-Attribute Modeling and Practical Use	Mrs. Margaret Corr
9377	CMMI®, ISO, Six Sigma and ANSI 748: Soulmates That Should to be Together – Quite Easily!	Ms. Carolina Rivero, Kinkini Sarkar

CONFERENCE PROMOTIONAL PARTNER

LEAN SOLUTIONS INSTITUTE, Inc.
LEAN SOLUTIONS™ FOR YOUR ORGANIZATION

Lean Solutions Institute, Inc. (LSI) specializes in helping organizations to rapidly achieve measurable results by using benchmarking and Lean Solutions™ (e.g., best practices to implement CMMI® in a lean way) to successfully improve client products and services. LSI helps organizations to measurably:

- Achieve ROI (e.g., 7:1)
- Increase productivity, performance and quality
- Reduce cycle time/schedule
- Reduce defects (e.g., post-release defects), rework and costs of poor quality
- Achieve world-class results (e.g., 70-90% defect removal efficiency or defects removed before test)

Systems engineering and software engineering have become more and more complex over the years. With this growing complexity, processes and procedures have become larger and more complex. Based on surveys, most organizations do not like their processes and procedures (e.g., including CMMI® Maturity Level 3-5 organizations) and they can have some of the following lean problems:

- Too large and complex (i.e., not lean or agile)
- Have non-value added activities
- Lack of visualization (e.g., pictures, diagrams, tables, charts, etc.)
- Difficult to use (e.g., poor usability)
- Lack of "chunking" which is a best practice for usability (7 plus or minus 2 principle)
- Lack of innovation
- Lack of "good metrics", not the right metrics, or not lean metrics

LSI has a patent pending approach for defining systems engineering and software engineering processes (e.g., CMMI® compliant processes) in a lean (e.g., short, usable, visual) way. Although this approach can be simple, it also scales up to handle complex processes (e.g., NASA processes). LSI uses "good diagrams" (i.e., process models) for putting the 5 W's (who, what, where, when, why) on one page. These visual one-page diagrams along with a page of support text typically replace about 25-30 pages of text. For example, lean CMMI® processes typically:

- Cost 33%-50% of a typical CMMI® implementation
- Take half the time to implement (e.g., 1 year instead of 2 years)
- Are 20-25% of the size of a typical CMMI® implementation

In several CMMI® success stories (independently verified) using the LSI approach, organizations estimate that processes are about 20-25% of the size of sister business units with a similar CMMI® rated processes, and have achieved CMMI® maturity levels in half the time (or less).

LSI can help your organization achieve measurable results, reduce size and complexity, and improve processes and metrics to become much more lean, "value added", visual, and usable. LSI also uses an ISO/Baldrige approach to implementing CMMI®. LSI only does improvement and uses independent Authorized SEI Lead Appraisers to objectively verify LSI Lean Solutions™ for CMMI®.

Lean Solutions Institute, Inc. (LSI)
(760) 804-1405
www.LSI-INC.com
Info@LSI-INC.com

CMMI® is a registered trademark of the U.S. Patent and Trademark Office by Carnegie Mellon University.

NDIA would like to thank our 2009 Promotional Partner!!

LEAN SOLUTIONS INSTITUTE, Inc.

LEAN SOLUTIONS™ FOR YOUR ORGANIZATION

The Benefits of CMMI®

November 17, 2009
CMMI ® Technology Conference

Wes Covell

President, Defense Programs

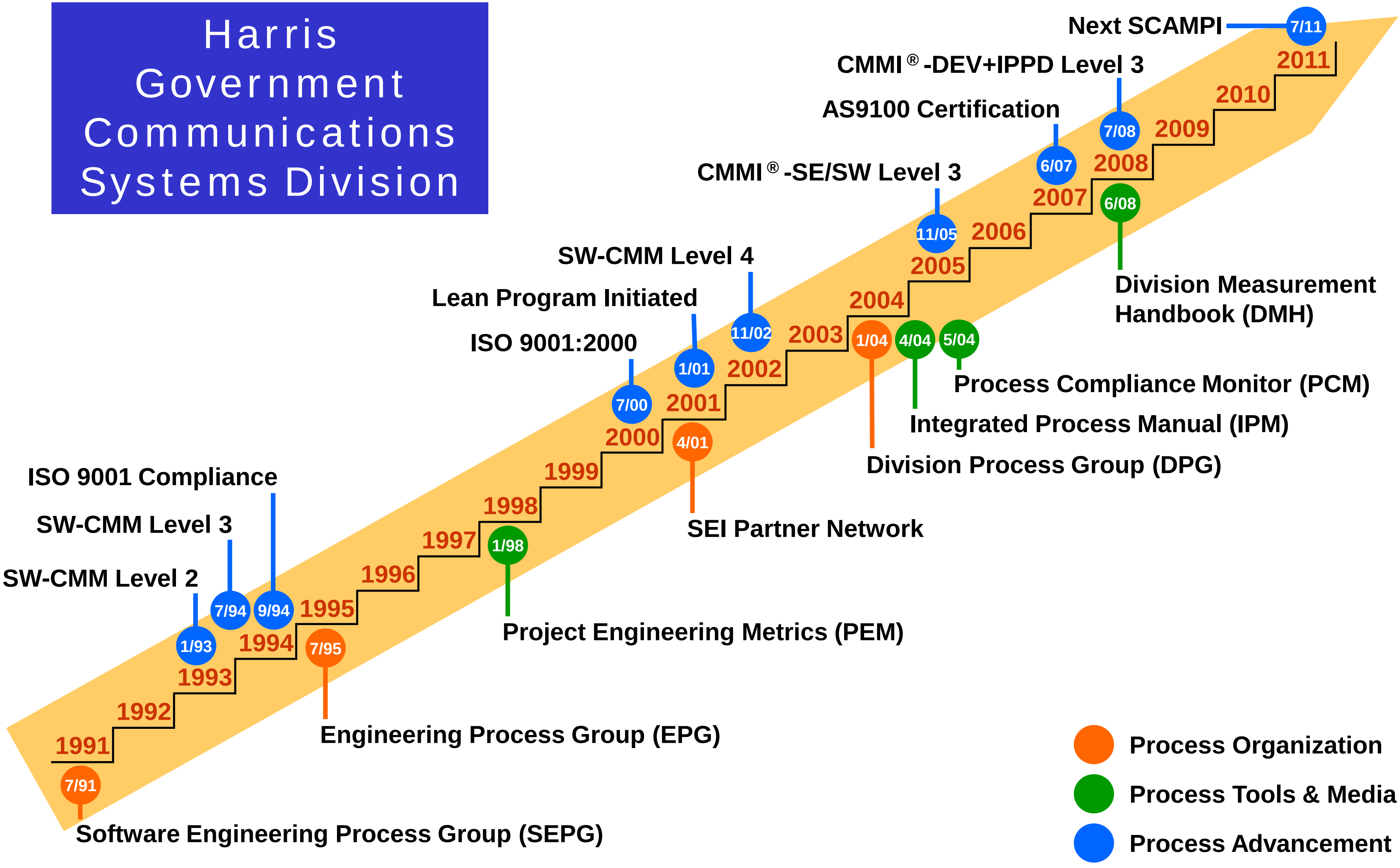
Harris Government Communications Systems Division

HARRIS
Assured Communications™
Anytime. Anywhere.

Process Improvement Timeline

HARRIS

Harris
Government
Communications
Systems Division



7/91 Software Engineering Process Group (SEPG)

1/93 SW-CMM Level 2

7/94 SW-CMM Level 3

9/94 ISO 9001 Compliance

7/95 Engineering Process Group (EPG)

1/98 Project Engineering Metrics (PEM)

7/00 ISO 9001:2000

1/01 Lean Program Initiated

4/01 SEI Partner Network

11/02 SW-CMM Level 4

1/04 Division Process Group (DPG)

4/04 Integrated Process Manual (IPM)

5/04 Process Compliance Monitor (PCM)

11/05 CMMI ® -SE/SW Level 3

6/07 AS9100 Certification

7/08 CMMI ® -DEV+IPPD Level 3

6/08 Division Measurement Handbook (DMH)

7/11 Next SCAMPI

● Process Organization

● Process Tools & Media

● Process Advancement

CMMI® Benefits - Industry

- **Proven framework for program planning and execution**
  - Provides infrastructure for best practices
  - Helps evaluate and set direction for process improvement
- **Performance-focused**
  - Measurable impacts on business effectiveness
  - Cost, schedule, quality, predictability
- **Levels the playing field**
  - Brings integrity and discipline to competition and program execution
- **Common language for communicating across company boundaries**
  - Facilitates teaming, process integration, and benchmarking

CMMI® Benefits - Harris

- **Integration of cross-functional business processes**
  - Alignment and flow-down of objectives
  - All functions engaged, with annual improvement plans regularly monitored
  - Improved communication paths and stakeholder involvement
- **Identification of process gaps and institutionalization needs**
  - Plan the plan; validation vs. verification; peer reviews; defect analysis
- **Self-governance**
  - Accountability for process compliance, risks, organizational performance
  - Greater management visibility and oversight of program execution
- **Continuous process improvement**
  - Productivity, quality, predictability
  - Leading indicators of performance issues (fewer surprises)

Addressing Program Performance

Program Start-Up Support

PEOPLE

- Customer Intimacy
- Integrated Program Teams
- Skills Assessment / Training
- Integrated Talent Management
- Mentoring

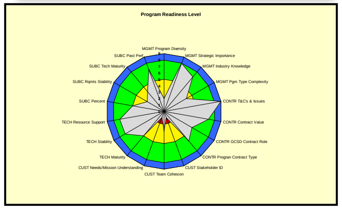
Cross-Functional Process Integration


GCSD INTEGRATED
PROCESS MANUAL

S-002-001

Media Accessibility

Program Readiness Level


Program Readiness Level

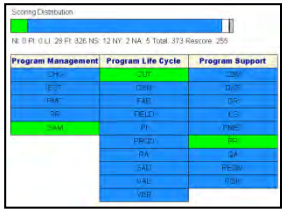
PROCESS

- CMMI, Lean Six Sigma
- Command Media
- Risk Management
- Reviews
- Validation

TECHNOLOGY

- Centers of Excellence
- Standard Tools
- Technology Readiness
- Program Readiness
- IR&D

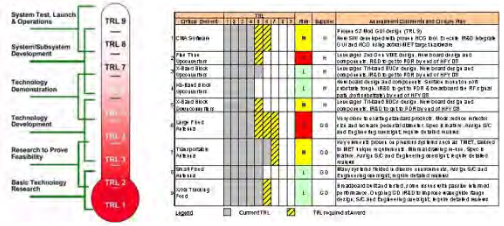
Process Compliance Monitor


Scoring Distribution

NI: 0 PI: 0 LI: 28 FI: 326 NS: 12 NY: 2 NA: 5 Total: 373 Rescore: 255

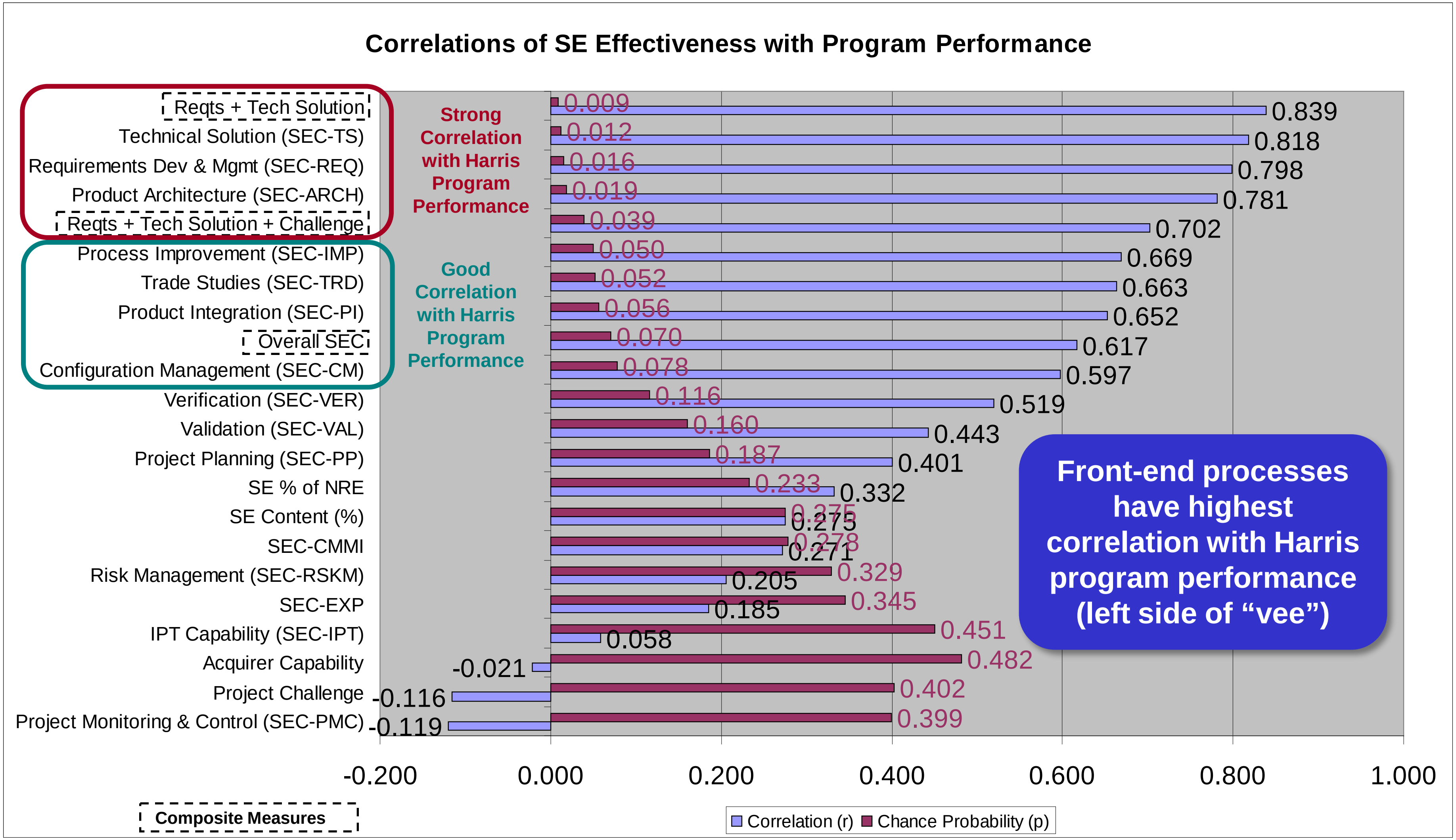
Program Management	Program Life Cycle	Program Support
CHG	CUT	CDM
EST	DEN	DAS
PMT	FAB	DR
RR	FIELD	ILS
SAM	PI	PME
	PROD	PR
	RA	QA
	SAD	REQM
	VAL	RISK
	VER	

Technology Readiness Level



Process & Program Performance

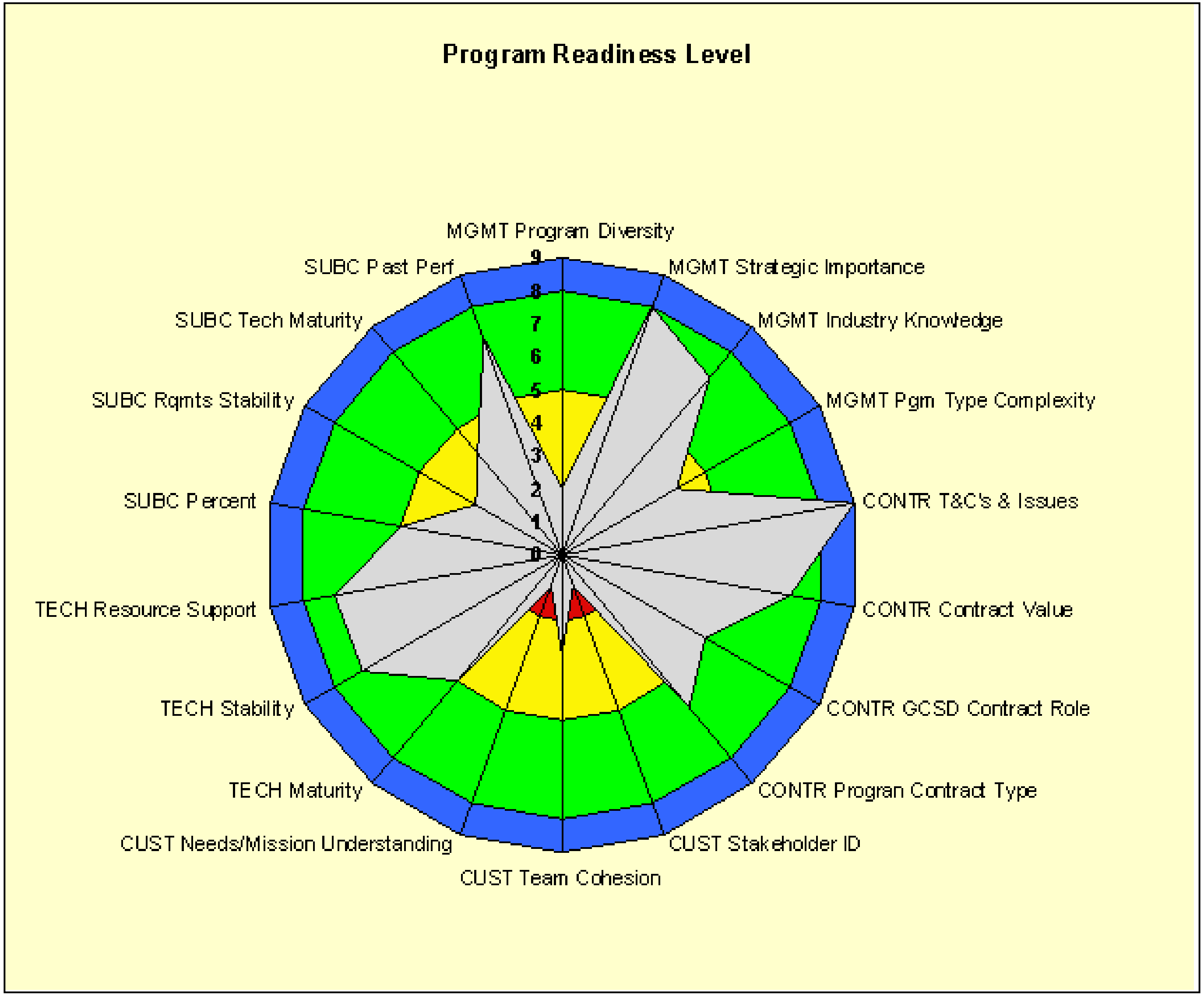
NDIA SE Effectiveness Study (Harris Projects)



Front-end processes have highest correlation with Harris program performance (left side of “vee”)

Reference: A Survey of Systems Engineering Effectiveness, Initial Results. Software Engineering Institute, CMU/SEI-2008-SR-034. http://www.sei.cmu.edu/library/abstracts/reports/08sr034.cfm

Program Readiness Assessment



Summary

- **It's a journey – not there yet**
  - Committed to continuous improvement
  - Executive involvement has grown
- **Too heavy for broad application across full range of program types**
  - $2M to billions
  - 3-month quick reacts, Agile development, large scale HW/SW development
- **Striving to find proper balance of process, tools, metrics**
  - Enough to be compliant and efficient and ensure successful program execution
  - Cost-effective appraisals and compliance oversight

CMMI & process focus are a necessary but not wholly sufficient condition for successful program execution

HARRIS

NORTHROP GRUMMAN

Value of CMMI High Maturity to Industry

CMMI Technology & User Conference
November 17, 2009

Mike Twyman
Vice President, Integrated C3I Systems
Defense Systems Division
Northrop Grumman Information Systems Sector

Five Operating Sectors

Aerospace Systems

- Large Scale Systems Integration
- C^{4}ISR
- Unmanned Systems
- Airborne Ground Surveillance / C2
- Naval BMC2
- Global / Theater Strike Systems
- Electronic Combat Operations
- ISR Satellite Systems
- Missile Defense Satellite Systems
- MILSATCOM Systems
- Environmental & Space Science Satellite Systems
- Directed Energy Systems
- Strategic Space Systems

Electronic Systems

- Radar Systems
- C^{4}ISR
- Electronic Warfare
- Naval & Marine Systems
- Navigation & Guidance
- Military Space
- Government Systems

Information Systems

- Command & Control Systems
- Network Communications
- Intelligence, Surveillance & Reconnaissance Systems
- Enterprise Systems and Security
- IT/Network Outsourcing
- Intelligence
- Federal, State/Local & Commercial
- Homeland Security & Health

Shipbuilding

- Naval Systems Integrator
- Surface Combatants
- Expeditionary Warfare Ships
- Auxiliary Ships
- Marine Composite Technology
- Coast Guard Cutters
- Commercial Ships
- Nuclear Aircraft Carriers
- Nuclear Submarines
- Fleet Maintenance
- Aircraft Carrier Overhaul & Refueling

Technical Services

- Systems Support
- Base and Infrastructure Support
- Range Operations
- Maintenance Support
- Training and Simulations
- Technical and Operational Support
- Live, Virtual and Constructive Domains
- Life Cycle Optimization
- Performance Based Logistics
- Modifications, Repair and Overhaul (MRO)
- Supply Chain Management
- Lead Support Integrator (LSI)

Long Legacy of High Maturity

- Northrop Grumman has a long history of embracing High Maturity
  - 1986 First CMM appraisal
  - 1996 Achieved first High Maturity assessment CMM for Software
  - 2002 Early adopter of CMMI High Maturity in 2 appraisals
- Northrop Grumman currently has 12 CMMI High Maturity Appraisals (26% of all US company CMMI Maturity Level 5 appraisals)
  - The Information Systems Sector currently has 9 of 12 Northrop Grumman High Maturity Appraisals (19.6% of US companies at CMMI Level 5)
  - The Defense Systems Division currently holds 5 of them that cover 27 development sites (11% of US appraised organizations at CMMI Level 5)
  - Another DSD High Maturity appraisal is underway as we speak.
- There is a reason
  - Our Division General Manager has managed High Maturity organizations since 1996
  - We firmly believe that we're better at what we do because of our commitment to high maturity processes

High Maturity has been a part of our development life for over a decade

CMMI Benefits – Often Expressed as ROI

2005 ①

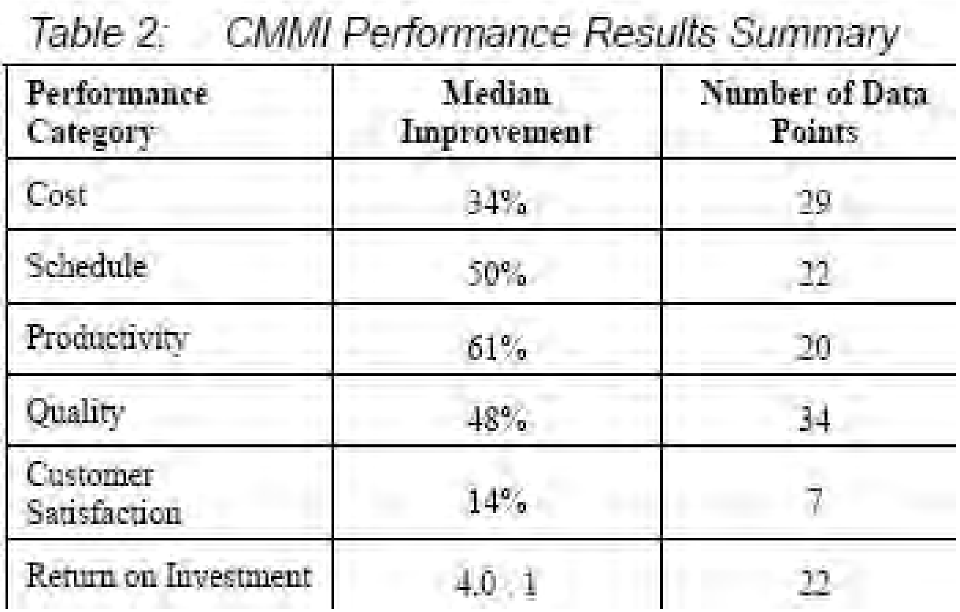


Table 2: CMMI Performance Results Summary

Performance Category	Median Improvement	Number of Data Points
Cost	34%	29
Schedule	50%	22
Productivity	61%	20
Quality	48%	34
Customer Satisfaction	14%	7
Return on Investment	4.0 : 1	22

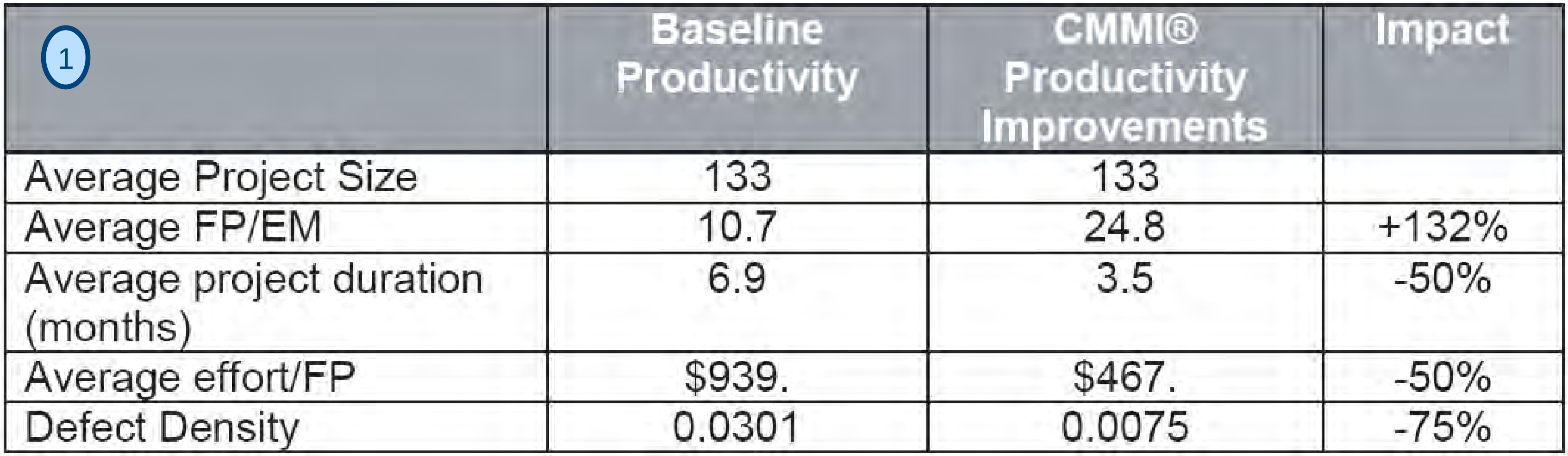
2007 ②

Performance Category	Median	Number of Data Points
Cost	20%	21
Schedule	37%	19
Productivity	62%	17
Quality	50%	20
Customer Satisfaction	14%	6
Return on Investment	4.7 : 1	16

①
Performance Results of CMMI-Based Process Improvement,
D. Gibson, D. Goldenson, K. Kost, Aug. 2006
SEI Technical Report

②
Performance Results From Process Improvement,
SEI and DACS, March 2007, Software Tech News

Benefits – Often Increased Productivity



①	Baseline Productivity	CMMI® Productivity Improvements	Impact
Average Project Size	133	133	
Average FP/EM	10.7	24.8	+132%
Average project duration (months)	6.9	3.5	-50%
Average effort/FP	$939.	$467.	-50%
Defect Density	0.0301	0.0075	-75%

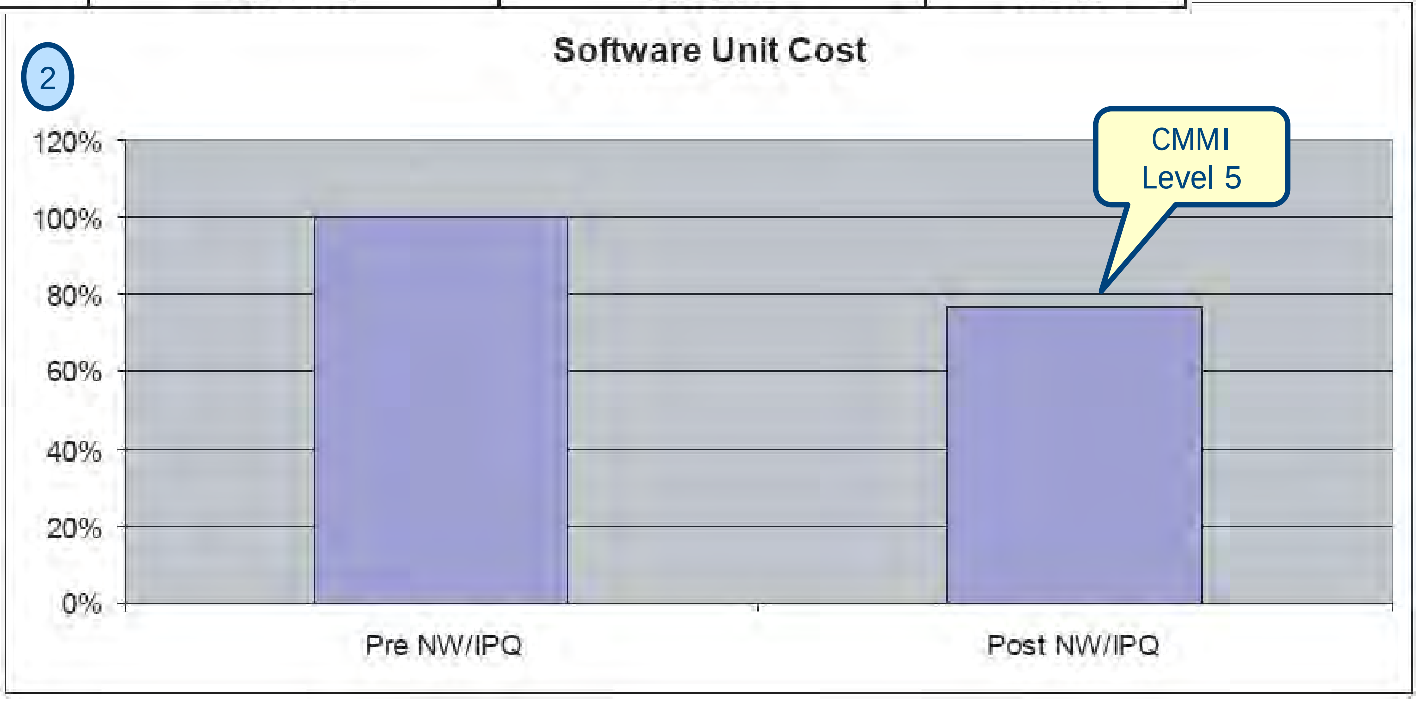
①

Performance Outcomes of CMMI Based Processess,
P. McNoone & S. Rohde,
Lockheed Martin

②

Improved Performance Should be Expected from Process Improvement,
D. Garmus & S. Iwaniki,
David Consulting Group

②



Everybody Does Defect Analysis ...BUT..

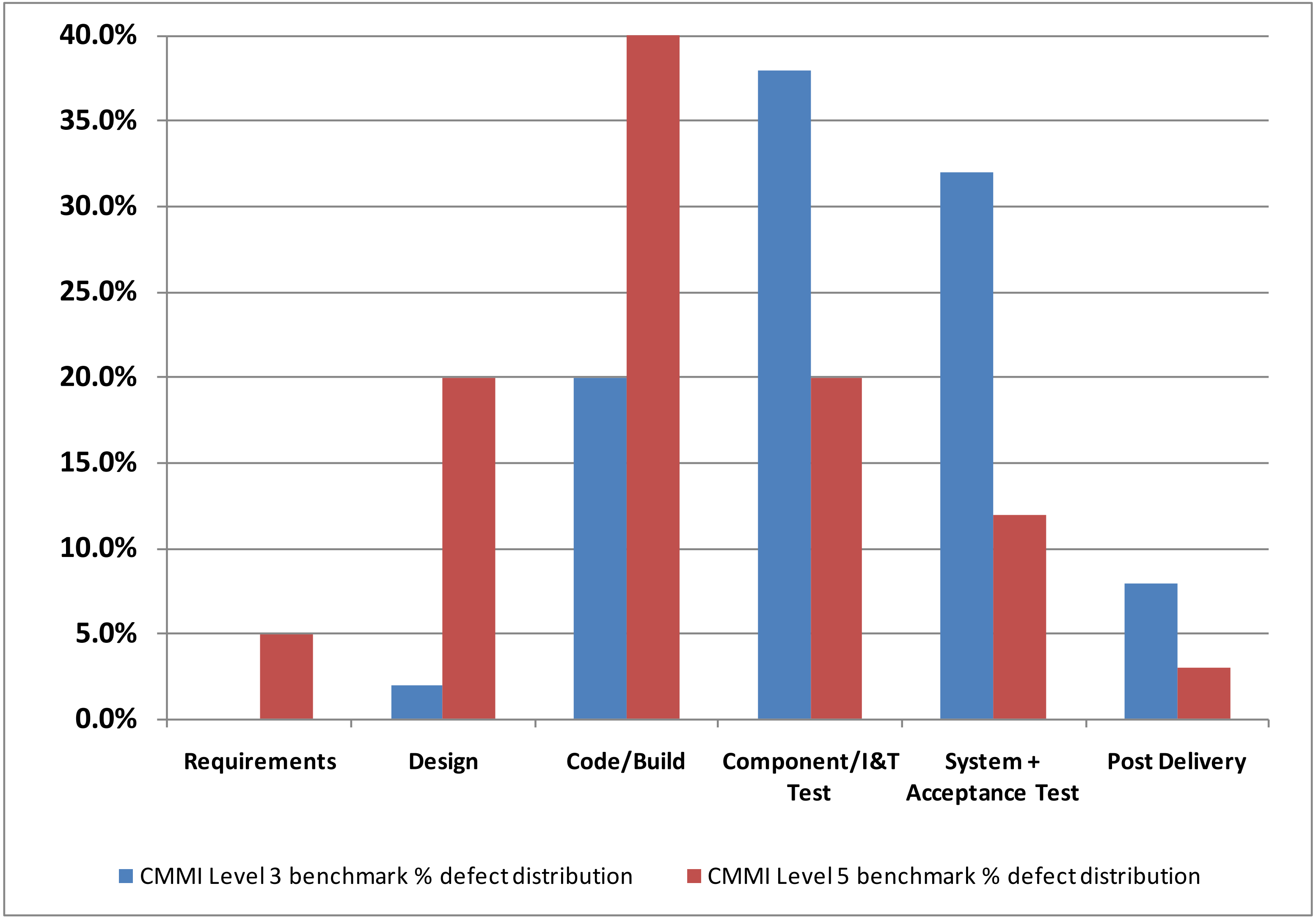
- The cost of correcting defects does vary
- "Cost to correct" depends upon when you find and fix

Phase	Hours to Fix ①
Requirements through Code / Build	6
Component / I&T Testing	37
System & Acceptance Testing	74
Post Delivery	123

- Level 3 organizations find defects later in the cycle
- Level 5 organizations find defects earlier

① Source of Data:
Madachy, Ray. "Quantitative Process Management and Software Quality Management", Department of Computer Science, University of Southern California, February 2000

Distribution – When Defects Found

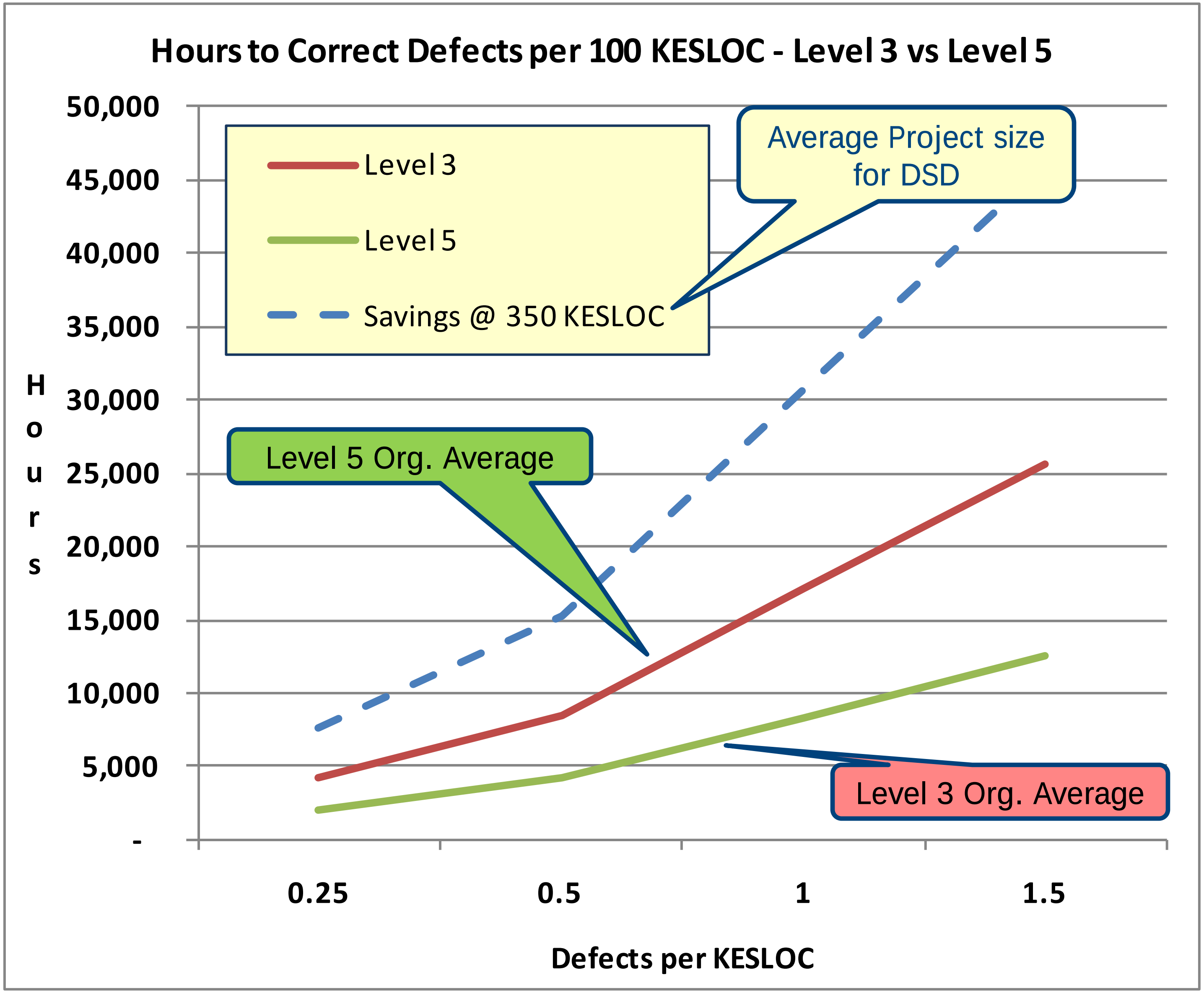


Real Value of CMMI High Maturity

Cost of 100 Defects Found & Fixed						
Phase	Level 3 Org		Level 5 Org		Value of HiMAT	
	%	Fix Hrs	%	Fix Hrs	Delta Hrs	% Savings
Reqs thru Code Build (6 hrs)	22%	132	65%	390	(258)	(5%)
Component / I&T (37 hrs)	38%	1406	20%	740	666	14%
System & Acceptance Test (74 hrs)	32%	2368	12%	888	1480	30%
Post Delivery (123 hrs)	8%	984	3%	369	615	13%
Total		4890		2387	2503	51%

50 % Savings and Fewer Defects Delivered to Your Customers - Priceless

Value Received Varies by Defect Rate



High Maturity Benefits

Benefit	Result
• Improved Productivity	Reduced Development Cost
	Shorter Development Schedule
• Fewer Delivered Defects	Better Acceptance Test Results
	Better User Satisfaction
• Lower Cost of Defect Correction	Reduced Development Cost
	Fewer Development Delays

NORTHROP GRUMMAN

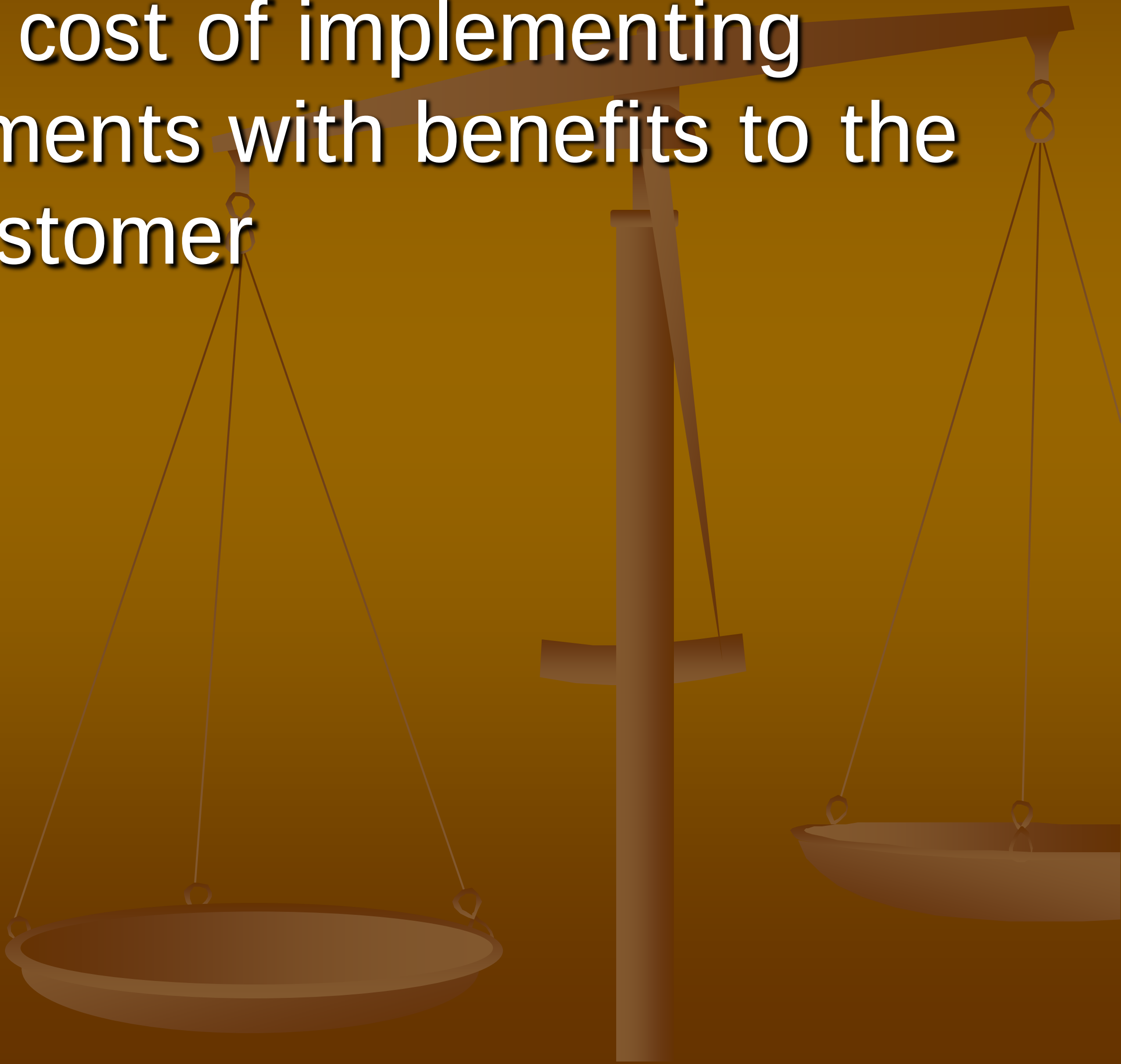
The Measured Value of CMMI

M. Lynn Penn
Director Process Management
Lockheed Martin Corporation
Information Systems & Global Services

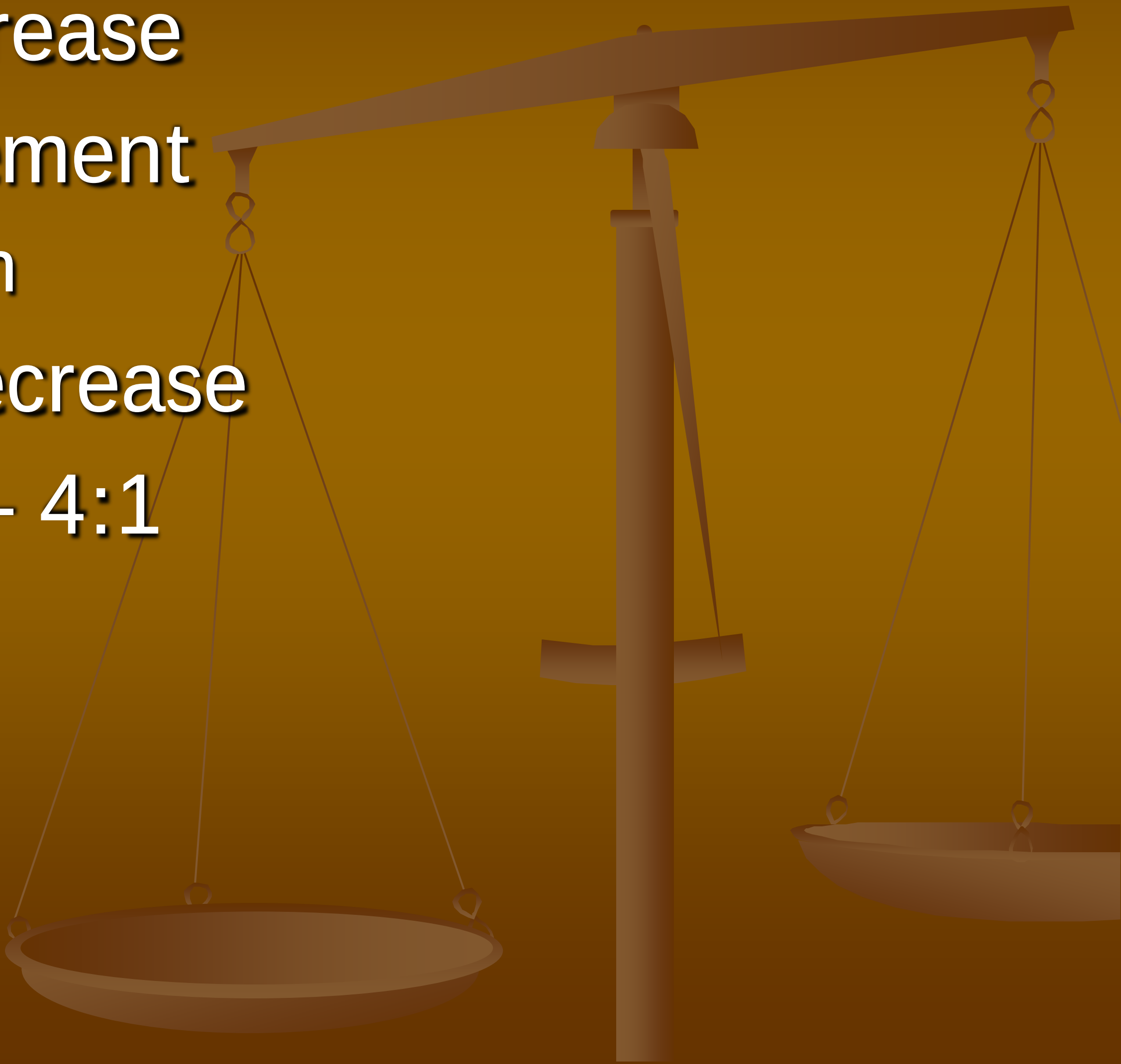
NDIA – November 2009

Challenge

- To **BALANCE** the cost of implementing process requirements with benefits to the business and customer



Traditional Advertised Benefits

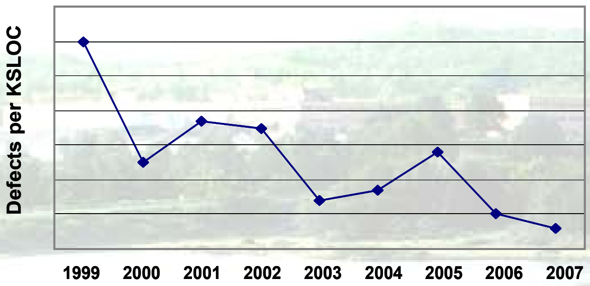


- Productivity Increase
- Quality Improvement
  - Defect detection
- Replanning – decrease
- ROI – average – 4:1

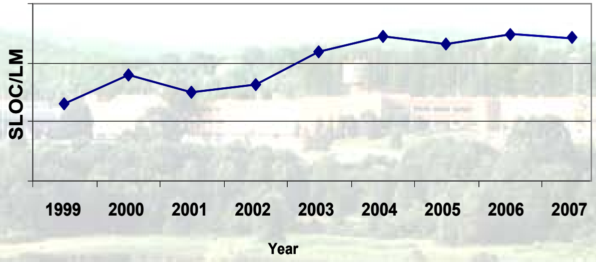
SI - Owego

Quality and Productivity

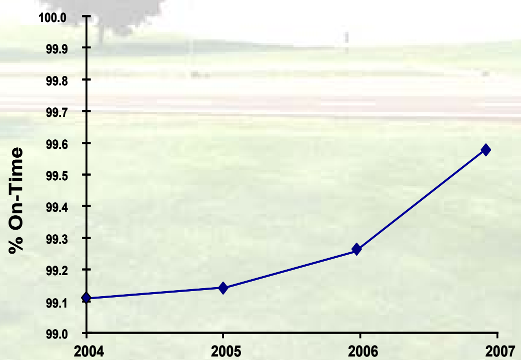
Software Defect Density



Software Productivity

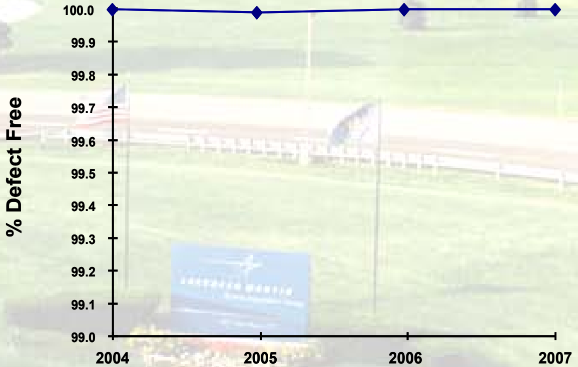


On-Time Delivery (All Products)



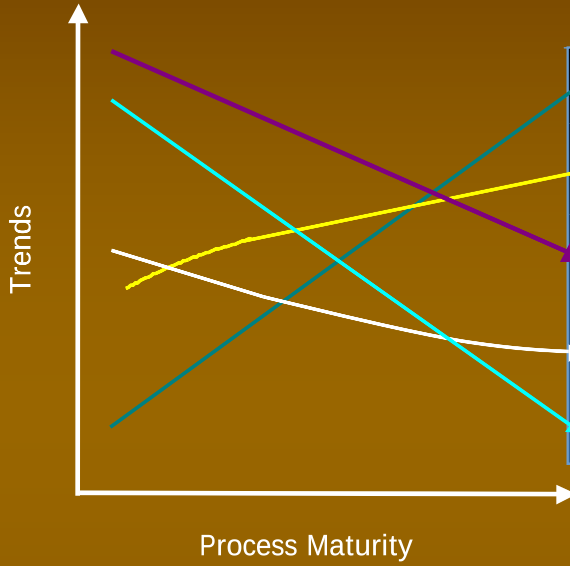
	2004	2005	2006	2007
Delivered (K)	22.6	20.6	17.9	19.0
Lates	201	176	127	79
% On-Time	99.11%	99.14%	99.29%	99.59%

Performance at Delivery (All Products)

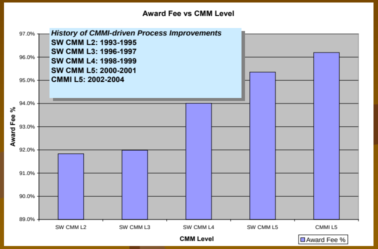


	2004	2005	2006	2007
Delivered (K)	22.6	20.6	17.9	19.0
Defects	0	2	0	0
% Error Free	100%	99.99 %	100%	100%

IS&GS

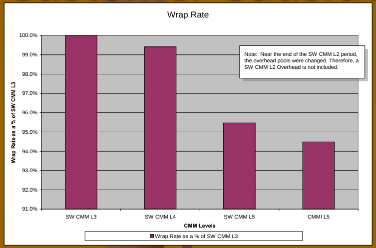


SW Productivity	Up 52%
Average Award Fee	Up 4.2 Points
SW Development Cost	Down 23%
Wrap Rate	Down 5.5%
Defect Find / Fix Cost	Down 21 %



History of CMMI-driven Process Improvements
SW CMM L2: 1993-1995
SW CMM L3: 1996-1997
SW CMM L4: 1998-1999
SW CMM L5: 2000-2001
CMMI L5: 2002-2004

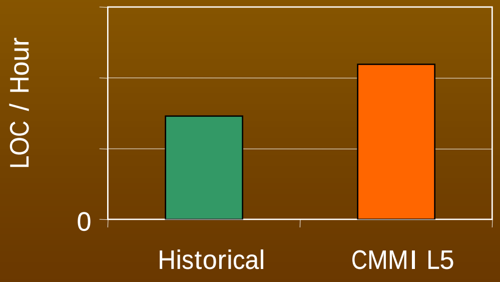
Customer Satisfaction



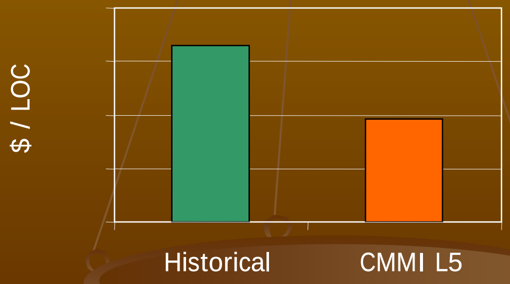
Note: Near the end of the SW CMM L2 period, the overhead pools were changed. Therefore, a SW CMM L2 Overhead is not included.

Overhead Costs

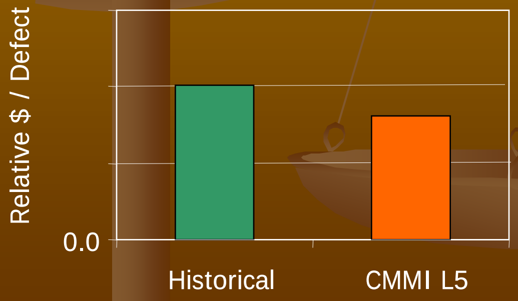
S/W productivity increased 52% over baseline average capability



S/W cost decreased 23% in Constant 2004 dollars



Defect Find / Fix cost down by 21%

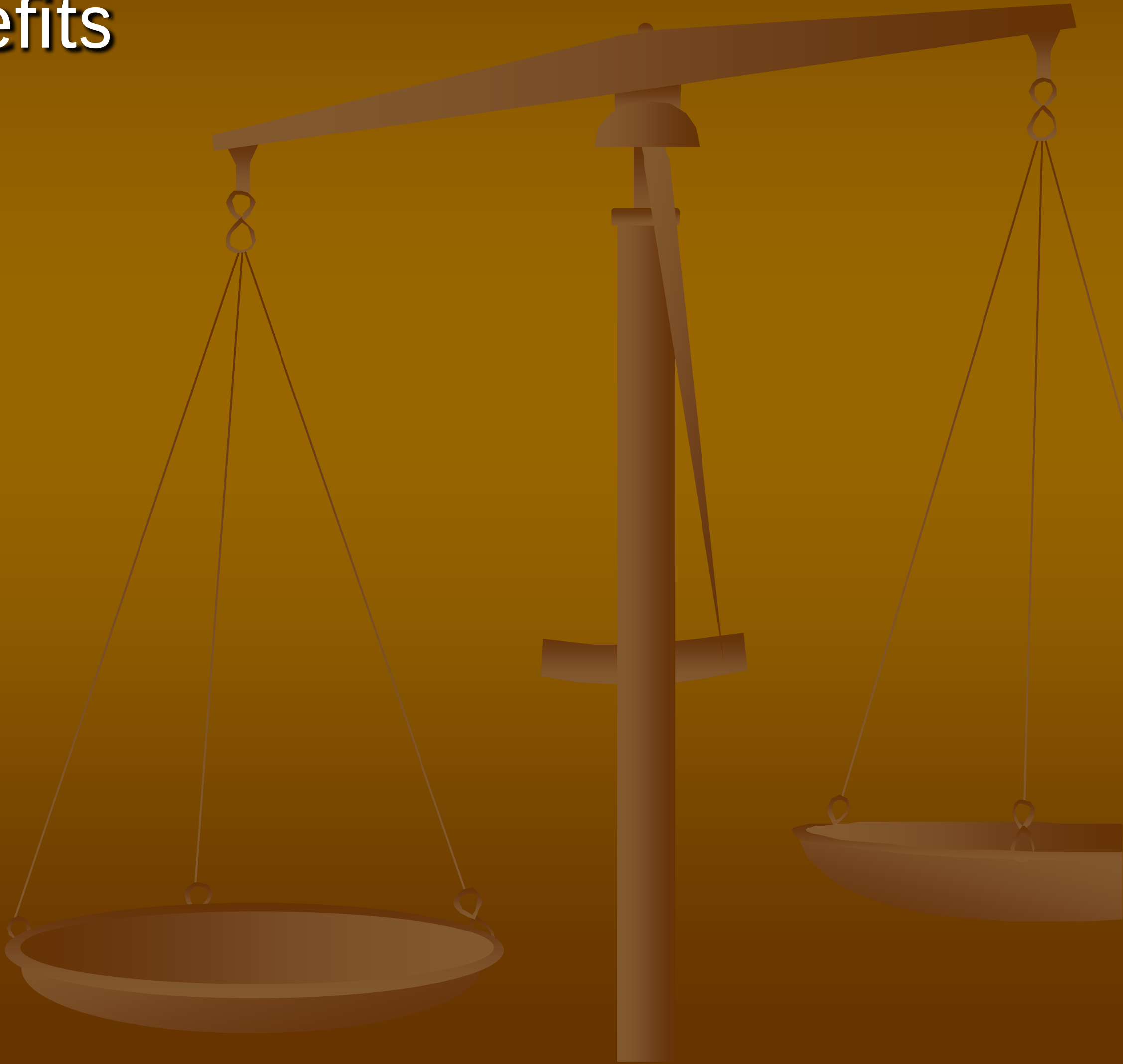


Last updated: 2006 with 2005 Data

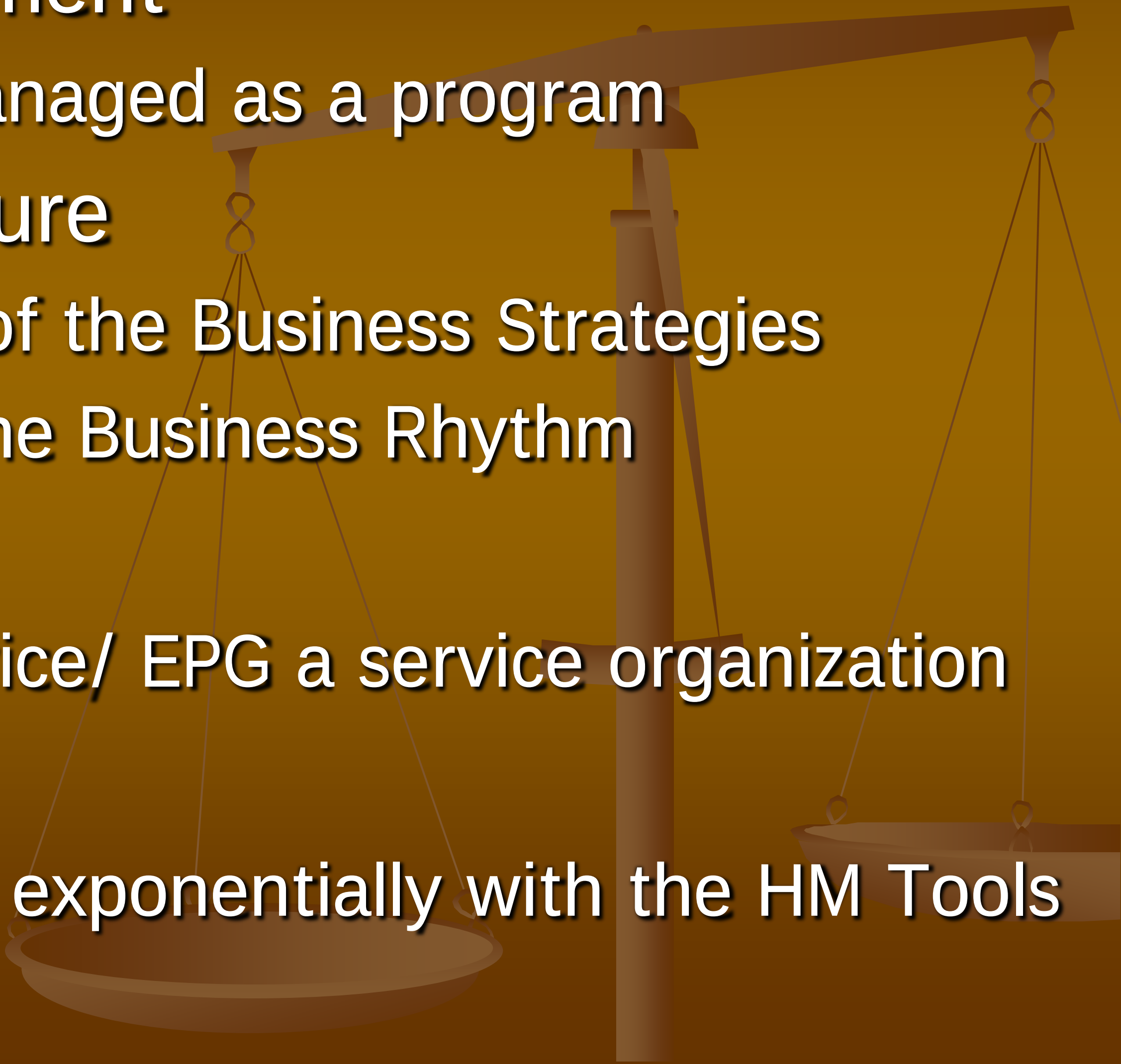
Agenda

Realizing CMMI Benefits

- Enablers
- Inhibitors

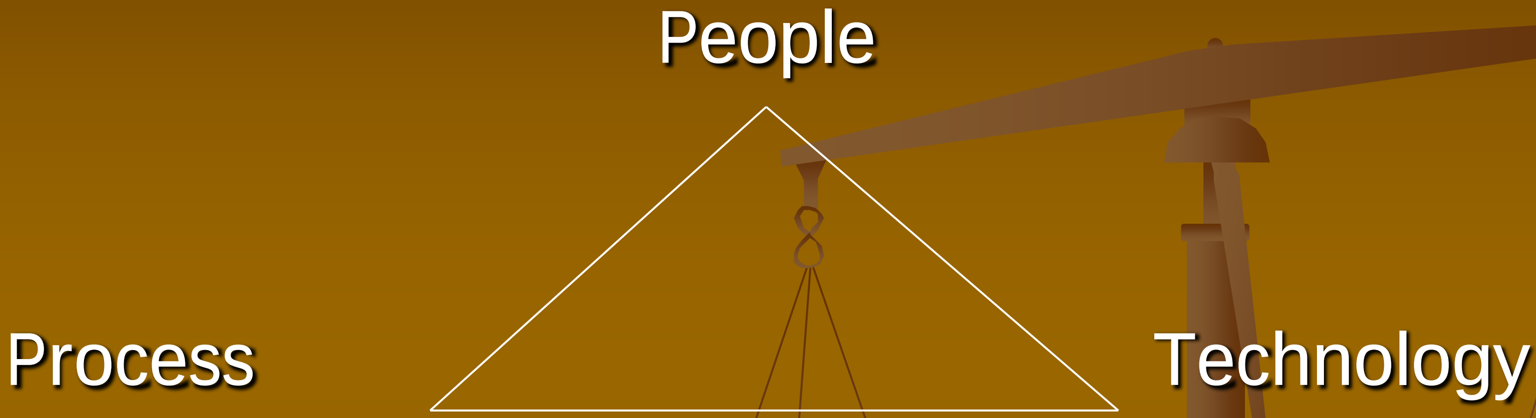


Enablers



- Process Improvement
  - Operated and managed as a program
- Process Architecture
  - Implementation of the Business Strategies
  - Integrated into the Business Rhythm
- CMMI – SVC
  - Process as a service/ EPG a service organization
- High Maturity
  - Benefits increase exponentially with the HM Tools

Enablers



- LMCO Strategic Plan
  - Business Unit Strategic Plan
    - Technology Plan
    - Learning Development Plan
    - Process Improvement Plan

Inhibitors

- MYTHS, MISCONCEPTIONS, IGNORANCE
  - External
  - Internal

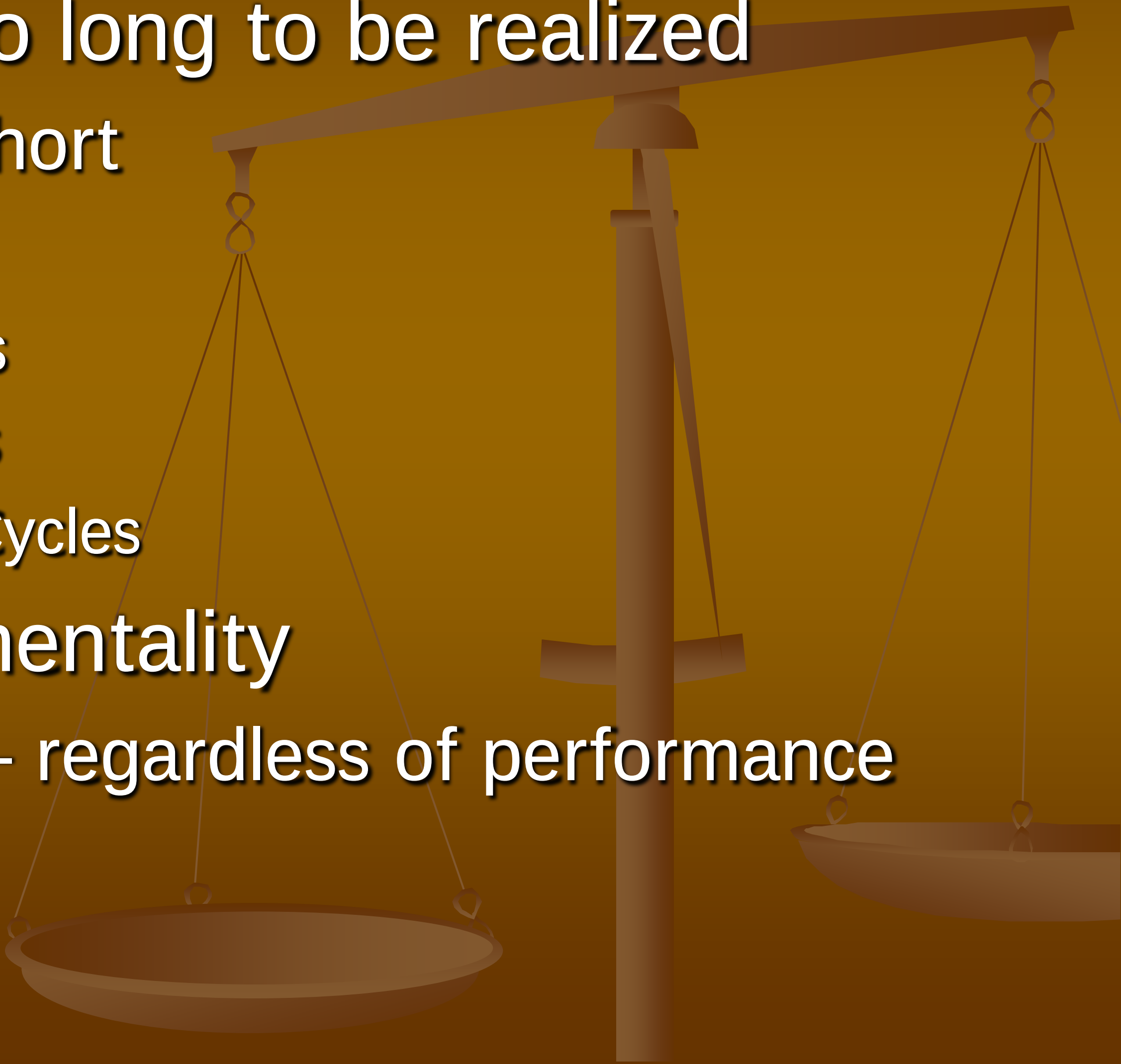
External Inhibitors

- Negotiation Challenges
  - Bid on accurate performance baselines/ historical data
    - Let’s try it for this amount (out of the blue)
    - Try it and MISS
- Problems arise – defects are found
  - Maturity Level 5 and have Defects ?????
  - Process not a panacea

External Inhibitors (cont)

- Required operation at Maturity Level 3 just take out that “other stuff”
- Teams composed with multiple level companies – forced to use highest level of processes

Internal Inhibitors



- Benefits take too long to be realized
  - Backing stops short
  - Reasons
    - Large Programs
    - Many Programs
    - Extended Life Cycles
- “Price to Win” mentality
  - Bid this to win – regardless of performance data

How to Survive

- Education
  - External
    - Set and understand expectation
  - Internal
    - Executive knowledge and buy in
      - Understand performance today predicts tomorrow
- Consistency
  - Institutionalization with tailoring
- PERSEVERENCE

Effective Use of CMMI®

NDIA Position Paper

Summary of NDIA industry position statements for obtaining best value from CMMI investments

The Effective Use of CMMI®

1. Good processes increase the likelihood of achieving successful project performance
2. CMMI is a model, not a standard – adapt CMMI to your business environment, resources, and objectives
3. Focus on business improvement objectives – a primary emphasis on achieving levels may not achieve significant benefits and may increase rather than decrease costs
4. High maturity is a business case – justify the investment; many organizations find business value in improving processes even at lower CMMI maturity levels
5. Maturity level ratings are not alone a predictor of project performance – many other factors can be significant contributors
6. Don't specify maturity levels in acquisitions – use CMMI to probe supplier capability and process execution risks
7. Greatest benefits of appraisals are from improvements, not evidence or ratings - disproportionate effort on appraisal preparation risk can diminish business returns

•"The Effective Use of CMMI®", NDIA Systems Engineering Division, June 2009.
http://www.ndia.org/Divisions/Divisions/SystemsEngineering/Documents/CMMI%20Working%20Group/CMMI%20NDIA%20position%20statement_final_.pdf

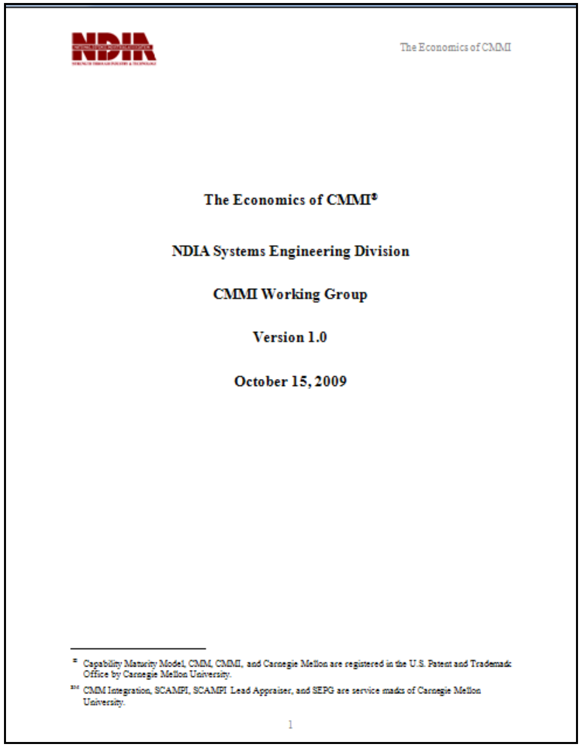
The Economics of CMMI

Overview:

- Developed by NDIA CMMI Working Group
- Guidance by industry, and for industry, on achieving business value through CMMI
- Suggested CMMI strategies and mechanisms, intended to be tailored much like the model itself

Content:

1. Guidance on achieving business performance improvement through economical use of CMMI
2. Guidance on effective CMMI implementations to address common business issues



The Economics of CMMI®

NDIA Systems Engineering Division

CMMI Working Group

Version 1.0

October 15, 2009

® Capability Maturity Model, CMM, CMMI, and Carnegie Mellon are registered in the U.S. Patent and Trademark Office by Carnegie Mellon University.

SM CMM Integration, SCAMPI, SCAMPI Lead Appraiser, and SEPG are service marks of Carnegie Mellon University.

Objectives:

- Provoke thoughtful dialog on the effective use of CMMI
- Influence the mindset of CMMI business value – focus on improvement
- Help raise expectations across industry for results achieved through CMMI

http://www.ndia.org/Divisions/Divisions/SystemsEngineering/Pages/CMMI_Working_Group.aspx

The Economics of CMMI - Summary

Business returns on CMMI investments are dependent largely on underlying principles

- **Objectives** – *alignment with business goals*
- **Sponsorship** – *leadership, commitment, resources*
- **Action** – *improvement velocity for business needs*
- **Engagement** – *participation, project focused*
- **Value** – *performance results to justify investments*
- **Motivation** – *performance improvement vs. ratings*

These factors are under an organization's control

- The Economics of CMMI is a balance sheet for obtaining best value from CMMI
- Implementation strategies govern whether CMMI investments translate into improved business performance, or simply added costs of doing business

Focus on business value to provoke thoughtful dialog and raised expectations for the effective use of CMMI

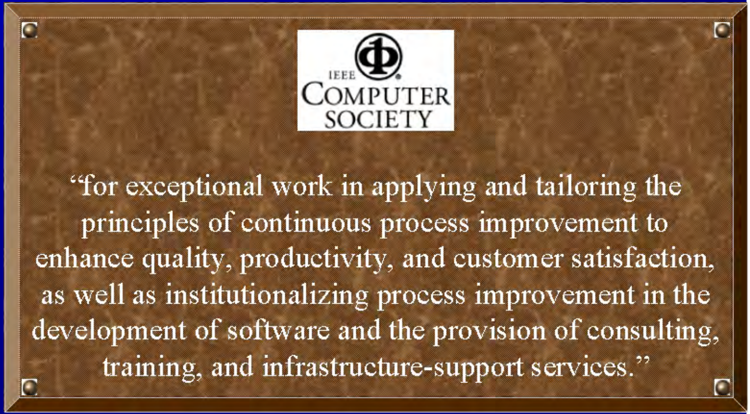
The Benefits of CMMI

Case Study of a Small Business
CMMI Level 5 Organization

Executive Panel
CMMI 9th Technology and User Group Conference
November 17, 2009
Denver

Software Process Achievement Award

- Sponsors
  - IEEE Computer Society
  - Software Engineering Institute (SEI)
- Winners
  - NASA Goddard Space Flight Center (94)
  - Raytheon (95)
  - Hughes Aircraft (97)
  - **Advanced Information Services Inc. (99)**
  - Oklahoma City Air Logistics Center (99)
  - Wipro (03)
  - IBM Australia (04)
  - Productora de Software S.A. (06)



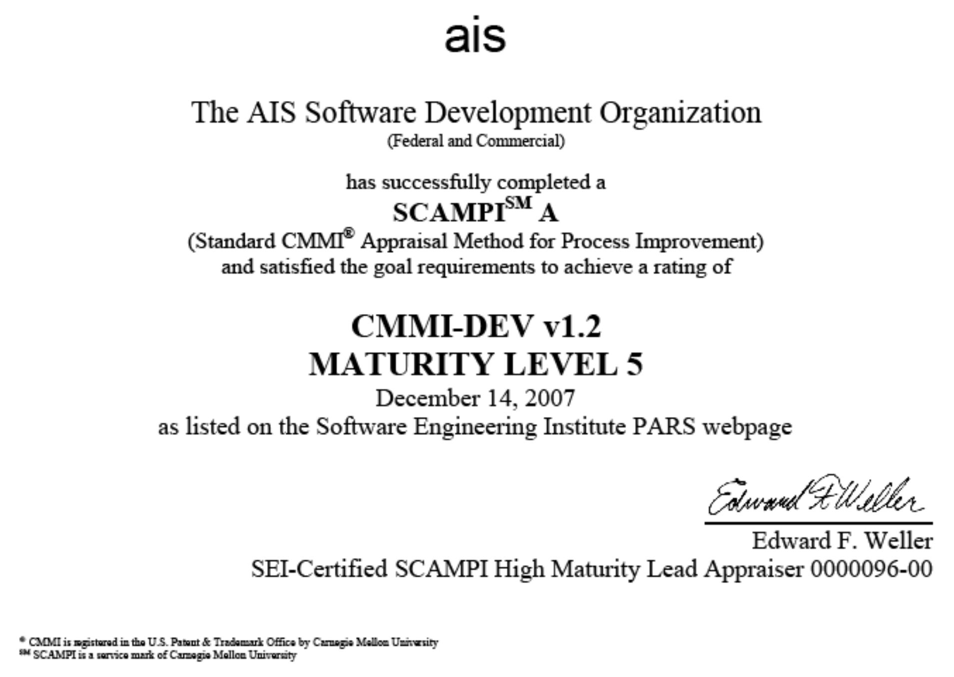
IEEE COMPUTER SOCIETY

"for exceptional work in applying and tailoring the principles of continuous process improvement to enhance quality, productivity, and customer satisfaction, as well as institutionalizing process improvement in the development of software and the provision of consulting, training, and infrastructure-support services."

AIS CMM/CMMI Assessment History

Date	**Levels Assessed**	**Levels Satisfied**	**Assessor**
April 1996	SW-CMM Levels 2 & 3	1	Jeannie Kitson
April 1999	SW-CMM Levels 2 to 4	3	Jeannie Kitson
Nov. 2000	SW-CMM Levels 2 to 3	3	Jeannie Kitson
Nov. 2002	SW-CMM Levels 2 to 4	3	Inigo Garro
Nov. 2004	SW-CMM Levels 2 to 4	4	Gloria Leman
Dec. 2005	SW-CMM Levels 2 to 5	5	Gloria Leman
Dec. 2007	CMMI Maturity Levels 2 to 5	5	Ed Weller

SEI CMMI Maturity Level 5



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The AIS Software Development Organization
(Federal and Commercial)

has successfully completed a
SCAMPI^{SM} A
(Standard CMMI® Appraisal Method for Process Improvement)
and satisfied the goal requirements to achieve a rating of

CMMI-DEV v1.2
MATURITY LEVEL 5
December 14, 2007
as listed on the Software Engineering Institute PARS webpage

Edward F Weller

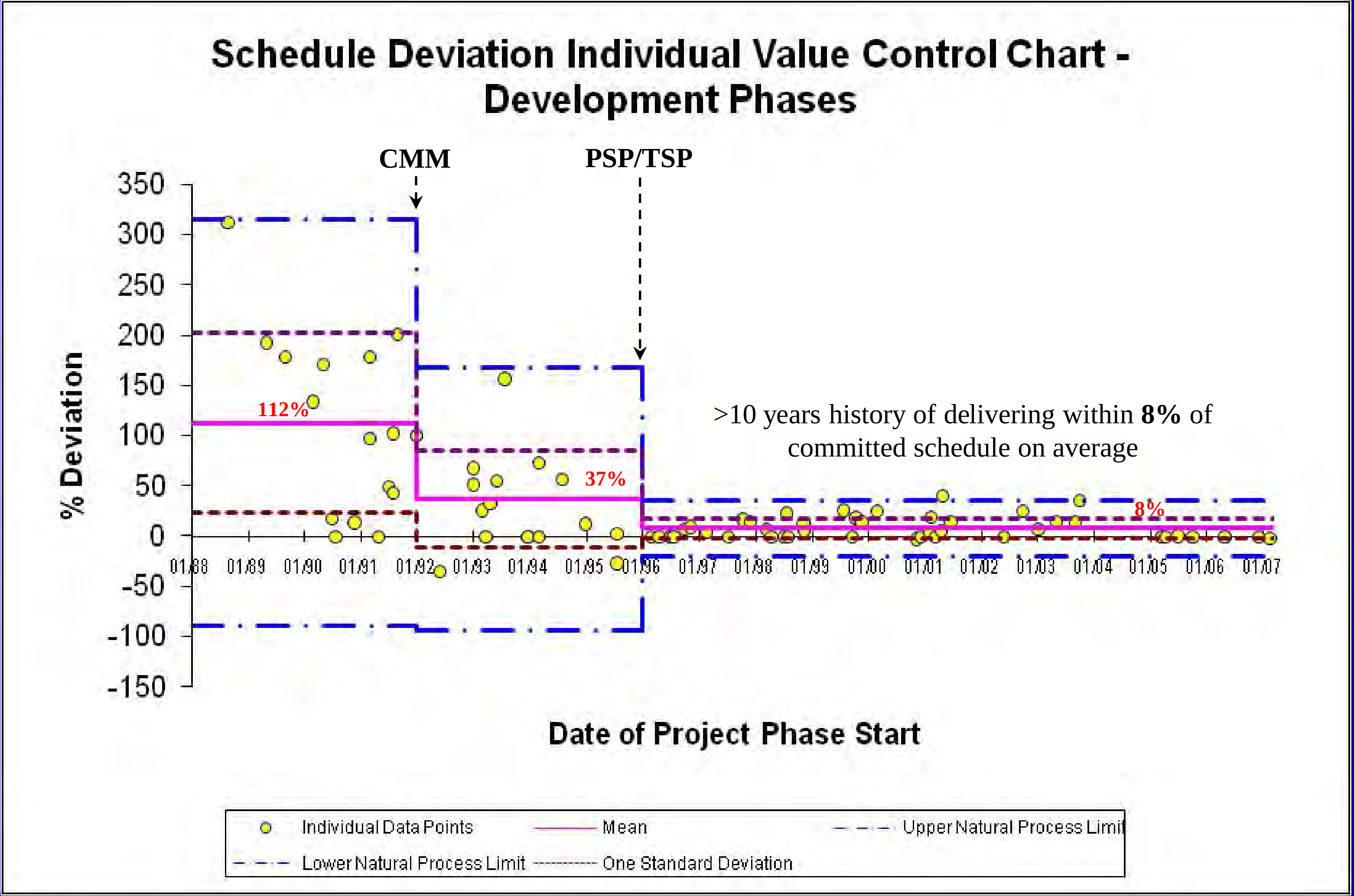
Edward F. Weller
SEI-Certified SCAMPI High Maturity Lead Appraiser 0000096-00

® CMMI is registered in the U.S. Patent & Trademark Office by Carnegie Mellon University
SM SCAMPI is a service mark of Carnegie Mellon University

SCAMPI A – Final Findings
AIS Global Strengths

- TSP coaches provide continuous mentoring for project team members
- Process focus at all levels in the organization
- Open communication
- Self-managed team structure and roles
- Individuals with:
  - Strong quality focus
  - Commitment to customer and organization
  - Sense of ownership
- Opportunity for involvement with multiple groups within the organization
- Empowered to make decisions that affect the organization

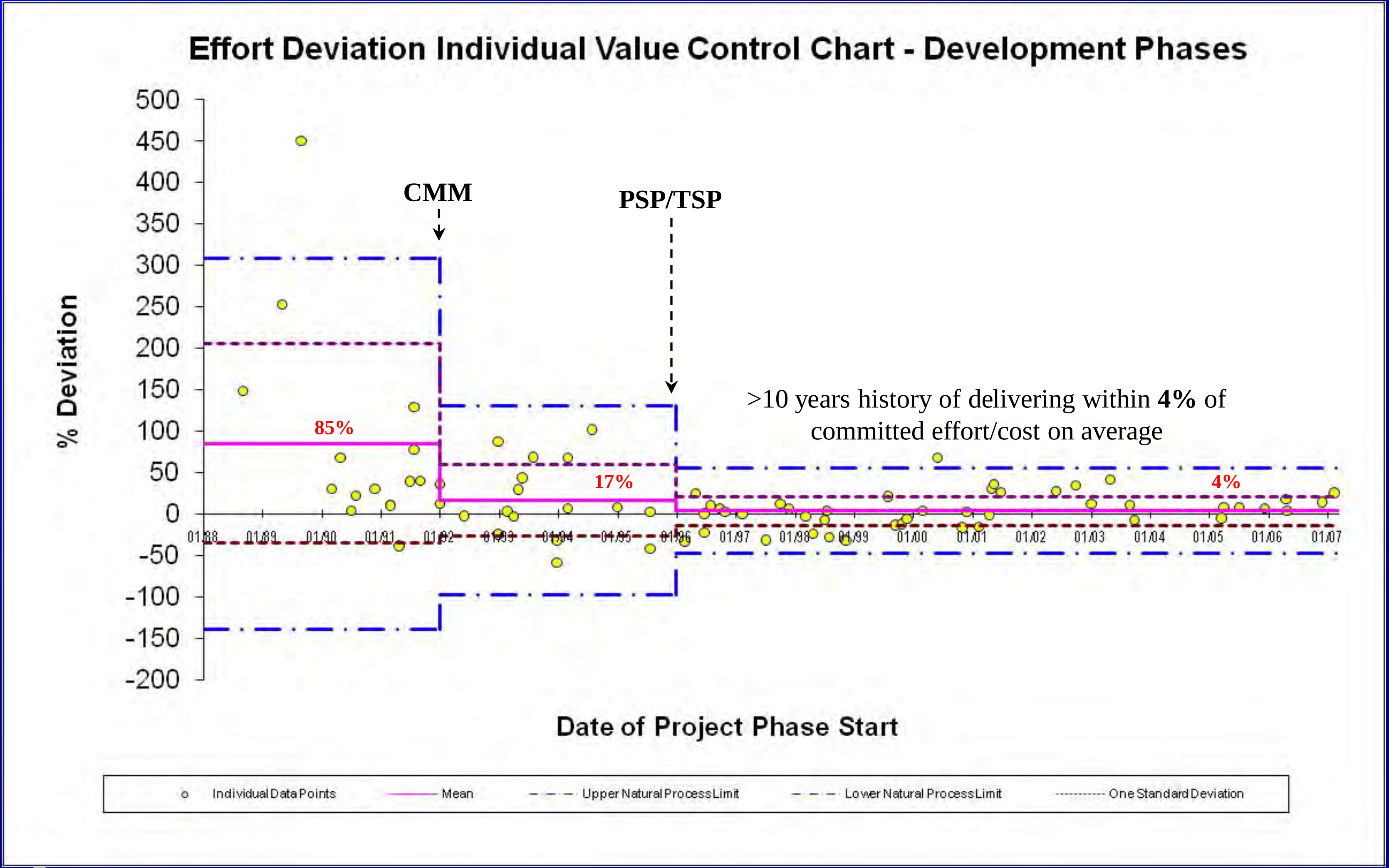
CMM/TSP Benefits
Schedule Performance



Schedule Deviation Individual Value Control Chart - Development Phases

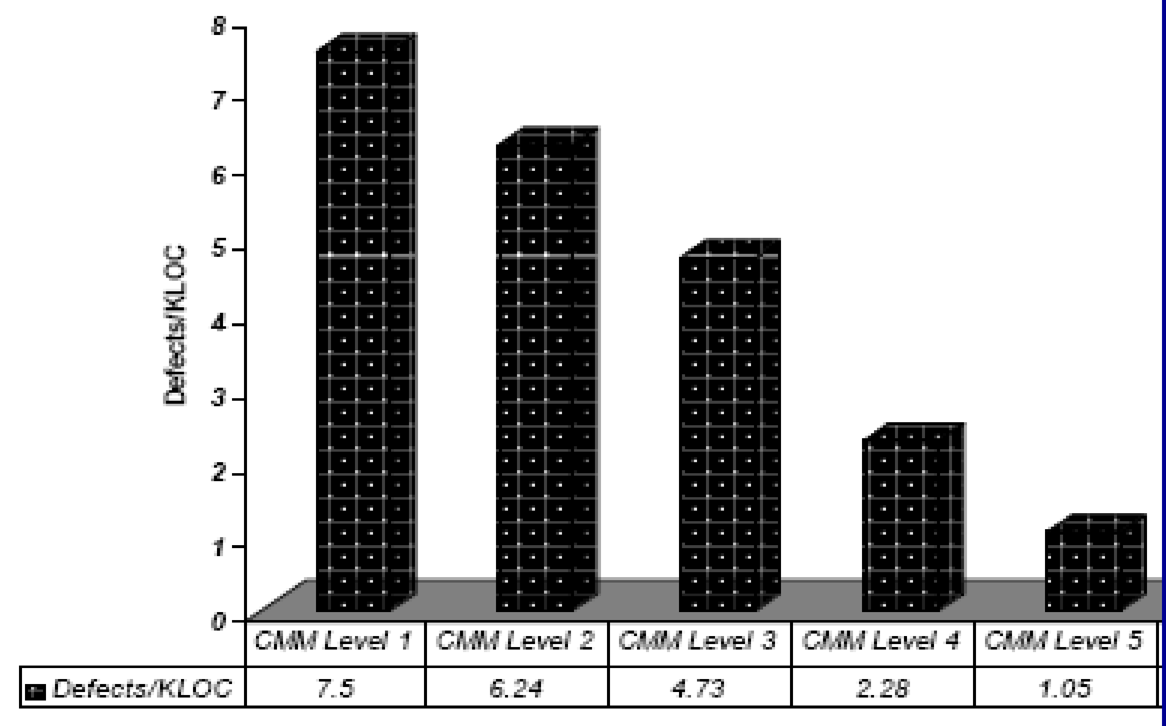
>10 years history of delivering within **8%** of committed schedule on average

CMM/TSP Benefits
Effort/Cost Performance



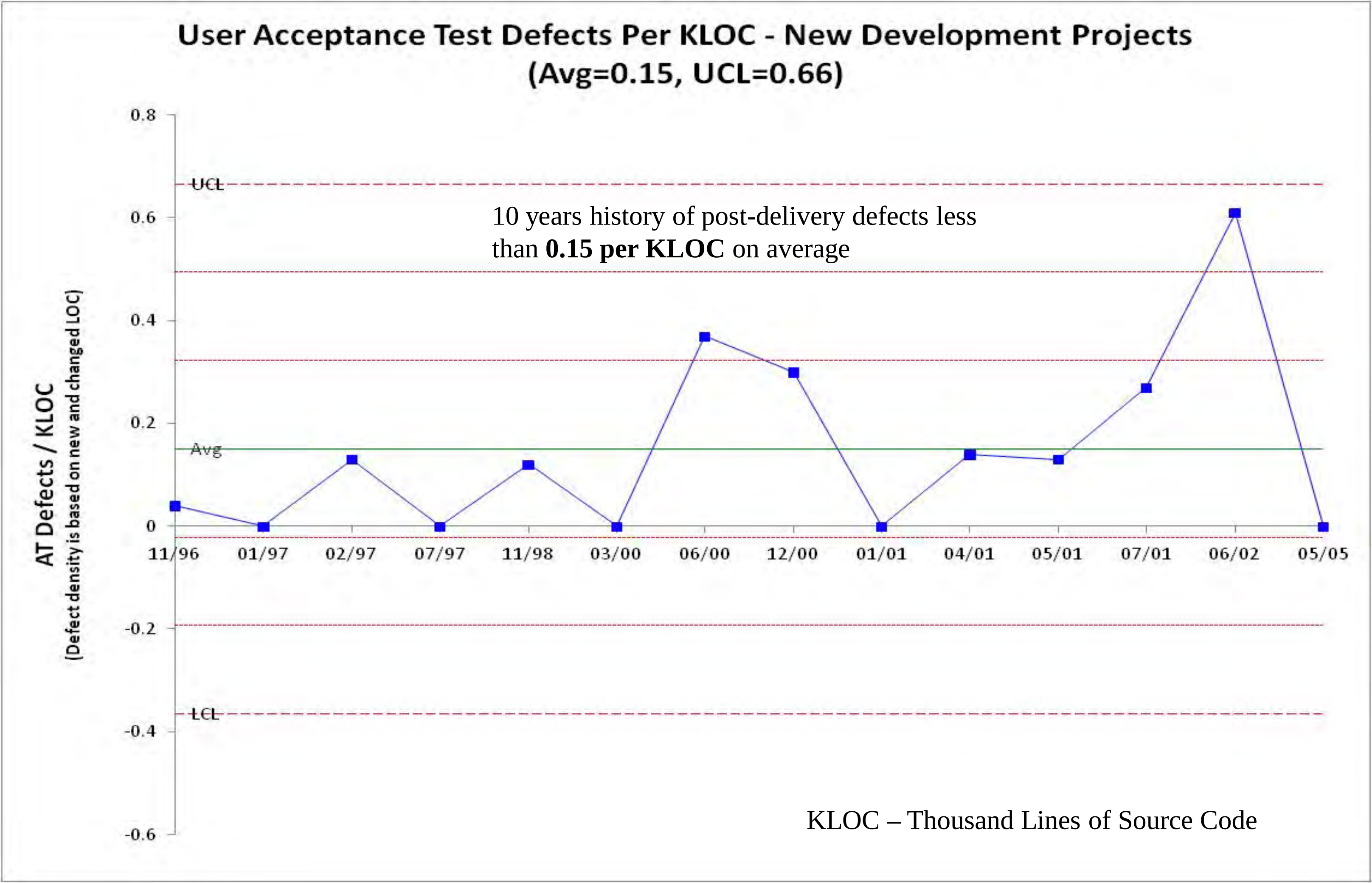
>10 years history of delivering within **4%** of committed effort/cost on average

CMMI Quality Results



Source: The TSP in Practice, SEI Technical Report, September 2003

CMM/TSP Benefits Quality Performance



10 years history of post-delivery defects less than **0.15 per KLOC** on average

KLOC – Thousand Lines of Source Code

What If?

What If It Takes A Billion Lines Of Code Per Year To Modernize The U.S. Government In Five Years?

ais

U.S. Government Modernization Maintenance Cost - 1

- Assume most federal IT contractors are CMMI L2, L3
- Assume average 5 defects/KLOC in delivered product
- Government will find 5 million defects per year in acceptance test and software use
- Assume average 40 hours to find and fix each defect
- Acceptance test and rework cost over five years - $100 billion

U.S. Government Modernization Maintenance Cost - 2

- Assume most federal IT contractors are CMMI L5
- Assume average 1 defect/KLOC in delivered product
- Government will find 1 million defects per year in acceptance test and software use
- Assume average 40 hours to find and fix each defect
- Acceptance test and rework cost over five years - $20 billion
- $80 billion cost avoidance in five years

ais

What If The Contractors ? (1)

Bid firm fixed price development after requirements phase

Guarantee less than 8% deviation in committed schedule

Guarantee reduction in government’s acceptance testing time by orders of magnitude

What If The Contractors ? (2)

Guarantee delivered product defect density of less than 0.3 defects per KLOC

Offer life time warranty on defects

AIS offers all of the above

Benefits of CMMI

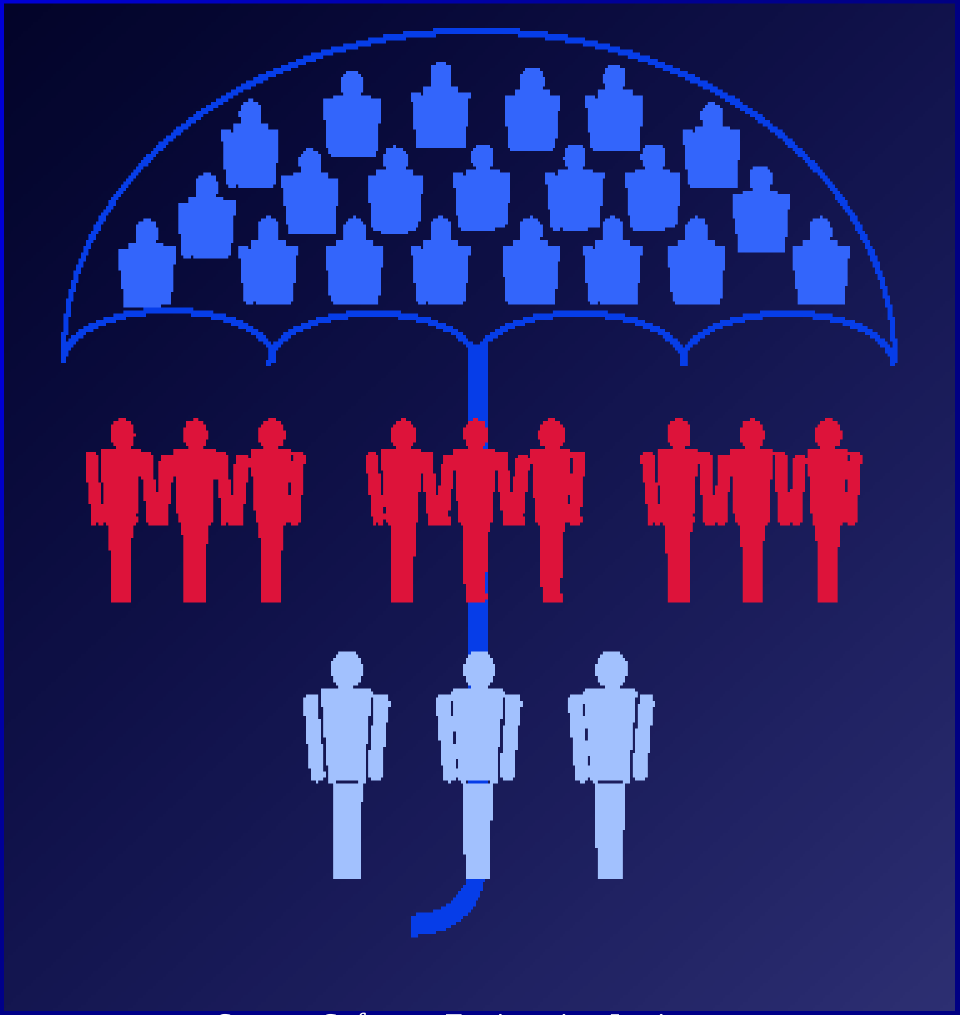
- Proven organization capability to deliver nearly defect free products on predictable cost/schedule
- Joy in work

Transforming The World Of Software
Models Of Excellence

CMMI – Builds organizational capability

TSP – Builds quality products on cost and schedule

PSP – Builds individual skill and discipline



Source: Software Engineering Institute

ais

What does

“FUN ON THE JOB”

Mean to you?

Contact Information

Girish Seshagiri

Advanced Information Services Inc.

(703) 286 0781

Email: girishs@advinfo.net

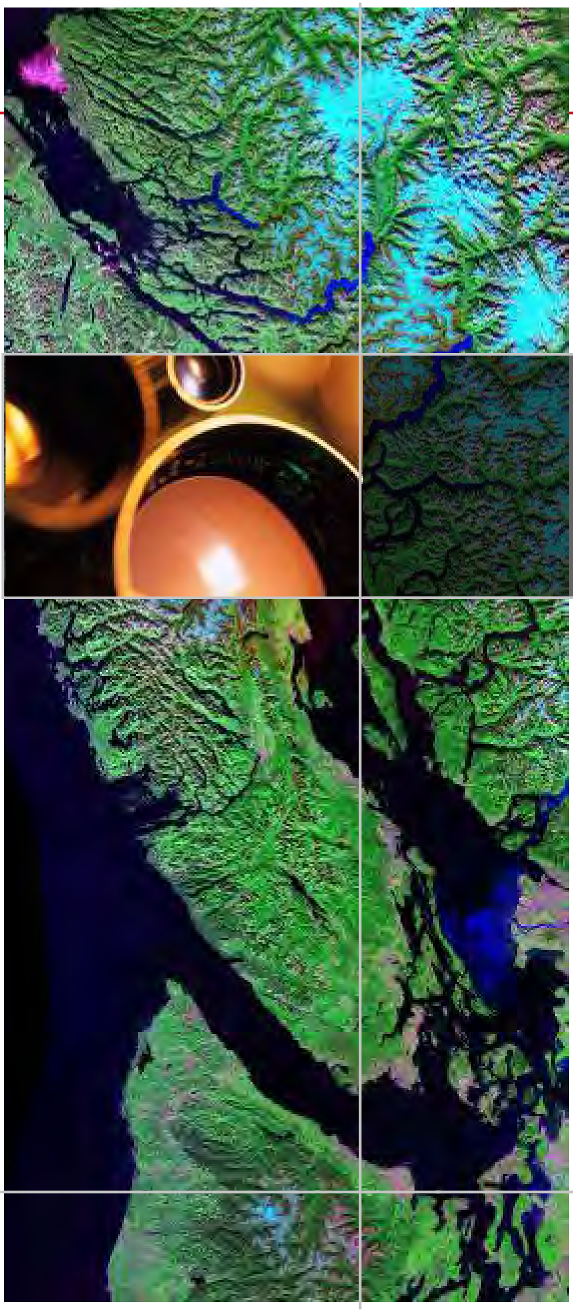
Website: www.advinfo.net

Raytheon
Customer Success Is Our Mission

CMMI® and Business Improvement at Raytheon

Dave Tyler
Sr. Manager
Enterprise Process Effectiveness
Raytheon Intelligence and Information Systems

17 November, 2009



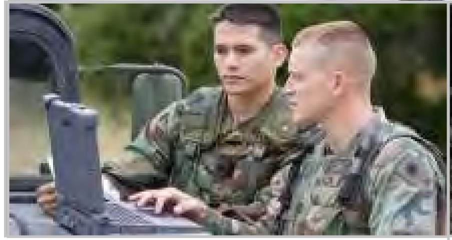
Raytheon Today

A Global Leader in Defense, Homeland Security and other Government Markets

- $23.2 billion in sales in 2008
- 73,000 employees worldwide
- More than 8,000 technology-driven programs
- Locations in 50 states, 80 countries, 7 continents
- Among the top 5 aerospace and defense companies in the nation

Raytheon's Core Markets

Expanding opportunities to provide innovative solutions



Our Domain Knowledge and Technical Leadership Creates Expanding Opportunities in Four Core Defense Markets:

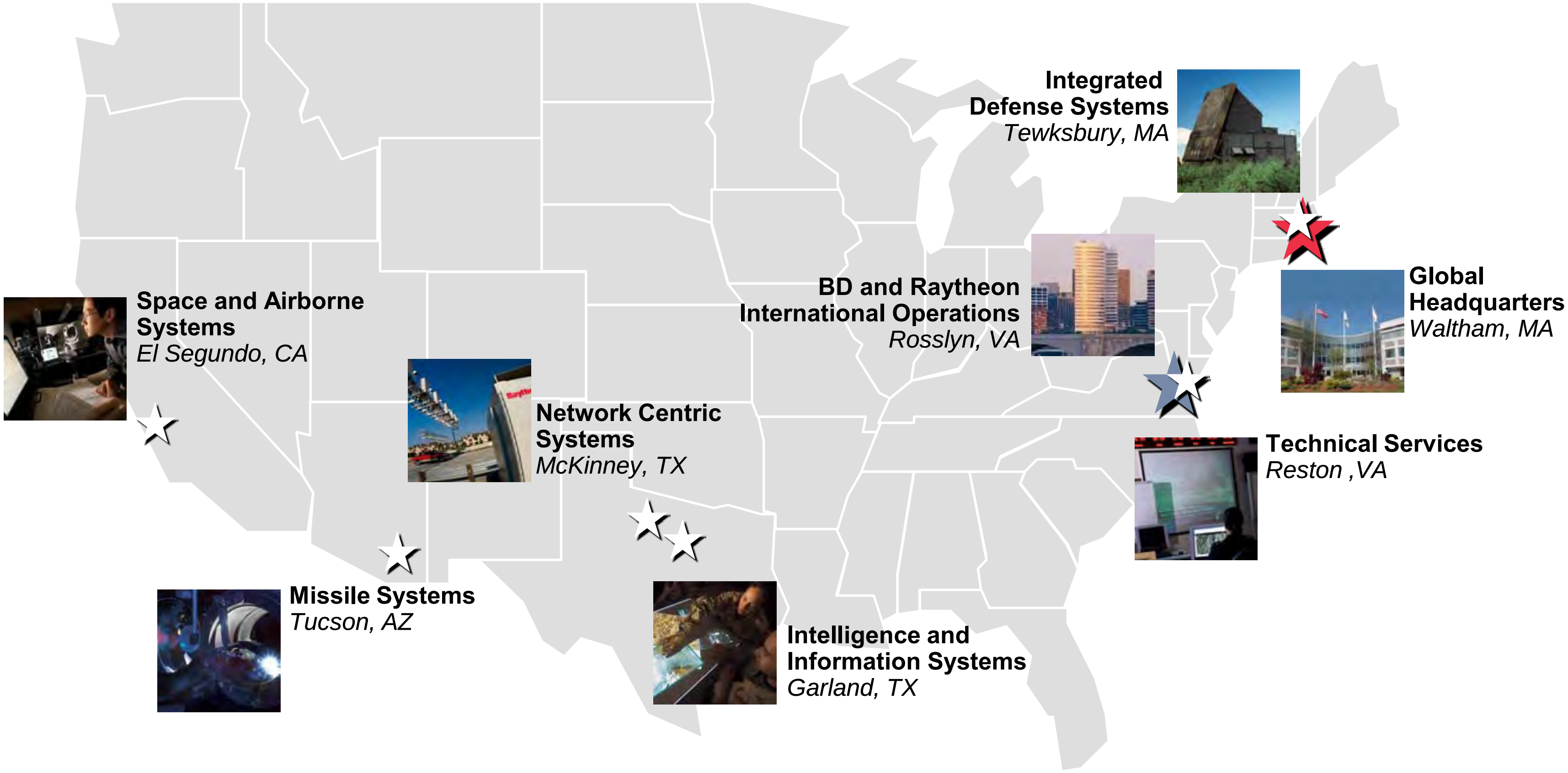
1. SENSING
Technologies that acquire data and create the information needed for effective battlespace decisions

2. C3I
(Command, Control, Communications and Intelligence Systems)
Integrated real-time systems that optimize operational planning and execution

3. EFFECTS
Technologies that achieve specific military actions or outcomes

4. MISSION SUPPORT
Total life-cycle solutions that ensure NoDoubt™ performance

Raytheon Businesses



Integrated Defense Systems
Tewksbury, MA

Global Headquarters
Waltham, MA

Space and Airborne Systems
El Segundo, CA

BD and Raytheon International Operations
Rosslyn, VA

Network Centric Systems
McKinney, TX

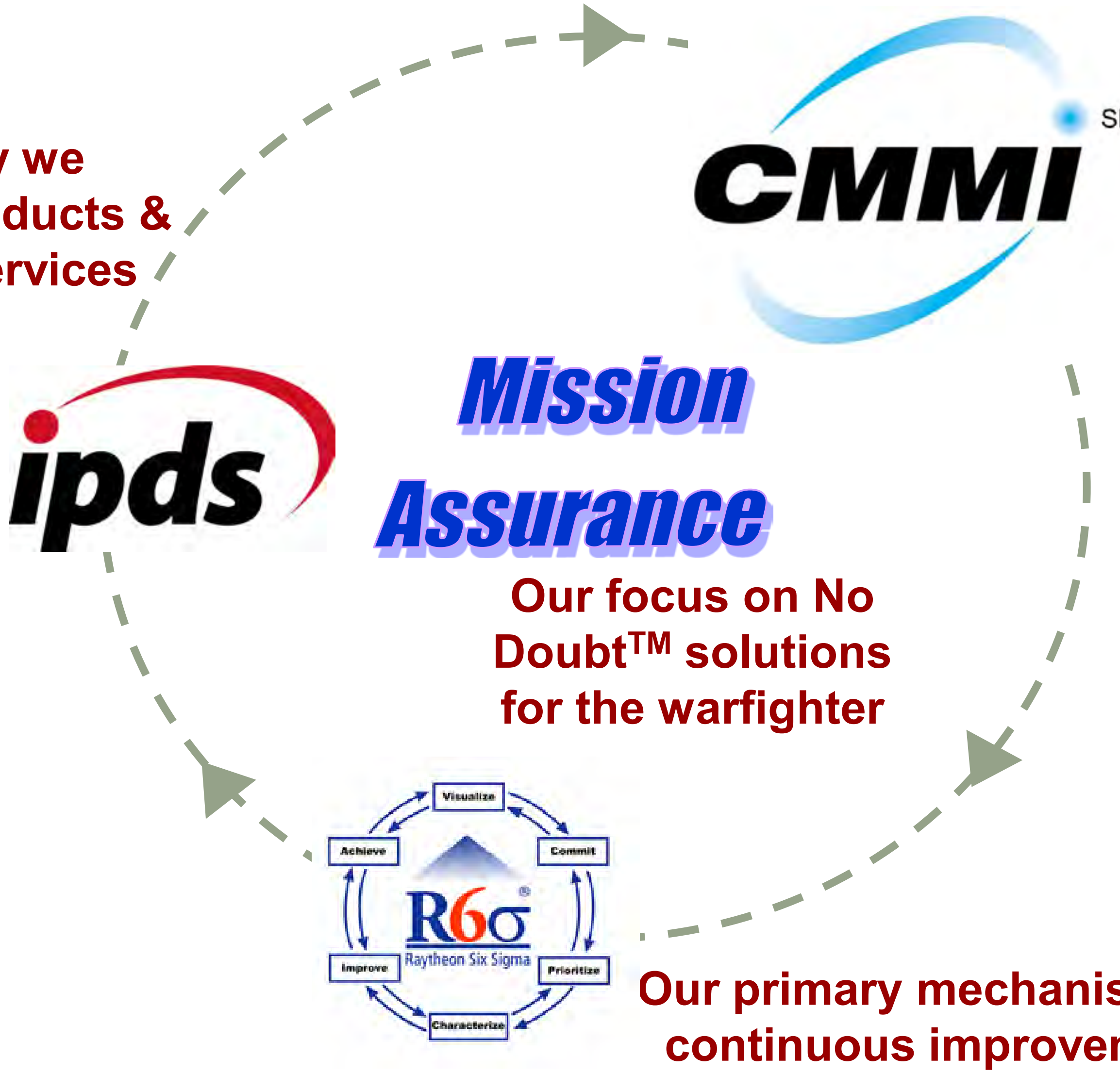
Technical Services
Reston ,VA

Missile Systems
Tucson, AZ

Intelligence and Information Systems
Garland, TX

Raytheon
Customer Success Is Our Mission

Raytheon Process Improvement



Mission Assurance

The way we develop products & provide services

A critical success measure

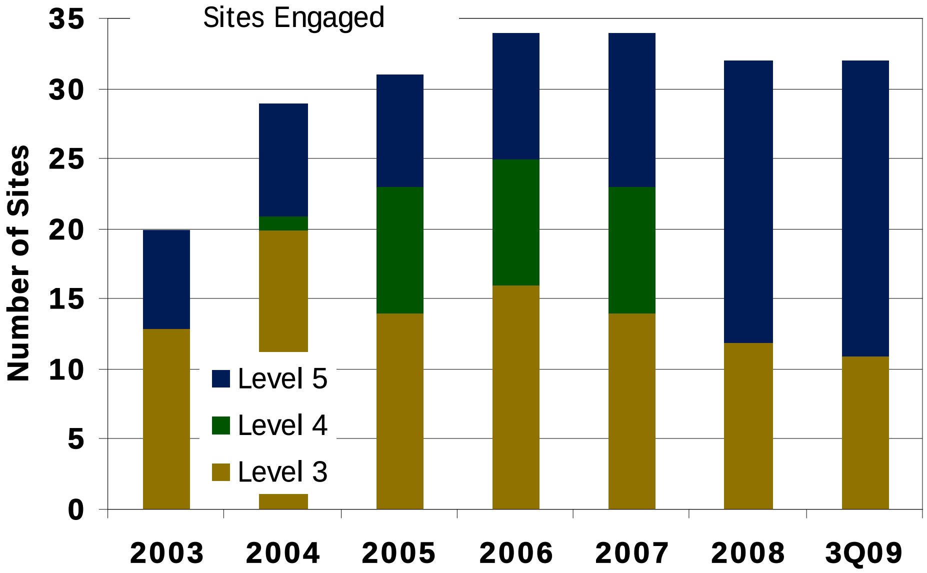
Our focus on No Doubt™ solutions for the warfighter

Our primary mechanism for continuous improvement

Raytheon

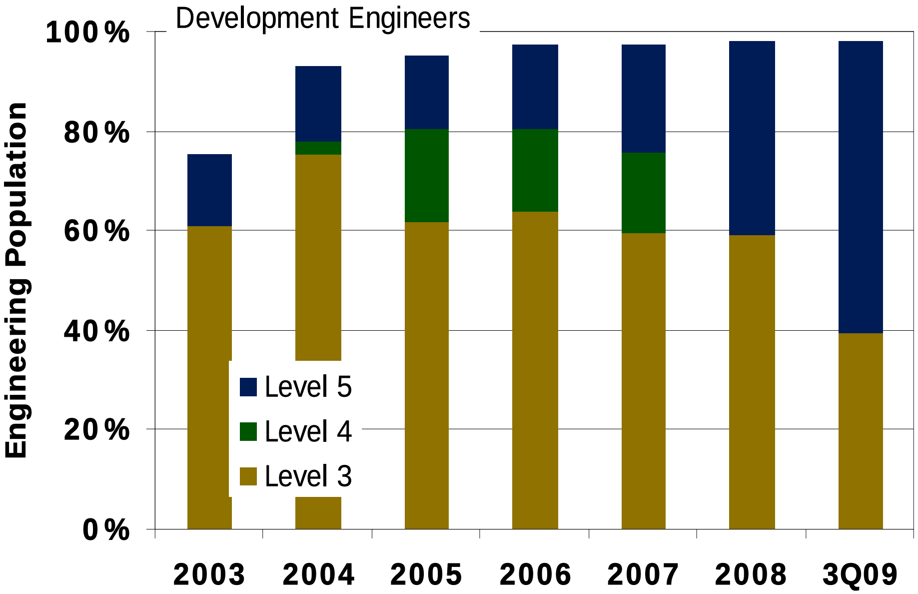
Customer Success Is Our Mission

CMMI® Adoption at Raytheon



Most divisions now operating at Maturity Level 5, including two v1.2 appraisals in last 12 months

Virtually all of the engineering population engaged with CMMI®



Early Adoption and Commitment to High Maturity at Raytheon

Sample Benefits

- **Productivity**
  - Systems Engineering: 14.3% Improvement
  - Software Engineering: 43 - 65% Improvement (depending on project)
  - Hardware Engineering: 25 – 56% Improvement (depending on discipline)
- **Quality**
  - Systems Engineering: requirements volatility reduced by 56%
  - Software Engineering: 12% improvement in defect containment
  - Hardware Engineering: 65% improvement in drawing defect density
- **Cost/Schedule**
  - 4% decrease in CPI and significantly reduced variability
  - 5% improvement to on-time deliveries
- **Process Management Cost**
  - $15M savings over 5 years in process infrastructure cost
  - 5:1 reduction in process guidance levied on business execution

Maturity Levels Don’t Tell the Whole Story

Non-Quantitative Benefits of CMMI®

- Establishes clear roles and responsibilities for business execution
- Documents a common language across broad spectrum of business functions
- Focuses process improvement on quality and performance objectives
- Provides for structured decision making instead of “seat of the pants”
- Helps answer the “are we there yet?” process institutionalization question
- Expands the reach of Raytheon Six Sigma
- Changes expectations (and behavior) of management

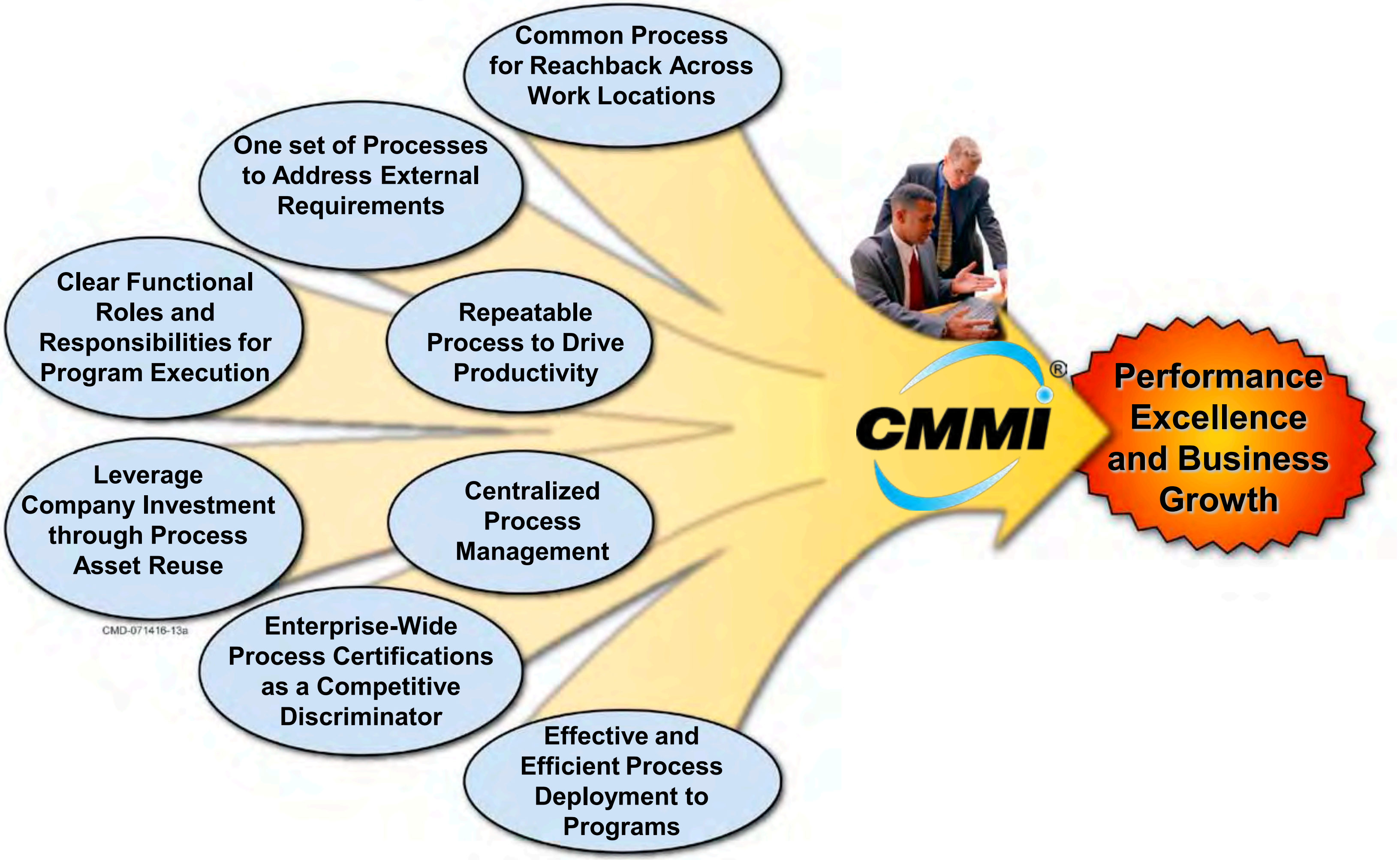
Achieving the “I” in CMMI®

Looking Ahead

- Continued focus on High Maturity
  - Leverage established best practices in the company to enable high maturity practices across the board
  - Invest in Capability Levels where Maturity Levels don’t make sense
- Implementation of CMMI-SVC
  - A visibly better “fit” for the engineering services business
  - Provides a new benchmark in an increasingly competitive market
- Integration with other improvement paradigms
  - ISO9001 and AS9100 in development organizations
  - ITIL, ISO20000 and COBIT in services organizations
  - Lean models in production organizations

Steady Momentum for CMMI® Implementation

The Bottom Line



Common Process for Reachback Across Work Locations

One set of Processes to Address External Requirements

Clear Functional Roles and Responsibilities for Program Execution

Repeatable Process to Drive Productivity

Leverage Company Investment through Process Asset Reuse

Centralized Process Management

Enterprise-Wide Process Certifications as a Competitive Discriminator

Effective and Efficient Process Deployment to Programs

CMMI®

Performance Excellence and Business Growth

CMMI® Drives Business Value for Raytheon

NORTHROP GRUMMAN

Publicly Reported Data Begging for Analysis

Data Gathered From SEI PARS Site

Everyone Can Do Their Own Analysis

November 17, 2009

Hal Wilson

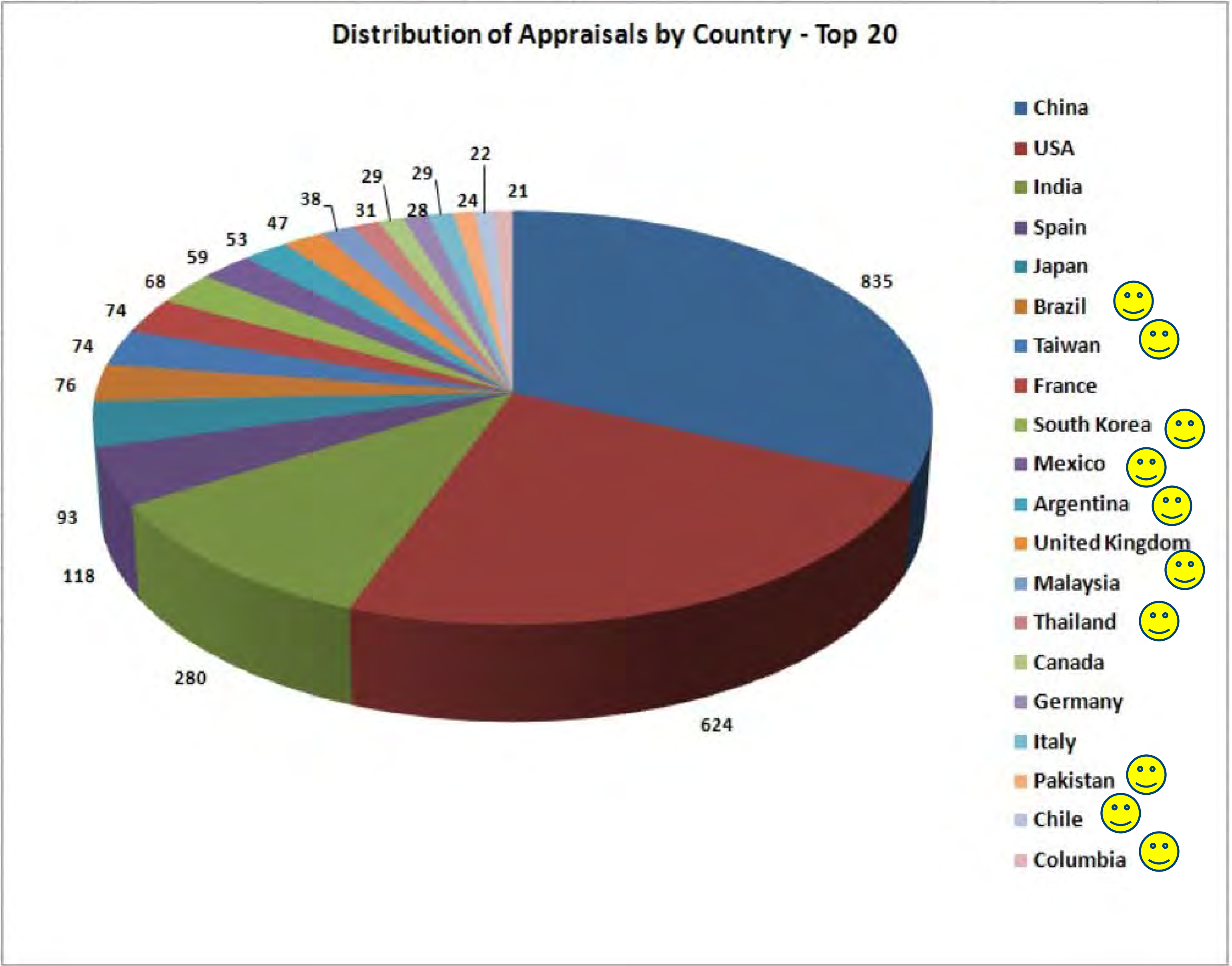
Director, Engineering
Defense Systems Division
Northrop Grumman Information Systems

Overheard Over the Years

- Bigger countries with big economies are the principal players in CMMI
  - Smaller countries aren’t really participating
- Big US companies with lots of DoD business dominate the US CMMI arena
- DoD companies only apply CMMI to get the ratings for Government competition

What the Publicly Reported Data Says

(thru Nov 14, 2009)



Vast Majority are CMMI-DEV

As of Nov 14,

2808 CMMI-DEV
4 CMMI-ACQ
0 CMMI-SVC*
2812 Total

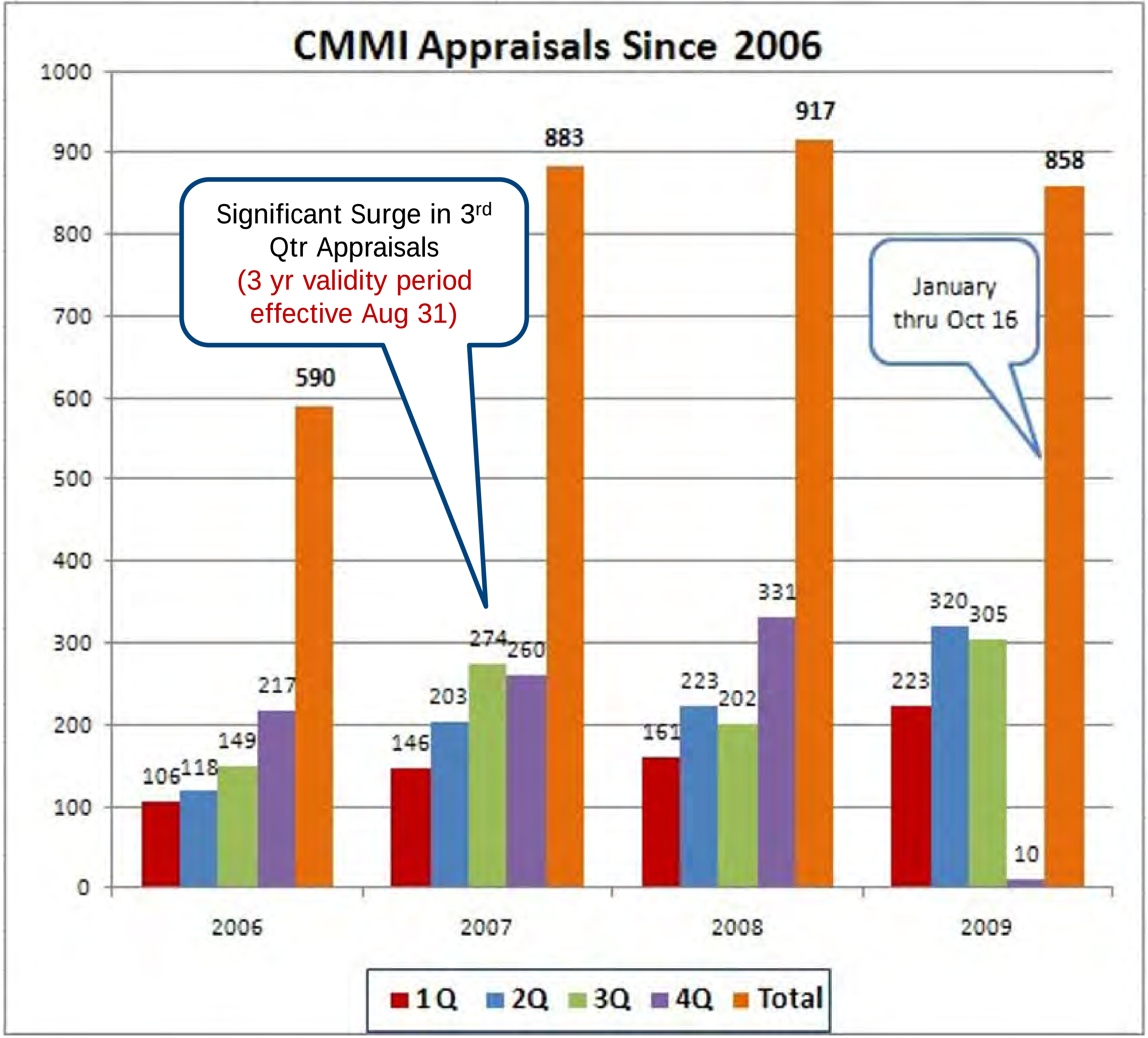
*(CMMI-SVC only eligible for Class A appraisals on Aug 31.)

Appraisal List includes 65 countries:

☺ Ten of the top 20 may not be the countries you expected

Publicly Reported Appraisals (thru Nov 7th)

NORTHROP GRUMMAN



CMMI Appraisals Since 2006

Significant Surge in 3rd Qtr Appraisals (3 yr validity period effective Aug 31)

January thru Oct 16

Note: 3rd Qtr 2007 was an anomaly!

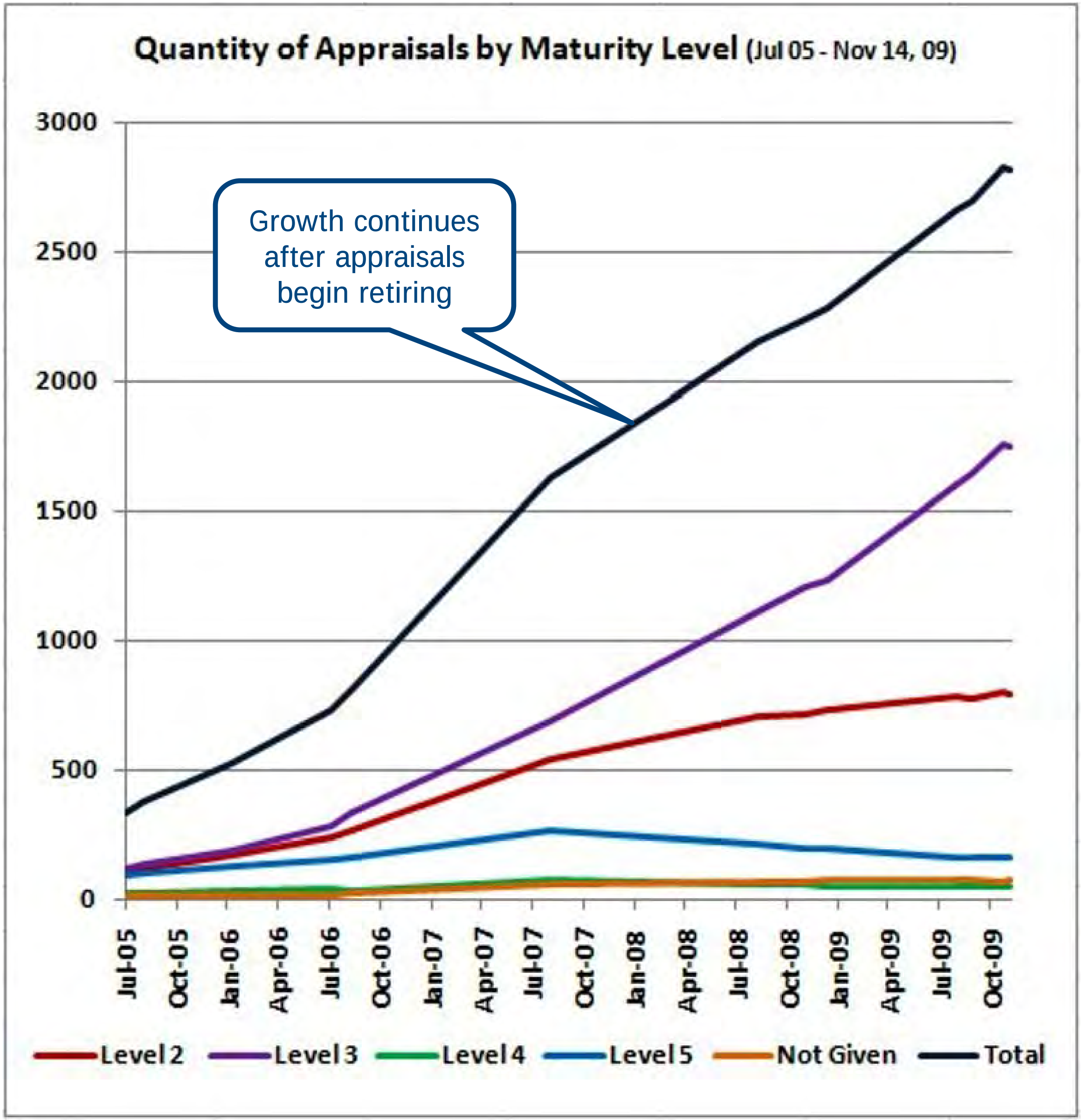
CMMI Steering Group initiated the 3 year validity rule for appraisals and it went into effect on Aug 31, 2007

Slower growth in 2008 may have been the result of older ‘appraisals for life’ being reappraised in 2007.

2009 is on pace to break 1000 for the first time but needed 590 just to stay even

2010 will need 883 to stay even

We’ve Had Steady CMMI Growth Over 4 Years



Growth continues after appraisals begin retiring

Obviously a good thing

BUT ….

Only Maturity Level 3 is growing robustly

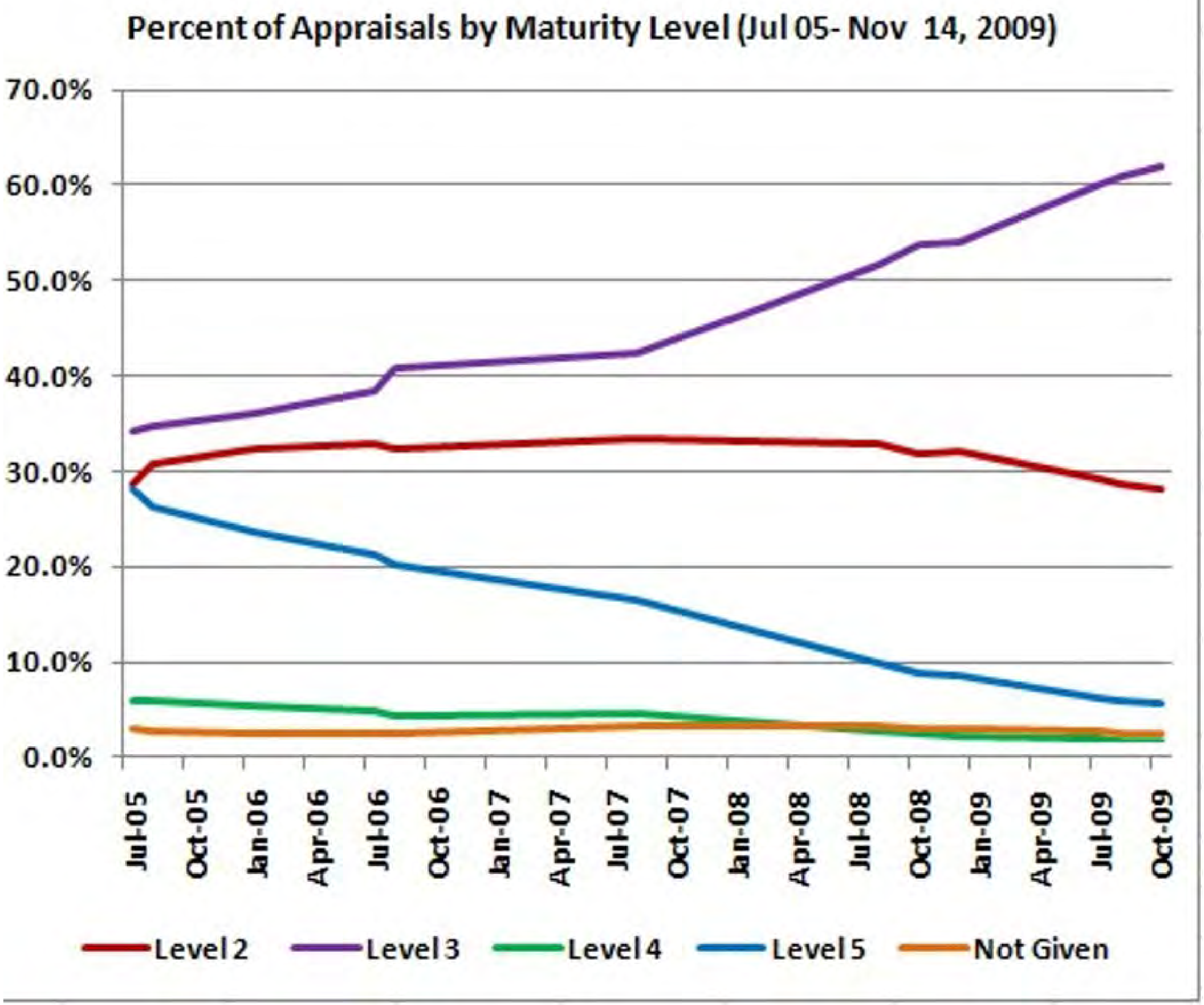
Maturity Level 2 is growing modestly

Maturity Level 4 is declining slightly

Maturity Level 5 is declining
-Only slightly higher than in July 2005

Not Given results are steady

Only Level 3 Appraisals Increasing



Relative Percentages of Appraisals tell a different story

Level 3 appraisals have grown from 34% to over 60% of all currently valid appraisals

Level 2 percentages haven’t changed

Level 4 percentages have dropped from 6.5% to under 2%

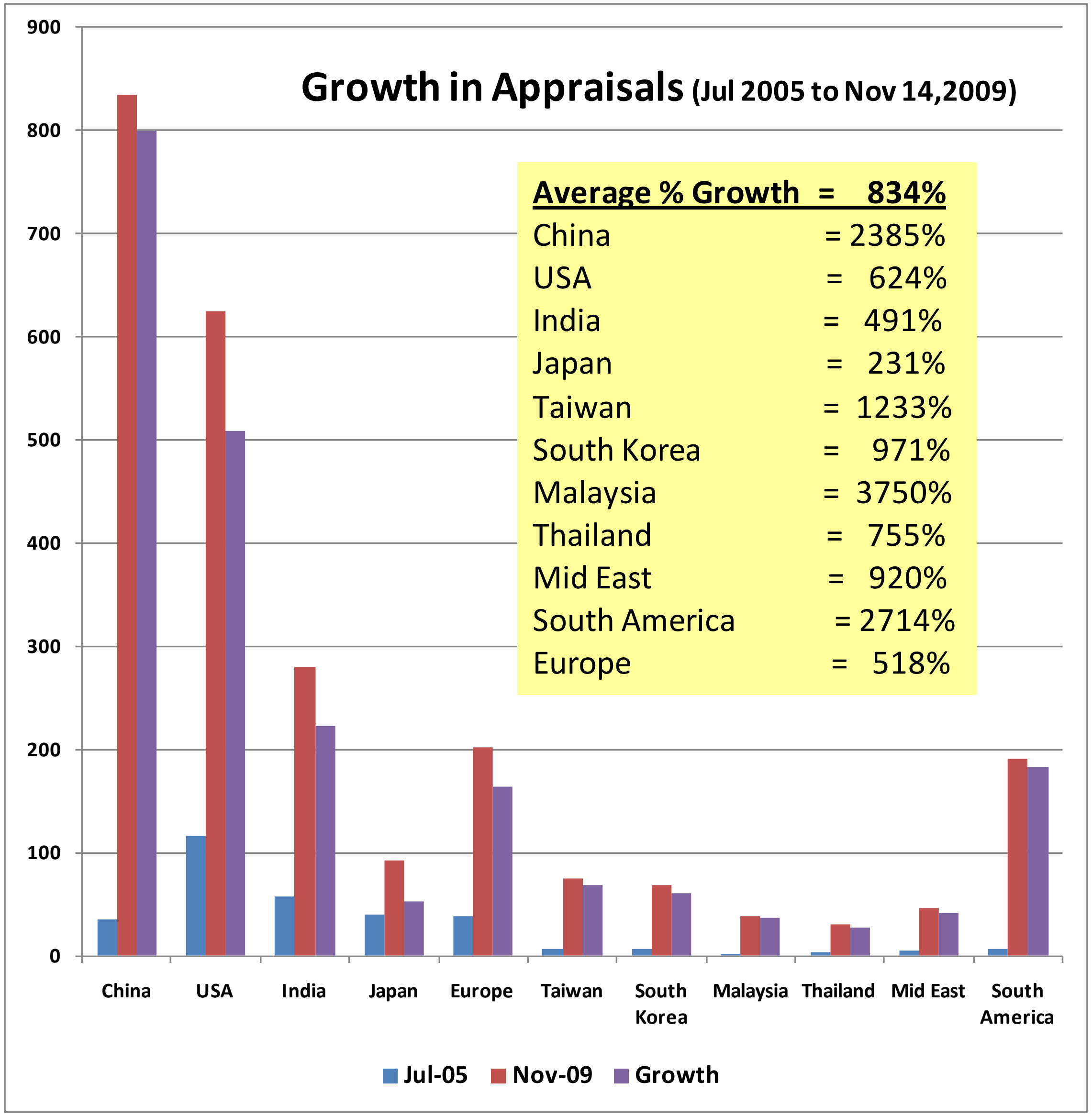
Level 5 has dropped precipitously from 29% to under 5.6%

WHY?

Why the Maturity Level 3 Surge?

- Chinese Government announced stipend for achieving a CMMI Maturity Level 3 in 2007
  - A surge of Chinese appraisals ensued and continues
  - China now has the largest quantity of appraisals of any country in the world
- CMMI Steering Group eliminated the “appraisal for life”, creating a surge in appraisals in 2006-2007
  - There still is a regular, growth overall even though ~ 1/3 of appraisals now retire each year
  - 144 appraisals are needed each year just to maintain the 2006 level.
- In 2008, SEI initiated High Maturity Audits without clearly stated appraisal criteria
  - Some companies re-appraised at Level 3 until they could predict that their expenditures would yield the desired results
- As a result, some did not pursue High Maturity appraisals until the criteria was published in Dec 08.
  - Hi Mat appraisal rates versus Level 2-3 have been dropping each year
  - From 11% to 6.5% to 5.1% since August 2007

External Influence or Early Adopters?



<u>**Average % Growth = 834%**</u>
China = 2385%
USA = 624%
India = 491%
Japan = 231%
Taiwan = 1233%
South Korea = 971%
Malaysia = 3750%
Thailand = 755%
Mid East = 920%
South America = 2714%
Europe = 518%

2005 Early Adopters

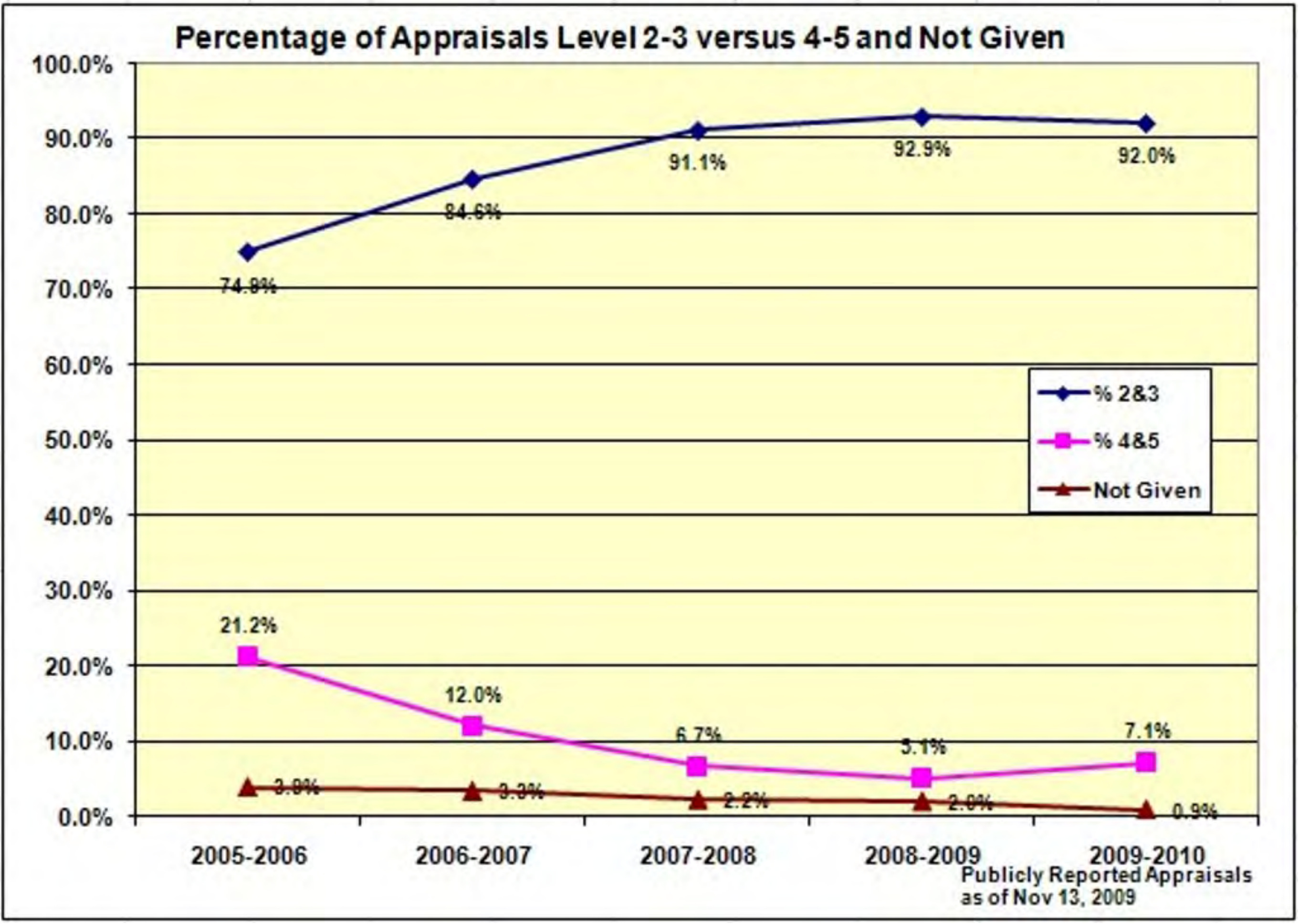
USA	116
India	57
Japan	40
Europe	39
China	35

2009 Leaders

China	835
USA	624
India	280
Europe	366
Japan	93

Rate of High Maturity Appraisals Slowing

(as of Nov 7, 2009)



Percentage of Appraisals Level 2-3 versus 4-5 and Not Given

Period of Measurement from Sep thru Aug

2006 Events that may have had impact

OSD Director of SSE

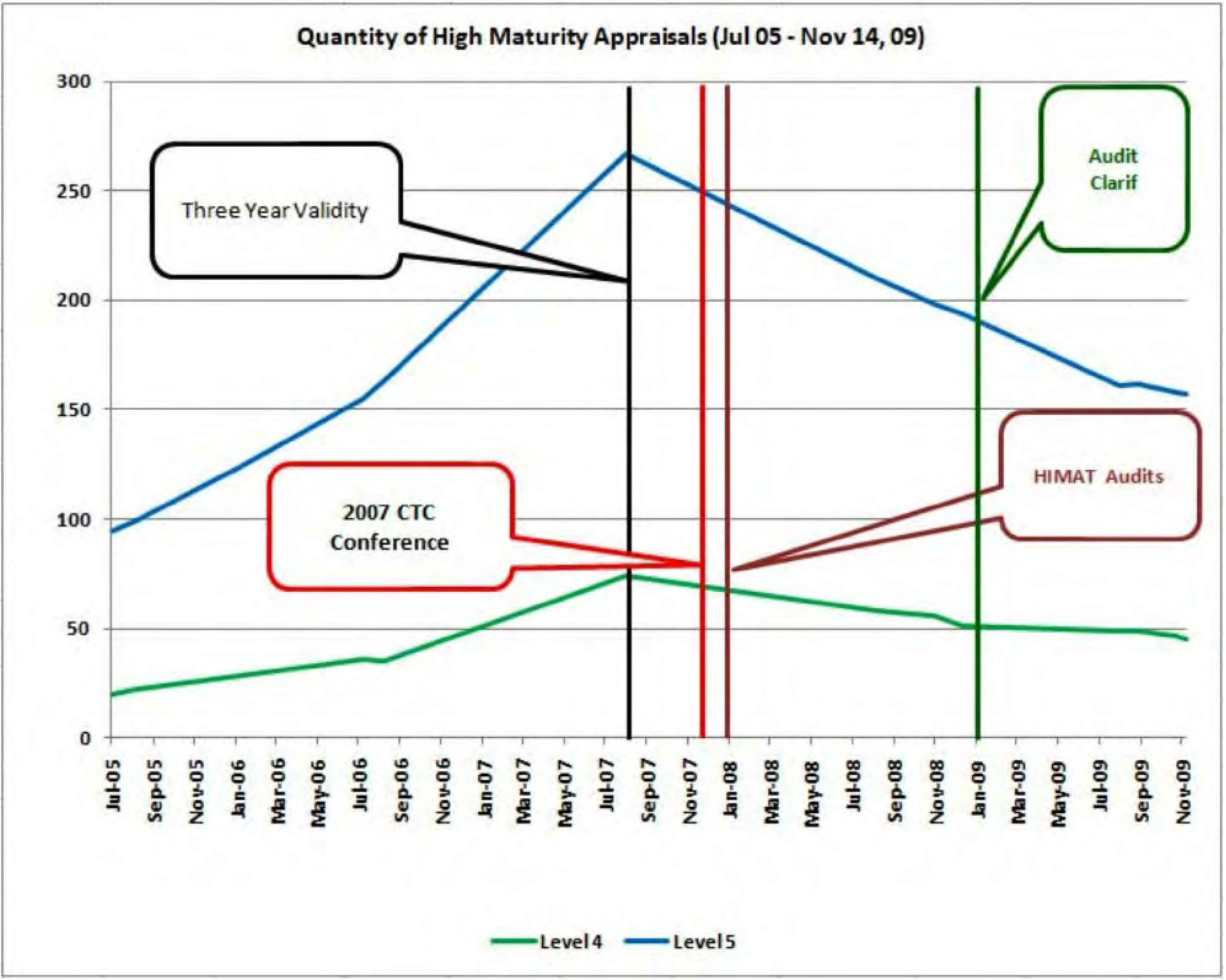
- Questioned the 'appraisal for life' status
- Claimed that Level 5 companies weren't demonstrating their Level 5 credentials
- Some complained about the quality of High Maturity appraisers

CMMI SG:

1. Instituted the 3 year validity
2. Instituted Hi Mat appraiser training & authorization

May be some hope in 2010

Events That Influenced Hi Mat



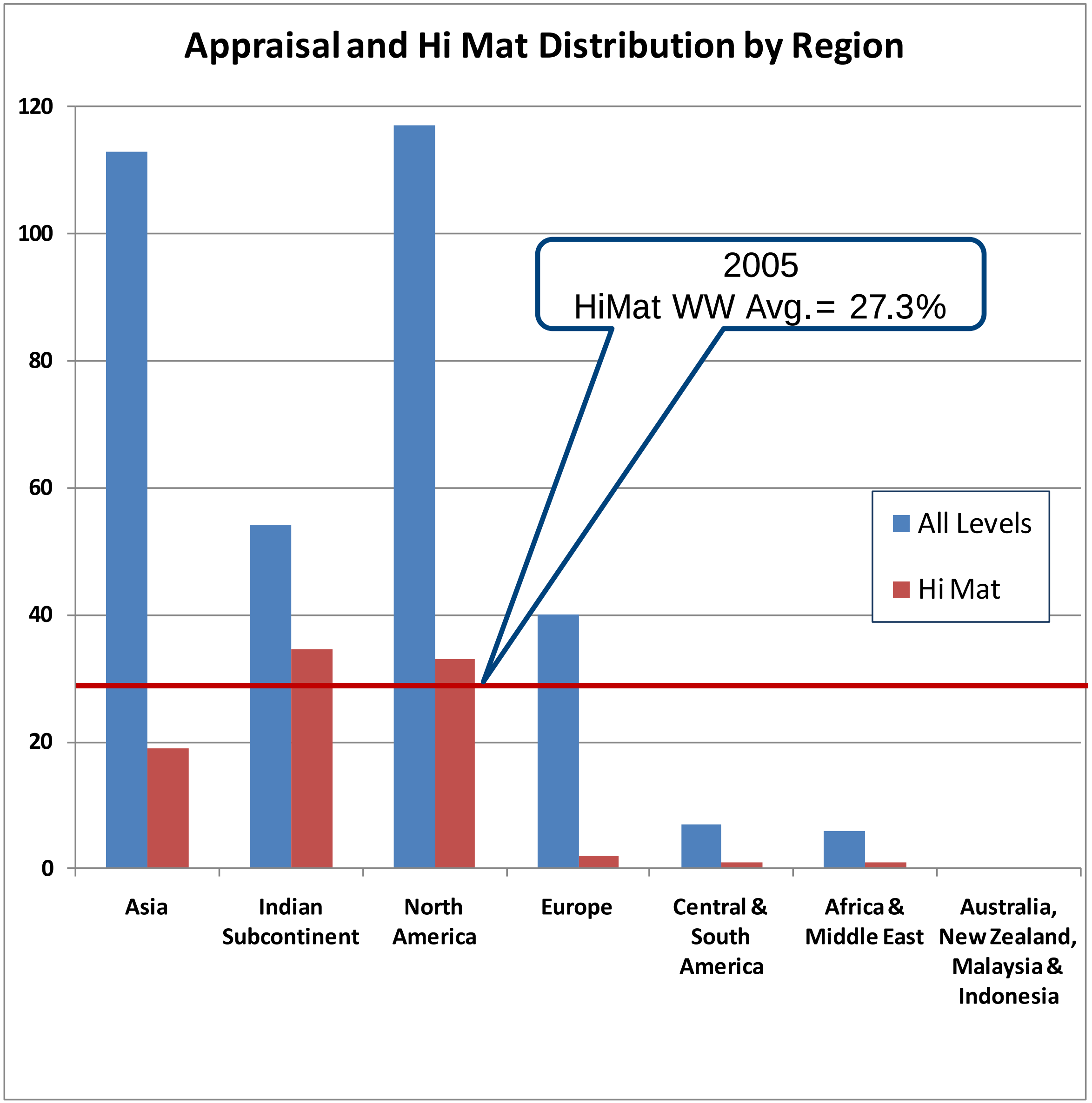
Factor: Companies have combined operations to save costs
BUT ...

Other events have impacted CMMI Hi Mat Appraisal Rates!

1) CMMI SG instituted a 3 year appraisal life
2) SEI instituted an undocumented audit process for all Hi Mat appraisals
3) Uncertainty about how DoD viewed Hi Mat appraisal holders

Those up for reappraisal may have wondered if it was worth it to continue if their integrity was questioned and they weren't sure of the rules

Distribution of Hi Mat Appraisals (July 2005)



July 2005
<u>% Hi Maturity (Level 4 & 5)</u>

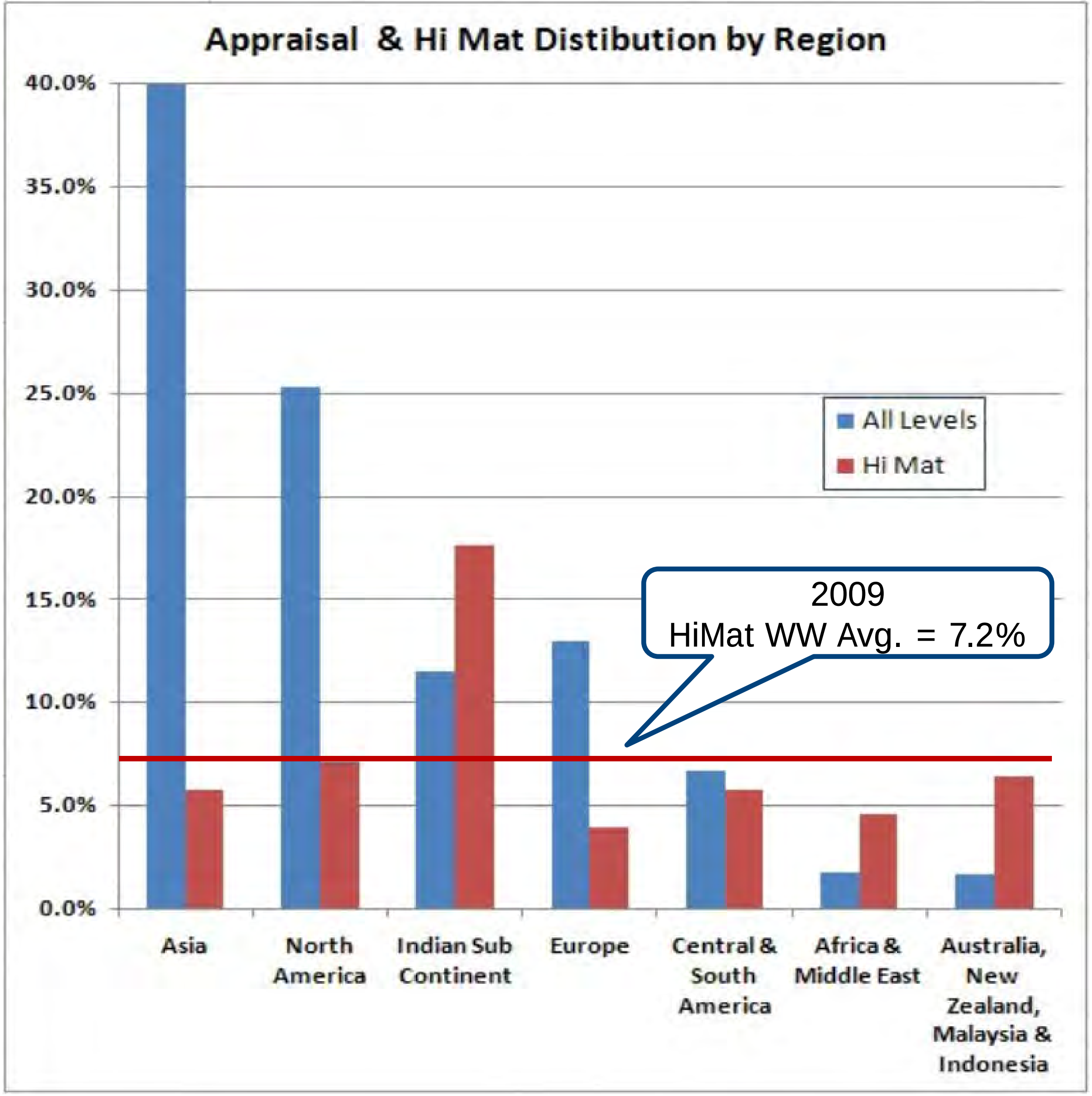
WW	**27.3 %**
North America	**28.3 %**

<u>Note</u>:
Appraisals did not begin retiring until 2007.

Surge of CMMI appraisals from early CMMI adopters in 2002-3 were still included in the totals

Biased the percentages during the early adopter period from 2002 to 2005

Distribution of Hi Mat Appraisals (Thru Nov 14)



2009
HiMat WW Avg. = 7.2%

Hi Maturity (Level 4 & 5) Average 7.2% of WW appraisals
(down from 34.9% in July 2005)

India averages 20.1% (Down from 36.5% in 2005)

North America averages 7.2%
US averaged 7.0% (Down from 28.3% in July 2005)

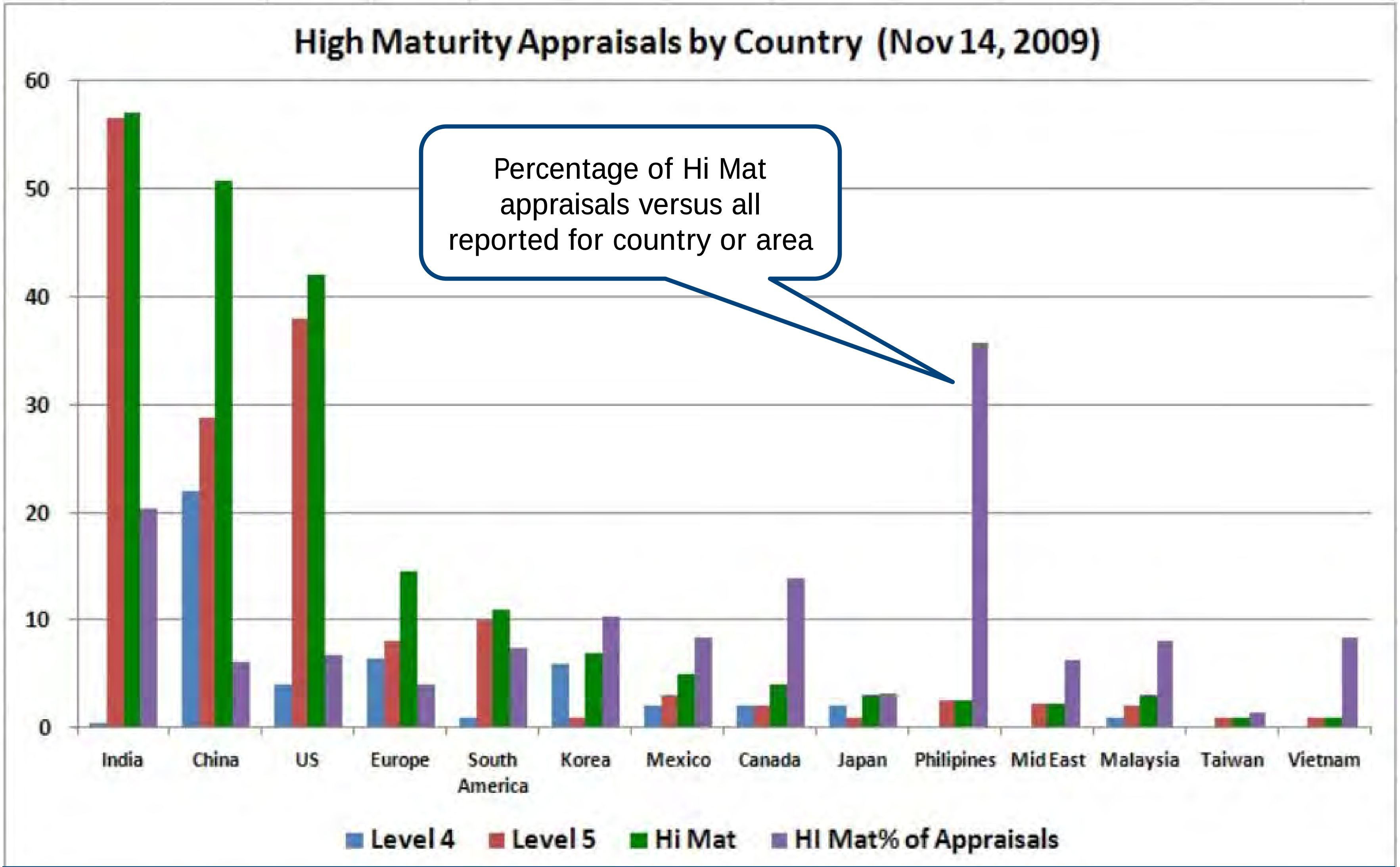
Canada averages 13.9%
Mexico averages 8.4%

China averages 6.2% (Down from 7.5% in July 2005
South Korea averages (10% Up from 2.1% in 2005)

Note: Appraisals prior to Oct 2005 (114) are not included

Pursuit of Maturity Level 5 Impacted by US DoD?

(113 of 156 organizations (72.4%) don't seem to be affected)

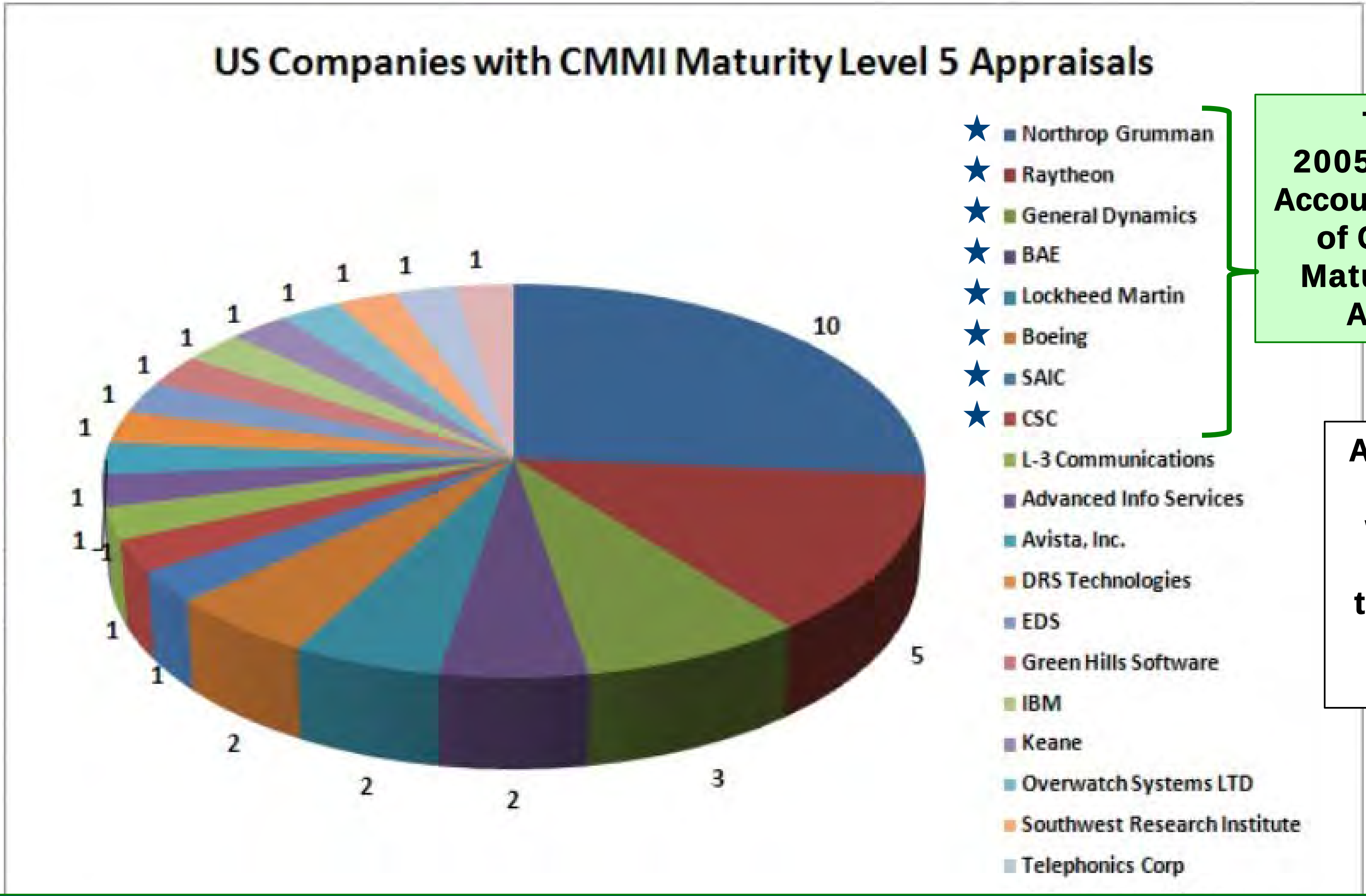


Percentage of Hi Mat appraisals versus all reported for country or area

Philippines, India, Canada, Korea, and Mexico still show more than 10% Hi Mat appraisals. India maintains close to a 20% Hi Mat appraisal percentage.

18 US Companies Remain CMMI Maturity Level 5

(Nov 14, 09 Compared to ★8 companies & 2 DoD in Jul 2005)



These 8 2005 Companies Account for 71.8% of Current US Maturity Level 5 Appraisals

After all these years, why do they still believe there is value in High Maturity?

Maybe these companies use measurement and analysis to prove Hi Mat value for themselves!

Possible Explanations?

(Even with consolidation of organizations, ML5 quantities have remained about at 2006 levels.)

Could it be that:

- Companies with successful High Maturity methods won’t abandon them if they are working?
  - They believe that there is value in managing with fact instead of supposition
  - They measure the value of their improvements
    - Our VP & General Manager won’t allow business units to manage without data
    - He uses that style of management and won’t relax his standards of performance
    - His Division has grown from $450 M in 2002 to almost $ 4 B in 2009.
- Perhaps the companies who were going for maturity levels instead of improvement never learned to get the real value from High Maturity?
  - That may be a reason some companies have not gone through Hi MAT reappraisals

Pursuit of High Maturity seems to depend upon perseverance and dedication. Expecting to achieve big benefits without continued effort and dedication doesn’t appear to pay off!

Your Challenge Awaits

- First look at the data and do your own analysis
  - See how you stack up against your competitors across the world
- Validate your impressions and look into potential factors
  - First determine if what others are saying has any validity in fact
  - Don’t be afraid to ask why the traditional perceptions don’t seem to be valid
  - Most importantly, look for what matters to your organization
- Keep your eye on CMMI-ACQ and CMMI-SVC
  - It would be natural to see if new organizations or existing organizations predominate initial adoption
  - It may be that your competitors will adopt these new CMMI constellations to improve their operations

NORTHROP GRUMMAN

Benefits to the Evolution of High Maturity Software Development: A 15 Year Case Study

Daniel W. Drew, Erik Likeness

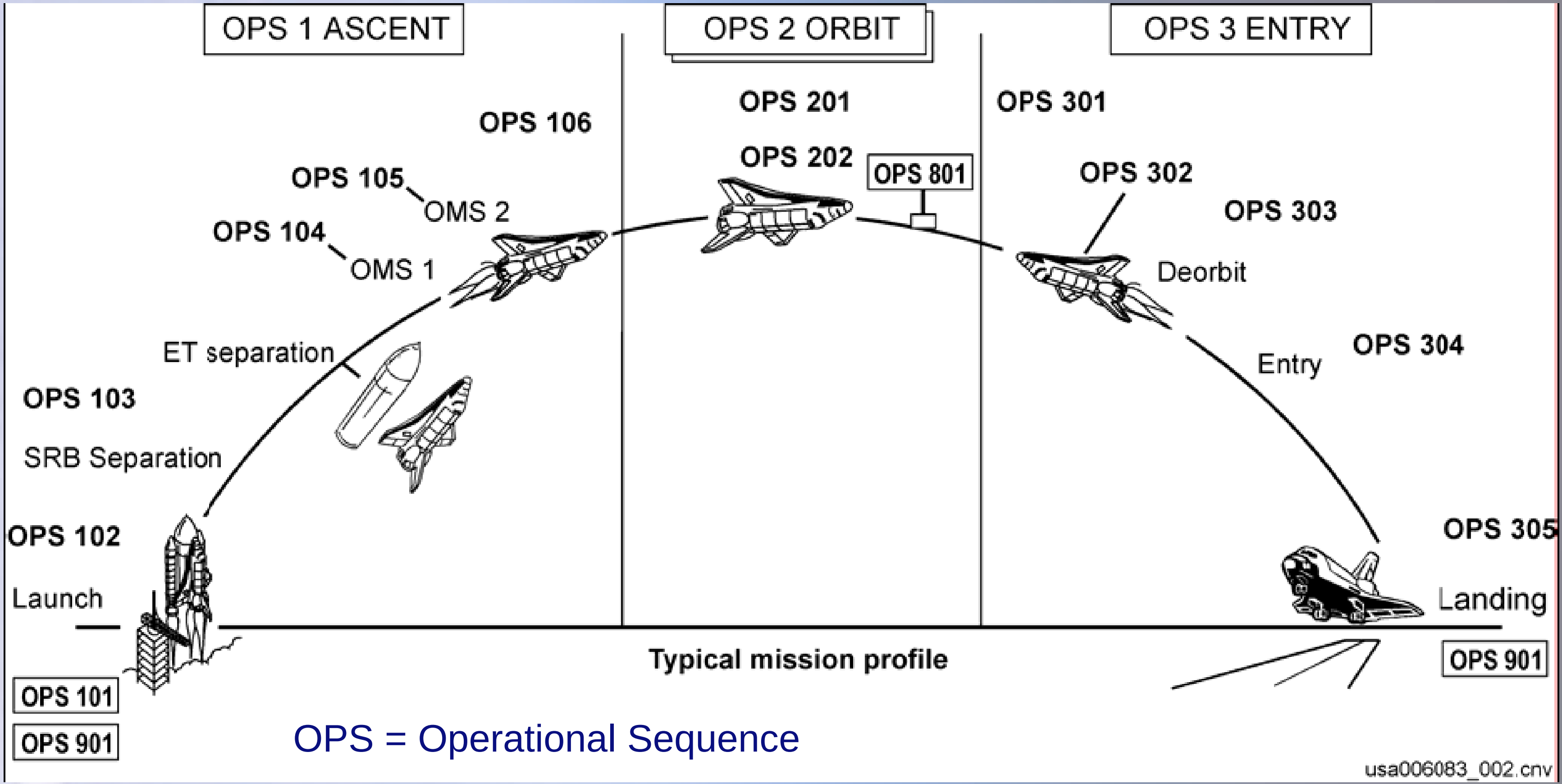
United Space Alliance, LLC

Agenda

- A brief history of the Flight Software Element (FSWE)
- Overview of the FSWE software process
- Changes to High Maturity
- Changes to the FSWE software process
- CMMI as a Vehicle to Meet Customer Needs
- Benefits to USA, our Customers, and Software Acquisition

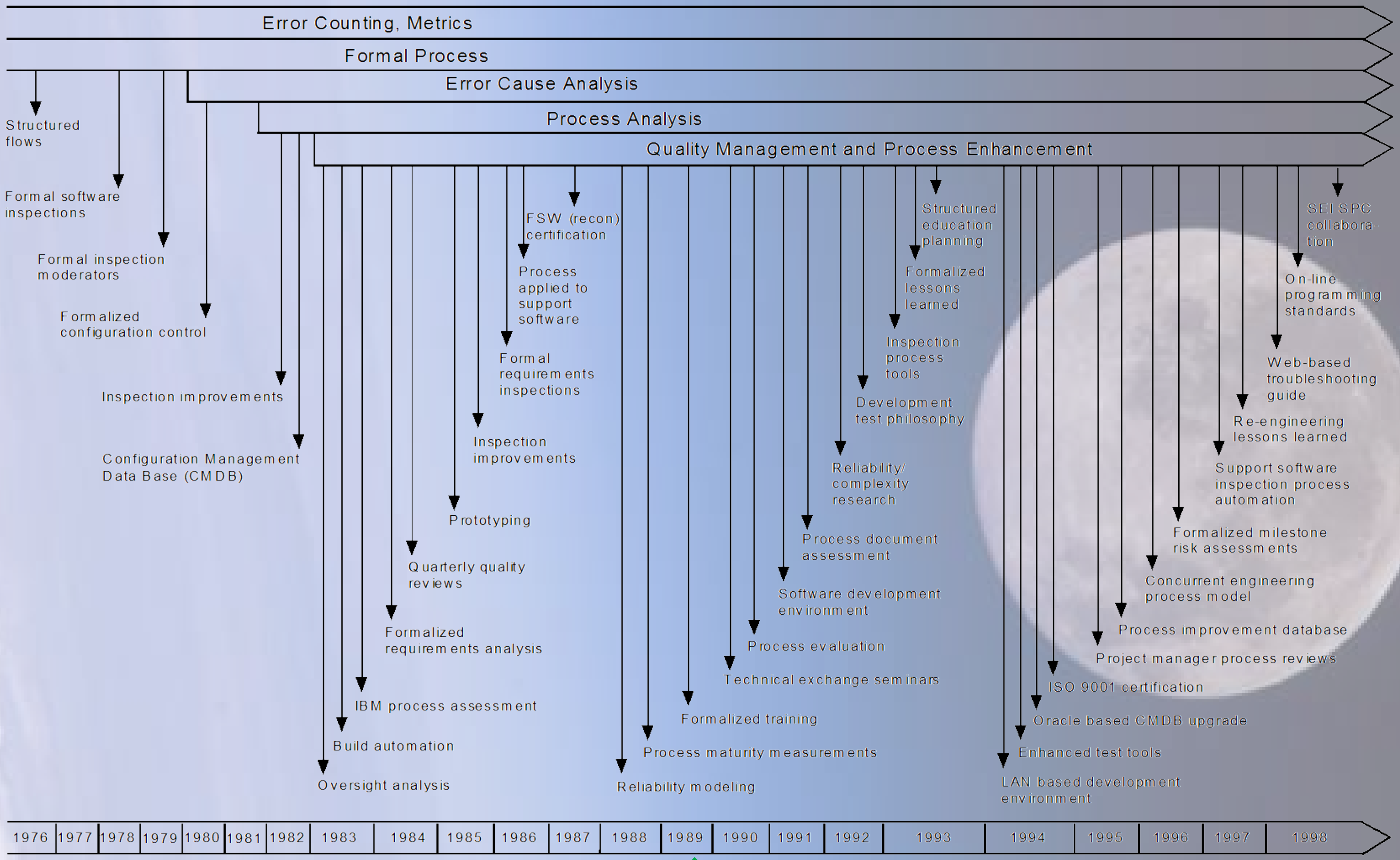
Functional Structure of Onboard Software

Preflight Initialization Checkout	**Ascent / Abort**	**On-Orbit**	**On-orbit Systems and Payload Management**	**Entry**	**Mass Memory Utility**



OPS = Operational Sequence

Continuous Process Improvement Started in 1976



Error Counting, Metrics

Formal Process

Error Cause Analysis

Process Analysis

Quality Management and Process Enhancement

Structured flows

Formal software inspections

Formal inspection moderators

Formalized configuration control

Inspection improvements

Configuration Management Data Base (CMDB)

Oversight analysis

Build automation

IBM process assessment

Formalized requirements analysis

Quarterly quality reviews

Prototyping

Inspection improvements

Formal requirements inspections

Process applied to support software

FSW (recon) certification

Reliability modeling

Process maturity measurements

Formalized training

Technical exchange seminars

Process evaluation

Software development environment

Process document assessment

Reliability/ complexity research

Development test philosophy

Inspection process tools

Formalized lessons learned

Structured education planning

LAN based development environment

Enhanced test tools

Oracle based CMDB upgrade

ISO 9001 certification

Project manager process reviews

Process improvement database

Concurrent engineering process model

Formalized milestone risk assessments

Support software inspection process automation

Re-engineering lessons learned

Web-based troubleshooting guide

On-line programming standards

SEI SPC collaboration

1976 1977 1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996 1997 1998

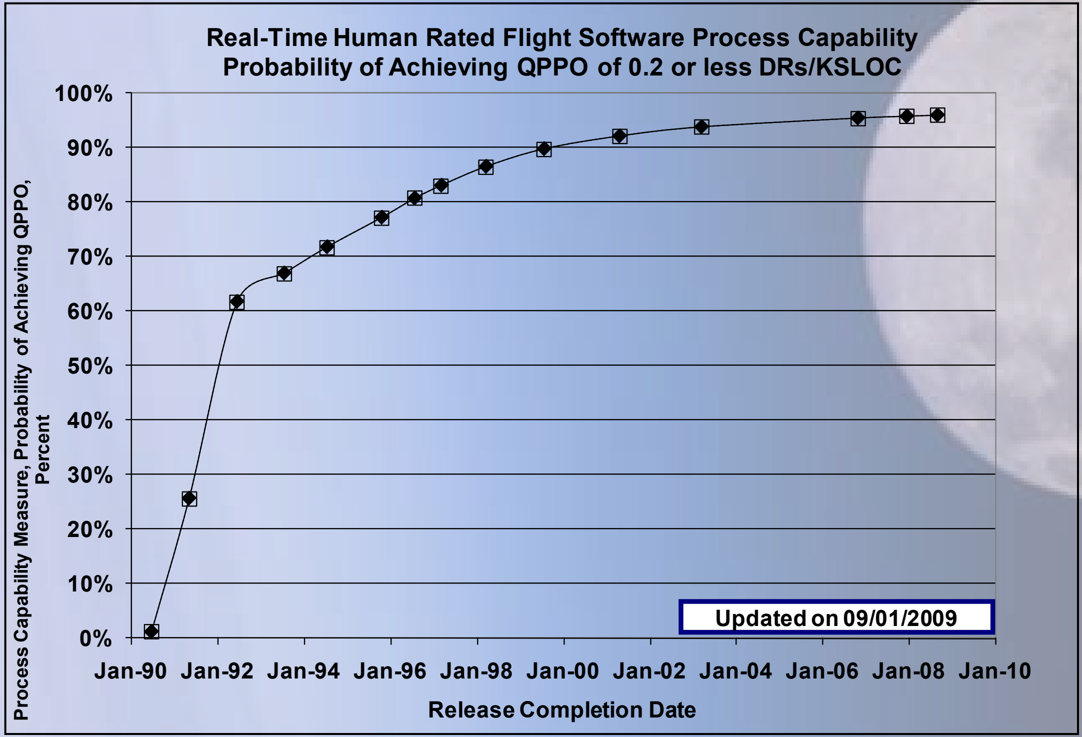
Groups_graphics_pubs_PASS_FSW_001.cvs

Recognized as CMM Level L5 1989

11/18/2009

Evolution of Capability

- The FSW Organization has practiced the elements of high maturity for over 20 years.
- From a quality perspective, our understanding of common and special cause variation within our processes has allowed us to optimize our quality to a world-class level



Evolution Cont.

- Today there are three major business areas in the FSW Organization
  - Real-Time Human Rated Software
    - Develops On-Board Guidance/Navigation/Control/Support Systems software for the Space Shuttle
  - Mission Critical Application Tools
    - Develops ground support software simulation/testing environments for Human-Rated Shuttle Software Validation and Mission Support Activities
  - Avionics Integrated Laboratory Support Software
    - Develops ground support software simulation/testing which are integrated with Shuttle Hardware to Validate Human-Rated Shuttle Software and Mission Support Activities
- Our CMM/CMMI ratings began with Human-Rated Software and evolved over the years to include all three.

High Maturity Evolution: Model Changes L4

CMM	CMMI 1.1	CMMI 1.2
Quantitative Process Management	**Quantitative Project Management**	**Quantitative Project Management**
Control the process performance of the project quantitatively	Quantitative management clarified to center around statistical techniques	Focus on the use of performance baselines and models in active project management
Software Quality Management	**Organizational Process Performance**	**Organizational Process Performance**
Define quantitative quality goals for project products and achieve those goals	Establish performance baselines and models for the organization's standard process	Focus on PPB and PPM tie to business objectives and use of statistical techniques

High Maturity Evolution: Model Changes L5

CMM	CMMI 1.1	CMMI 1.2
Defect Prevention	**Causal Analysis and Resolution**	**Causal Analysis and Resolution**
Identify the cause of defects and prevent them from recurring	Amplification on causal analysis and resolution activity	Tie causal analysis and resolution to a “quantitatively managed” process
Technology Change Management	**Organizational Innovation and Deployment**	**Organizational Innovation and Deployment**
Identify new technologies and transition them into the organization	Select and deploy incremental and innovative improvements that measurably improve processes and technology Tie to PPB and PPM and Statistical techniques	Improvements show measurable statistical significance Tie to business objectives
Process Change Management		
Improve the software processes with the intent of improving software quality		

Evolution of the Flight Software Organization

Man-Rated Real Time Software

Included Mission Critical Application Tools and Avionics Integration Support Software

Multi-contract environment drives additional emphasis at organizational level

- Formal Processes
- Process Enactment
- Quality Management
- Error Analysis
- Process Analysis

- Strengthened all high maturity practices by standardizing measurements across all business areas (OPP)
- Transformed measurements into metrics (OPP)
- Integrated PPB and PPM (OPP)
- Formalized Causal Analysis Process (CAR)
- Structured incremental and innovative improvements to tie to PPB, PPM and Statistical techniques using Lean Six Sigma (OID)

- Embedded L6S DMAIC Methodology into CAR/OID/OPP.
- Quantitative Business Objectives with detailed measurement plans and link to PPB and PPM. (OPP)
- Closed the loop between QPM and OPP. (CAR)
- New or Changed PPB Integrated into Organizational Assets (CAR)
- Quantitative Business Objectives with direct linkage to Innovation projects.

CMM 1989	CMMI v1.1 2006	CMMI v1.2 2009

11/18/2009

United Space Alliance

Customer Needs Closed Loop with PPB & PPM

Customer Needs

Define

Measure

Analyze

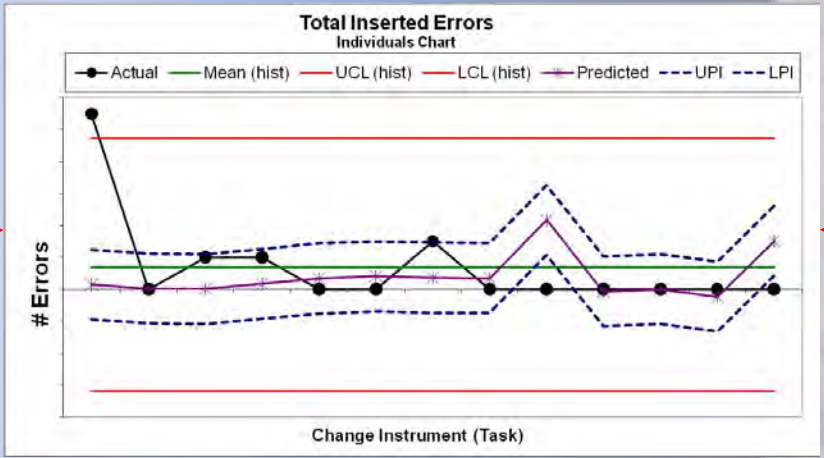
Improve

Control

SMART Objectives Enable Focus for OPP

(Specific, Measureable, Achievable, Realistic, Time-Bound)

OPP: Process Performance Baselines & Models



OPP: Process Performance Baselines & Models

CAR & OID Facilitate Measurable Improvements that are Controlled Quantitatively

Define

Measure

Analyze

Improve

Control

Improvement

11/18/2009

Overall Benefit

- Process improvement driven more by changes in business environment rather than changes in the CMMI
  - In the past, we have had only a single customer where Quality was paramount.
  - Today's Market, as well as future market, Cost is becoming equally as important.
- Changes to the CMMI provided more focus direction for applying high maturity to the organization's business needs
- While the improvements we have made benefited the market of their time, those methodologies can be translated to help provide customers with overall best-value
  - Tailor-able Cost and Quality given the needs of the customer
  - Processes with historically proven capability

Acquisition Strategy

- A High Maturity Organization should be able to provide
  - Reliable and predictable quality
    - Tailored to your specific capability needs
  - Substantiated cost with the ability to optimize
    - Tailored based on your dynamic budget
  - Consistent predictable results
- Do not rely merely on the CMMI rating
  - Look at the application of PPBs and PPMs
  - Review the organization's business objectives and benchmarks against those objectives

BACKUP CHARTS

Comparison of CMM and CMMI Goals

Quantitative Process Management	Quantitative Project Management
The quantitative process management activities are planned.	The project is quantitatively managed using quality and process-performance objectives.
The process performance of the project's defined software process is controlled quantitatively.	The performance of selected subprocesses within the project's defined process is statistically managed.
The process capability of the organization's standard software process is known in quantitative terms.	

Comparison of CMM and CMMI Goals

Software Quality Management	Organizational Process Performance
The project’s software quality management activities are planned.	Select the processes or subprocesses in the organization’s set of standard processes that are to be included in the organization’s process-performance analysis
Measurable goals for software product quality and their priorities are defined.	
Actual progress toward achieving the quality goals for the software products is quantified and managed.	

Comparison of CMM and CMMI Goals

Defect Prevention	Causal Analysis and Resolution
Defect prevention activities are planned.	Root causes of defects and other problems are systematically determined.
Common causes of defects are sought out and identified.	Root causes of defects and other problems are systematically addressed to prevent their future occurrence.
Common causes of defects are prioritized and systematically eliminated.	

Comparison of CMM and CMMI Goals

<table>
<tr><th>Technology Change Management</th><th>Organizational Innovation and Deployment</th></tr>
<tr><td>Incorporation of technology changes is planned.</td><td>Process and technology improvements, which contribute to meeting quality and process-performance objectives, are selected.</td></tr>
<tr><td>New technologies are evaluated to determine their effect on quality and productivity.</td><td>Measurable improvements to the organization’s processes and technologies are continually and systematically deployed.</td></tr>
<tr><td colspan="2">Appropriate new technologies are transferred into normal practice across the organization</td></tr>
<tr><th colspan="2">Process Change Management</th></tr>
<tr><td colspan="2">Continuous process improvement is planned.</td></tr>
<tr><td colspan="2">Participation in the organization’s software process improvement activities is organization-wide.</td></tr>
<tr><td colspan="2">The organization’s standard software process and the projects’ defined software processes are improved continuously.</td></tr>
</table>

Criteria for Audits of CMMI High Maturity Appraisals

- The SEI is currently performing audits of all CMMI High Maturity appraisals. The following are the criteria being used for these audits. These criteria in no way limit the application of the model or its intent or judgments made during an appraisal, nor do they relieve the organization from fully implementing the model.
- As defined in the SCAMPI v1.2 Method Definition Document Section 1.1.3, these criteria refers to the instantiations in the representative sample that are identified as either focus projects, non-focus projects, or other organizational level instantiations with a scope that includes the high maturity process areas.

Audit Criteria

- Organizational Process Performance
  - (SP 1.1) Show the relationship between the business objectives and the processes selected for process performance analysis.
  - (SP 1.2) Show the analysis and rationale for deciding what data to include in the process performance analysis.
  - (SP 1.3) Show the relationship between business objectives and Quality and Process Performance Objectives (QPPOs).
  - (SP 1.4) Describe Process Performance Baselines (PPBs) in terms of central tendencies and variation for the processes selected for analysis.
  - (SP 1.5) Describe at least one Process Performance Model (PPM) in terms of the processes included, the controllable inputs and the predicted outputs. The model must be statistical or probabilistic in nature rather than deterministic, i.e., the model considers uncertainty and predicts that uncertainty or range of values in the outcome.

Audit Criteria

- Quantitative Project Management
  - (SP 1.2) Describe how the projects created their defined process by using PPBs and/or PPMs to predict the ability of the processes selected to meet the project's QPPOs.
  - (SP 1.3) Describe the project's rationale for selecting subprocesses to be statistically managed.
  - (SP 1.4) Show how at least one project used process measures as inputs to a PPM used to actively manage the project.
  - (SP 2.2) Show that at least one project applied statistical methods to identify and remove special causes of variation from selected subprocesses.
  - (SP 2.3) Show how projects monitor the capability of selected subprocesses.

Audit Criteria

- Causal Analysis and Resolution
  - (SP 1.2) Demonstrate that at least one of the defects or problems selected for analysis was related to a quantitatively managed process, where “quantitatively managed” is as defined in the glossary.
- Organizational Innovation & Deployment
  - SP 2.3) Demonstrate that the effects of at least one improvement were measured for statistical significance.

Changing Behavior:

The key to adoption of complex process technology

Dr. Gene Miluk
Software Engineering Institute
Carnegie Mellon University
Pittsburgh, PA 15213

November, 2009

My goals for this presentation

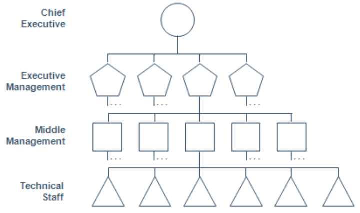
1) Present new or different approaches to technology transition
2) Challenge your current thinking (changing change agents is hard)
3) Describe what I see is working in the field (and my thoughts on why)
4) Focus on the potential benefits to you and your organization inherent in these approaches to change
5) Describe my reactions and internalization of the approaches

Topics

- Current SEI Change Management Approach
- What's Needed
- A New Approach
- Bandura Social Learning
- Bayesian Belief Networks

Comprehensive System Change Model (IDEAL)

Typical Organization Structure



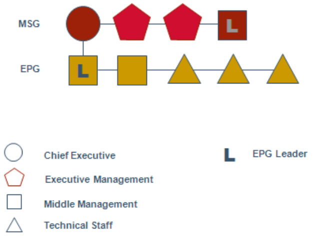
A Process Improvement Infrastructure

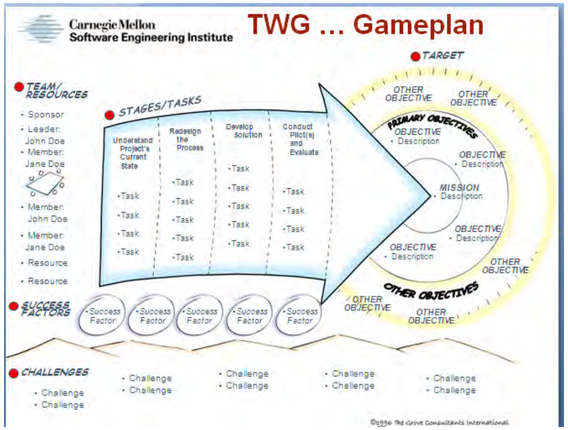
Core Teams are typically formed and given responsibilities and roles for managing, facilitating, and implementing a change effort from start to finish.

The Process Change Method

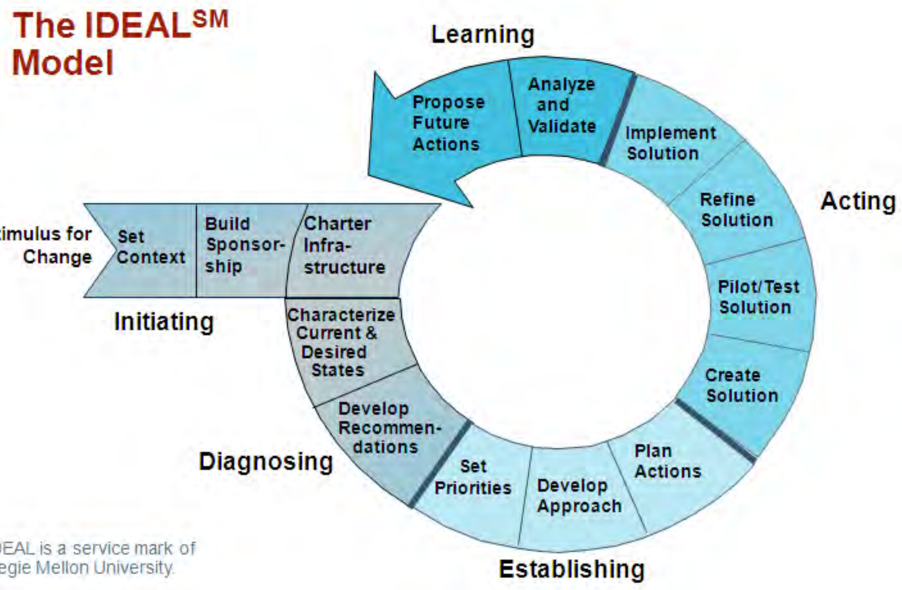
① Organize and Prepare
② Conduct Organizational Scan
③ Establish Technical Working Groups
④ Understand Project's Current State
⑤ Redesign the Process
⑥ Develop Solution
⑦ Conduct Pilot(s) and Evaluate
⑧ Facilitate Organizational Learning

Staffing the Process Infrastructure





SEI IDEAL™ Model



^{SM} IDEAL is a service mark of Carnegie Mellon University.

Based on Org Change Principles:

Action Research

Socio-tech Systems

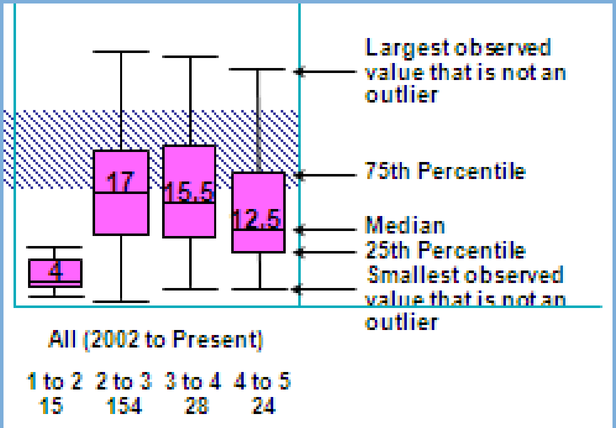
Plan Do Check Act

Cascading Sponsorship

Parallel learning Structures (SEPG)

My experience with using IDEAL:

- Takes too long (SEI time to move up)
- Costs too much
- Engineers don't embrace it
- Hard to sell Management Value Proposition



The assimilation gap is the gap between the objective and the deployment

Assimilation Gap

1) Implementation gap

2) Performance gap

*Robert G. Fichman, Chris F. Kemerer, **"The Illusory Diffusion of Innovation : An Examination Of Assimilation Gaps"**, Working Paper Series No.746, Katz Graduate School of Business, University of Pittsburgh, November 1995.*

Interested In ?

A streamlined transition approach that provides:

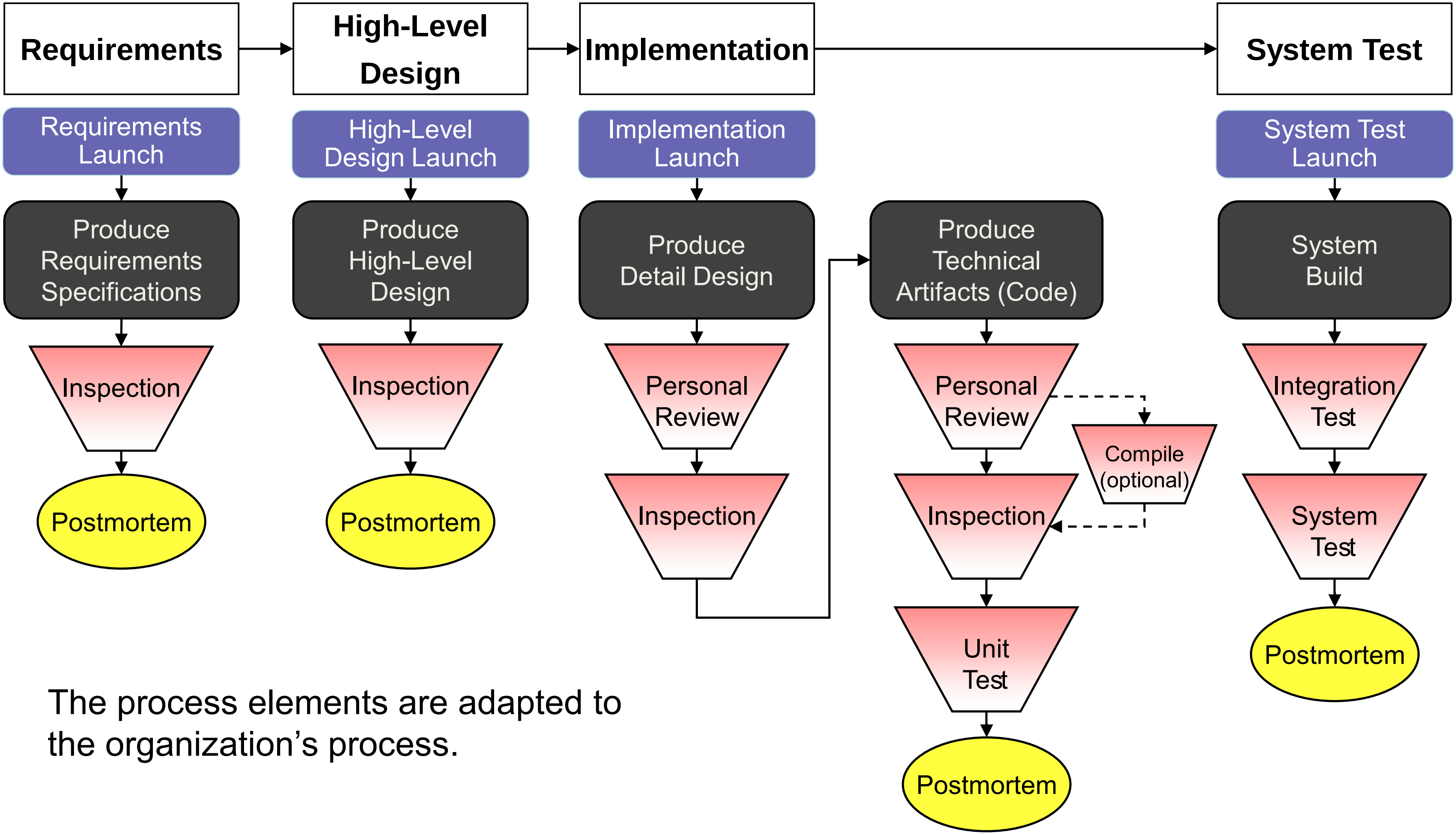
- Compelling Management Value Proposition
  - Predictable Costs
  - Creeping Commitment
  - Quick results with measurable ROI
- Concentrated and Focused process investments
- Accelerated Learning Environment
  - New Processes, New Experiences, New Data, New Beliefs, New Behaviors
- Rapid Predictable Organizational Adoption
- Continually Measurable Results

Major Differences in Approach to Transition

- Concentrated Process
  - Comprehensive Packaged Operational System of Integrated Processes
  - Proven Performance
  - Integrated Operational Measurement System (Individual level)

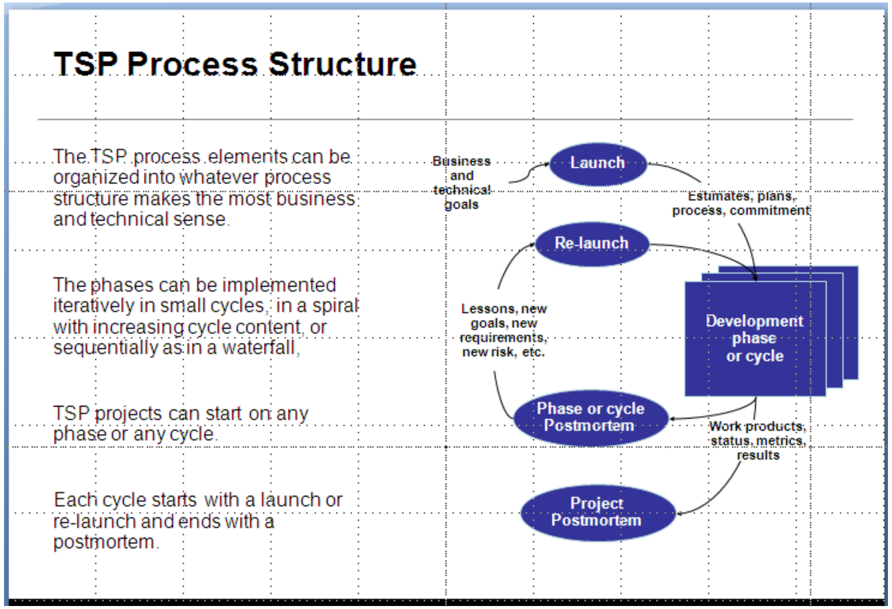
- Focused Implementation Strategy
  - Unit oriented (Project/Team)
  - JIT Concentrated 3 level Training
  - Accelerated Learning Laboratory
  - Effective Project/Team Launch Process
  - Coaching and continued support

Comprehensive HP Development Process



The process elements are adapted to the organization's process.

Effective Project/Team Launch Process



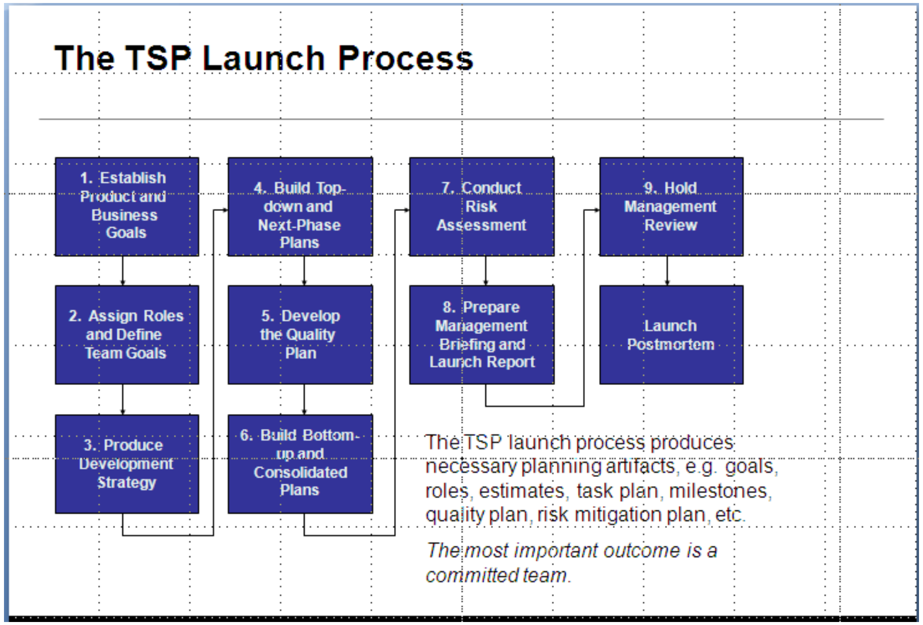
TSP Process Structure

The TSP process elements can be organized into whatever process structure makes the most business and technical sense.

The phases can be implemented iteratively in small cycles, in a spiral with increasing cycle content, or sequentially as in a waterfall,

TSP projects can start on any phase or any cycle.

Each cycle starts with a launch or re-launch and ends with a postmortem.



The TSP Launch Process

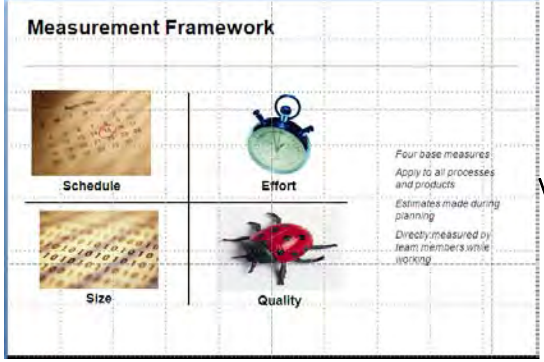
1. Establish Product and Business Goals
2. Assign Roles and Define Team Goals
3. Produce Development Strategy
4. Build Top-down and Next-Phase Plans
5. Develop the Quality Plan
6. Build Bottom-up and Consolidated Plans
7. Conduct Risk Assessment
8. Prepare Management Briefing and Launch Report
9. Hold Management Review

Launch Postmortem

The TSP launch process produces necessary planning artifacts, e.g. goals, roles, estimates, task plan, milestones, quality plan, risk mitigation plan, etc.

The most important outcome is a committed team.

Operational Plans Implemented Processes



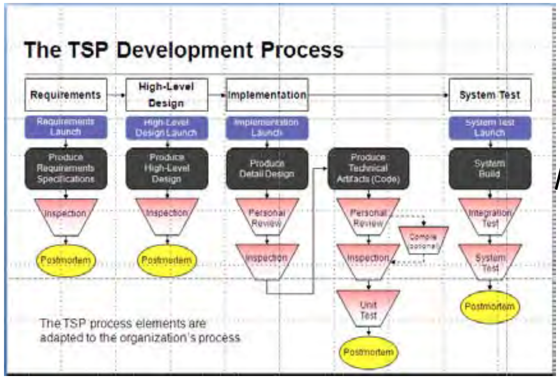
Measurement Framework

Four base measures

Apply to all processes and products

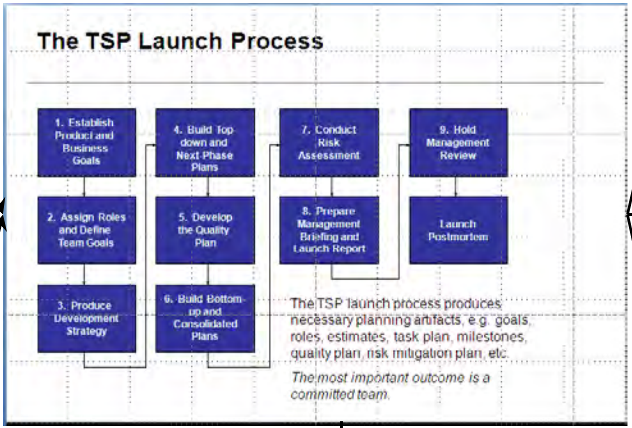
Estimates made during planning

Directly measured by team members while working



The TSP Development Process

The TSP process elements are adapted to the organization's process



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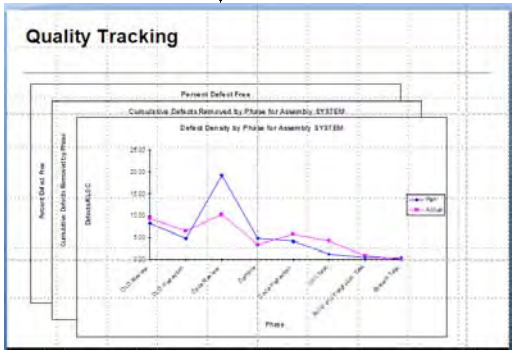
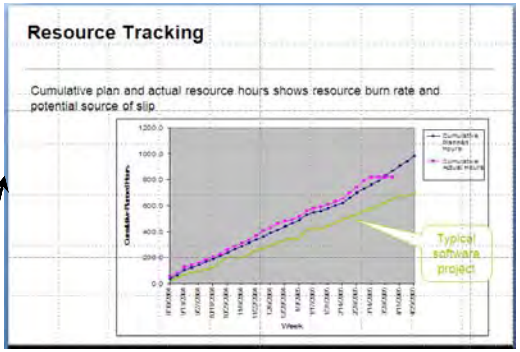
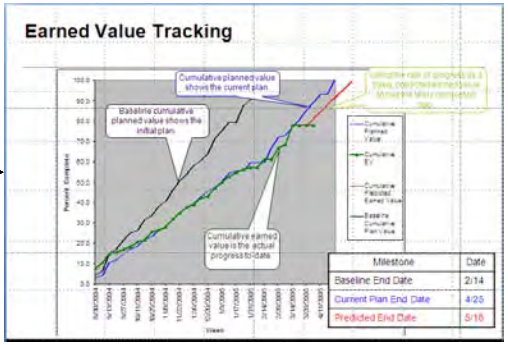


Quality Tracking



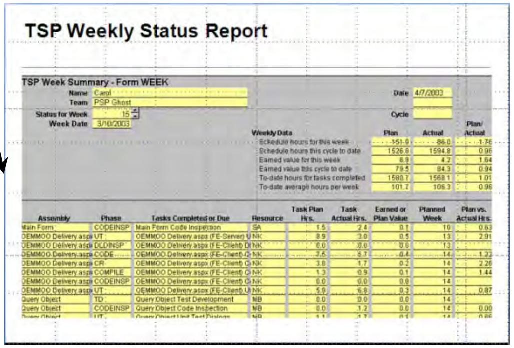
Resource Tracking

Cumulative plan and actual resource hours shows resource burn rate and potential source of slip



Earned Value Tracking

Milestone	Date
Baseline End Date	2/14
Current Plan End Date	4/25
Predicted End Date	5/16



TSP Weekly Status Report

TSP Week Summary - Form WEEK

Name: Carol

Team: PSP Ghost

Status for Week: 15

Week Date: 3/10/2003

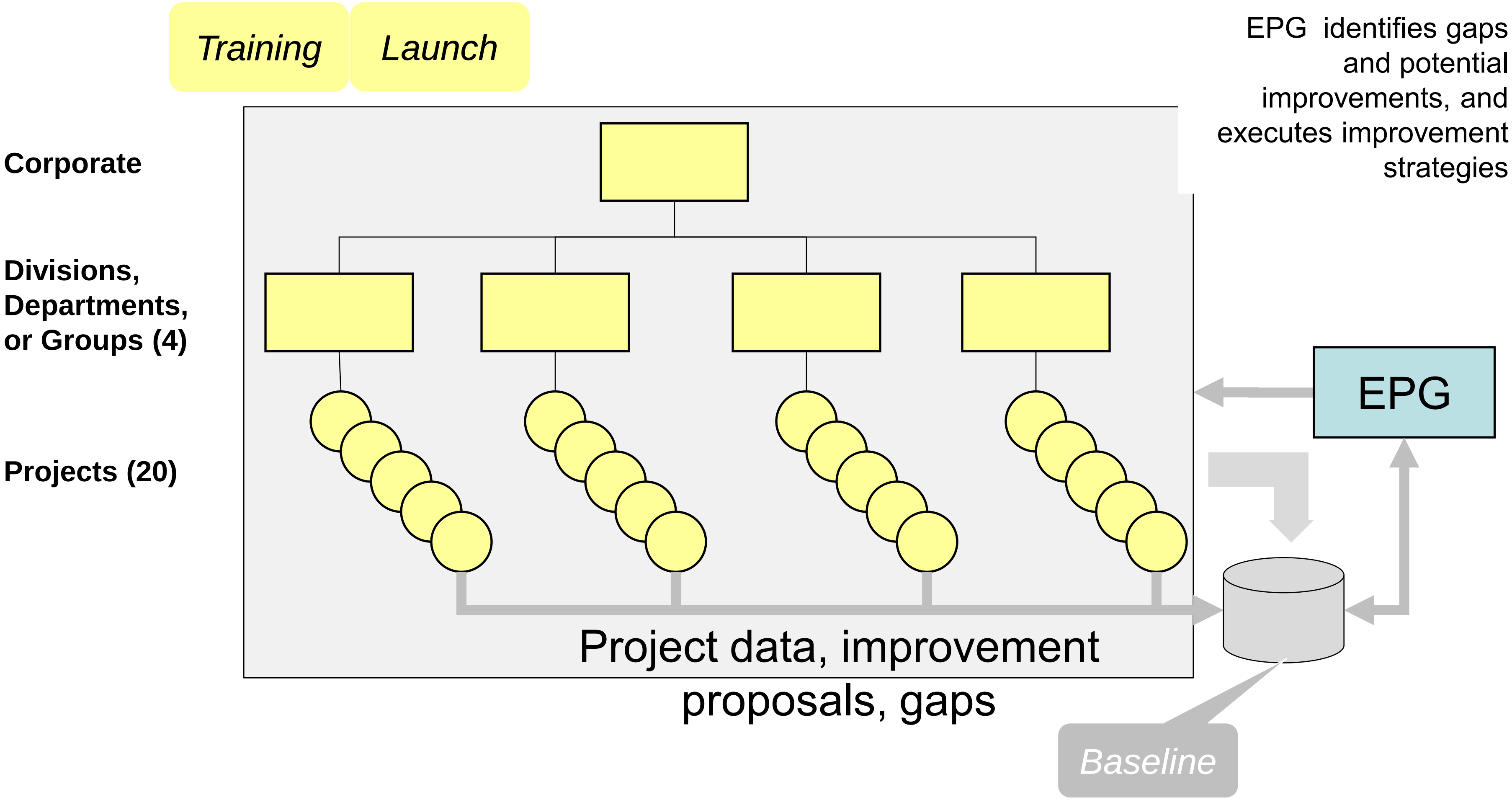
Date: 4/7/2003

Cycle:

Weekly Data	Plan	Actual	Plan/ Actual
Schedule hours for this week	151.0	86.0	1.76
Schedule hours this cycle to date	1526.0	1594.8	0.96
Earned value for this week	6.9	4.2	1.64
Earned value this cycle to date	79.5	84.3	0.94
To-date hours for tasks completed	1580.7	1568.1	1.01
To-date average hours per week	101.7	106.3	0.96

Assembly	Phase	Tasks Completed or Due	Resource	Task Plan Hrs.	Task Actual Hrs.	Earned or Plan Value	Planned Week	Plan vs. Actual Hrs.
Main Form	CODEINSP	Main Form Code Inspection	SA	1.5	2.4	0.1	10	0.63
OEMMOO Delivery.asp	UT	OEMMOO Delivery.aspx (FE-Server) U	NK	8.9	3.0	0.5	13	2.91
OEMMOO Delivery.asp	DLDINSP	OEMMOO Delivery.aspx (FE-Client) D	NK	0.0	0.0	0.0	13	
OEMMOO Delivery.asp	CODE	OEMMOO Delivery.aspx (FE-Client) C	NK	7.5	6.7	0.4	14	1.22
OEMMOO Delivery.asp	CR	OEMMOO Delivery.aspx (FE-Client) C	NK	3.8	1.7	0.2	14	2.26
OEMMOO Delivery.asp	COMPILE	OEMMOO Delivery.aspx (FE-Client) C	NK	1.3	0.9	0.1	14	1.44
OEMMOO Delivery.asp	CODEINSP	OEMMOO Delivery.aspx (FE-Client) C	NK	0.0	0.0	0.0	14	
OEMMOO Delivery.asp	UT	OEMMOO Delivery.aspx (FE-Client) U	NK	5.9	6.8	0.3	14	0.87
Query Object	TD	Query Object Test Development	NB	0.0	0.0	0.0	14	
Query Object	CODEINSP	Query Object Code Inspection	NB	0.0	1.2	0.0	14	0.00
Query Object	UT	Query Object Unit Test Dialogs	NB	1.1	1.7	0.1	14	0.66

Focused Implementation: Building Organizational Capability Project-by-Project, Team-by-Team



Training *Launch*

EPG identifies gaps and potential improvements, and executes improvement strategies

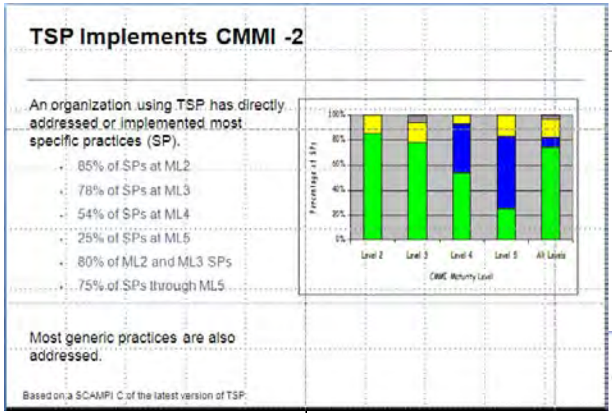
Corporate

Divisions, Departments, or Groups (4)

Projects (20)

Project data, improvement proposals, gaps

Does it work for Organizations?



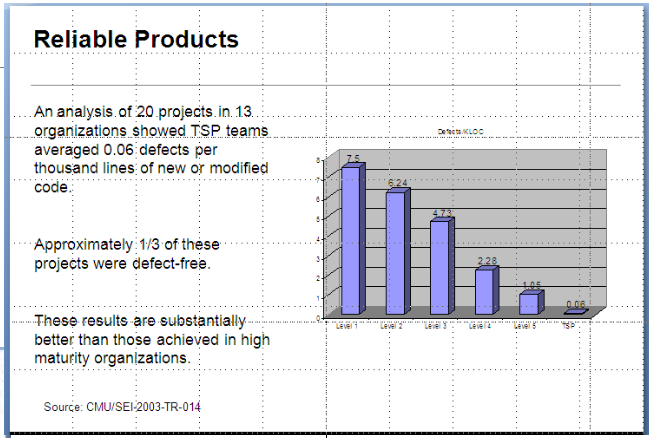
TSP Implements CMMI -2

An organization using TSP has directly addressed or implemented most specific practices (SP).

- 85% of SPs at ML2
- 78% of SPs at ML3
- 54% of SPs at ML4
- 25% of SPs at ML5
- 80% of ML2 and ML3 SPs
- 75% of SPs through ML5

Most generic practices are also addressed.

Based on a SCAMPI C of the latest version of TSP



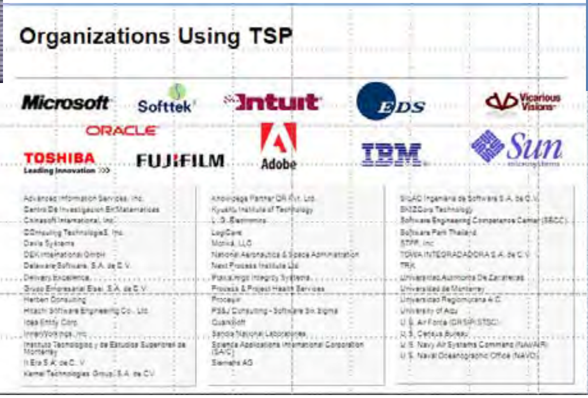
Reliable Products

An analysis of 20 projects in 13 organizations showed TSP teams averaged 0.06 defects per thousand lines of new or modified code.

Approximately 1/3 of these projects were defect-free.

These results are substantially better than those achieved in high maturity organizations.

Source: CMU/SEI-2003-TR-014

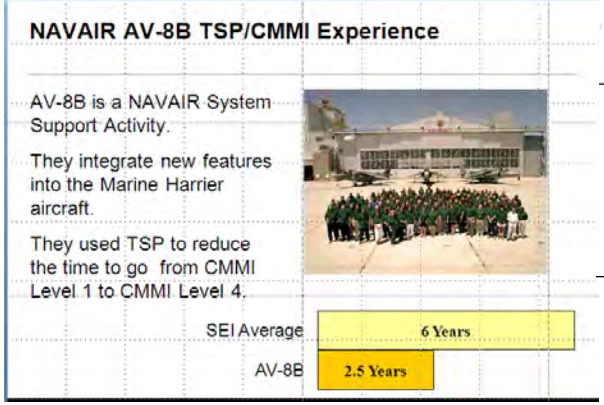


Organizations Using TSP

Advanced Information Services, Inc.
Centro De Investigacion En Matematicas
Chinasoft International, Inc.
Consulting Technologies, Inc.
Davis Systems
DEK International GmbH
Delaware Software, S.A. de C.V.
Delivery Excellence
Grupo Empresarial Eisei, S.A. de C.V.
Herbert Consulting
Hitachi Software Engineering Co., Ltd.
Idea Entity Corp.
InnerWorkings, Inc.
Instituto Tecnologico y de Estudios Superiores de Monterrey
It Era S.A. de C.V.
Kernel Technologies Group, S.A. de C.V.

Knowledge Partner QR Pvt. Ltd.
Kyushu Institute of Technology
L. G. Electronics
LogiCare
Motiva, LLC
National Aeronautics & Space Administration
Next Process Institute Ltd.
Praxis High Integrity Systems
Process & Project Health Services
Procesix
PS&J Consulting - Software Six Sigma
QuarkSoft
Sandia National Laboratories
Science Applications International Corporation (SAIC)
Siemens AG

SILAC Ingenieria de Software S.A. de C.V.
SKIZCorp Technology
Software Engineering Competence Center (SECC)
Software Park Thailand
STPP, Inc.
TOWA INTEGRADADORA S.A. de C.V.
TRX
Universidad Autonoma De Zacatecas
Universidad de Monterrey
Universidad Regiomontana A.C.
University of Aizu
U.S. Air Force (CRSIP/STSC)
U.S. Census Bureau
U.S. Navy Air Systems Command (NAVAIR)
U.S. Naval Oceanographic Office (NAVO)

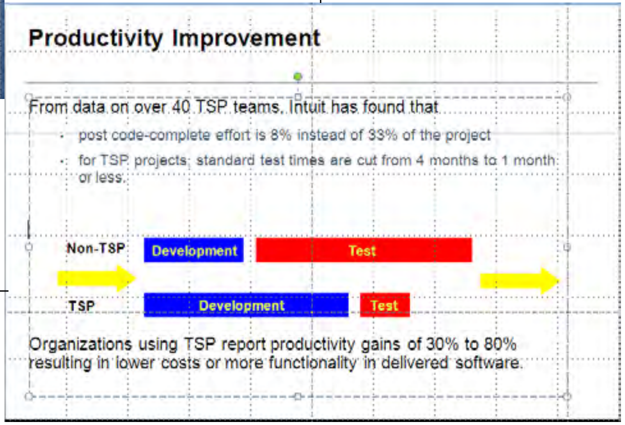


NAVAIR AV-8B TSP/CMMI Experience

AV-8B is a NAVAIR System Support Activity.

They integrate new features into the Marine Harrier aircraft.

They used TSP to reduce the time to go from CMMI Level 1 to CMMI Level 4.



Productivity Improvement

From data on over 40 TSP teams, Intuit has found that

- post code-complete effort is 8% instead of 33% of the project
- for TSP projects, standard test times are cut from 4 months to 1 month or less.

Organizations using TSP report productivity gains of 30% to 80% resulting in lower costs or more functionality in delivered software.

Individual Transition:

Contact

- Conversation
- Website
- Article

Awareness

- Conferences
- Books
- Articles
- Training

Understanding

- JIT Training Focused on the projects and units implementing the processes(two weeks)
- Three levels of training
    - Executive
    - Team Leader
    - Practitioner
- Advanced Learning Laboratory

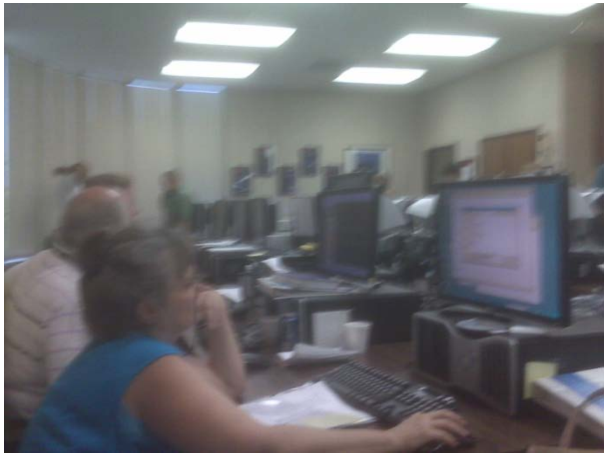
Trial Use

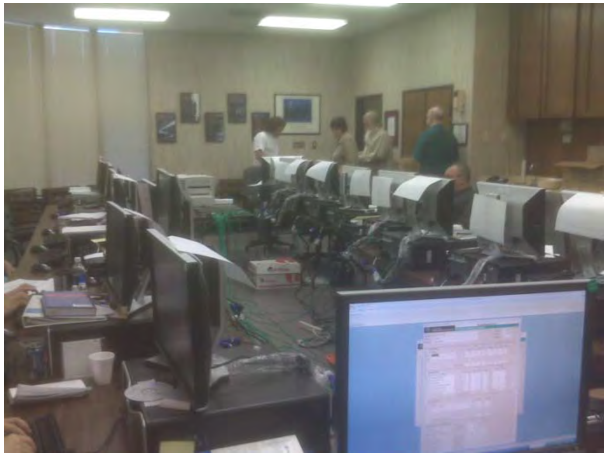
- Packaged proven whole product Launch Process
- Supported by a "COACH"
- Instrumented
- Implements the Processed learned in the Learning Laboratory on the actual project
- Coach reinforces discipline throughout the project

Adoption

- Project Based Rollout Strategy
- Organizational Commitment
- Organizational Support (EPG)

Advanced Learning Laboratory





Training ++

Process Simulation

Individual Instrumentation

Immersion Therapy

Self Discovery

Behavioral modification

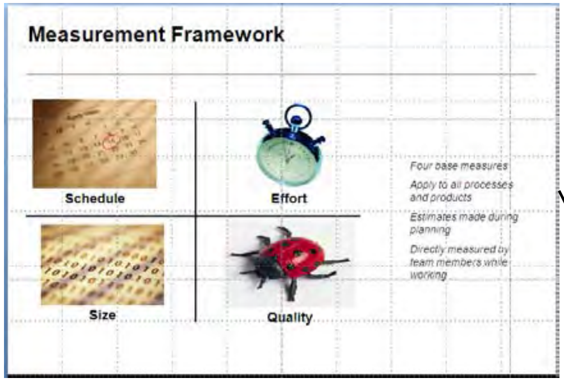
Challenge current beliefs

Change Behavior

Change Behavior generates new results

Executing the Processes

Product-Process-Planning Data



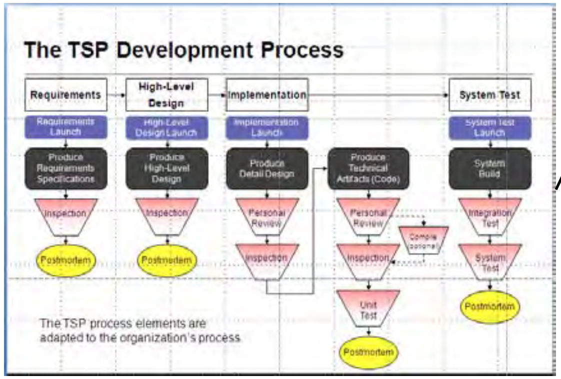
Measurement Framework

Four base measures

Apply to all processes and products

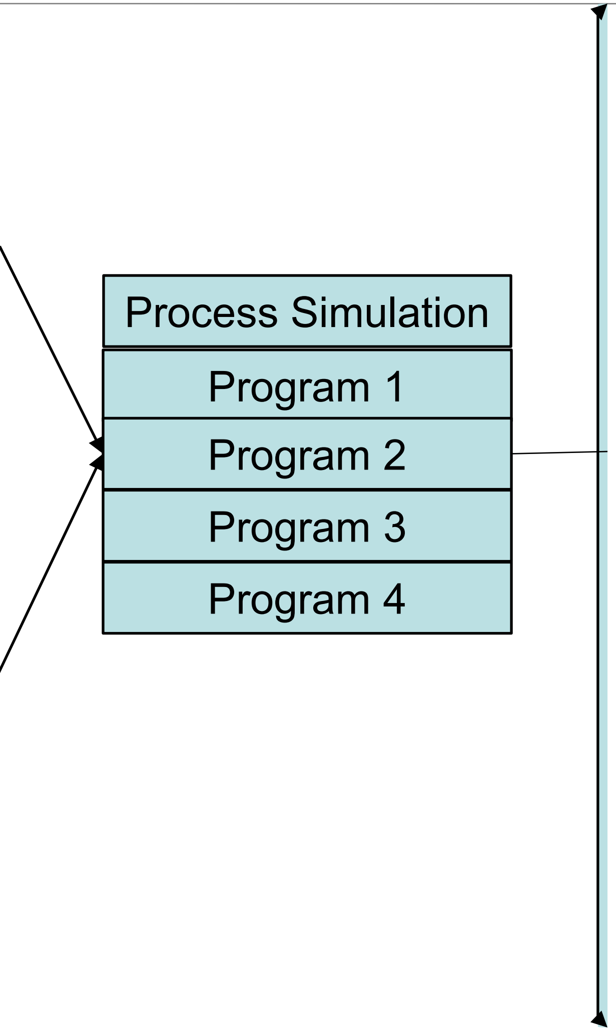
Estimates made during planning

Directly measured by team members while working



The TSP Development Process

The TSP process elements are adapted to the organization's process



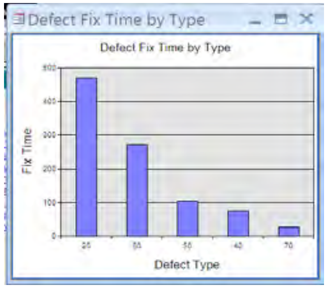
Process Simulation

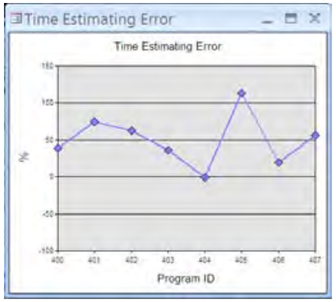
Program 1

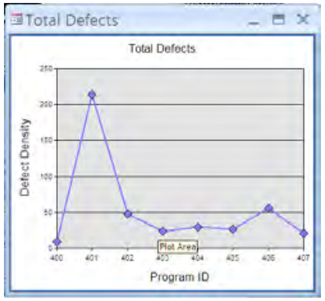
Program 2

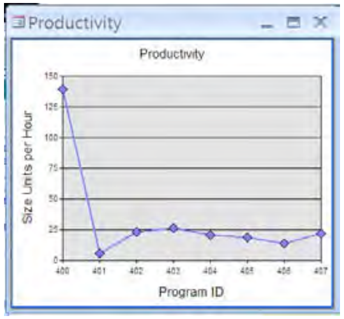
Program 3

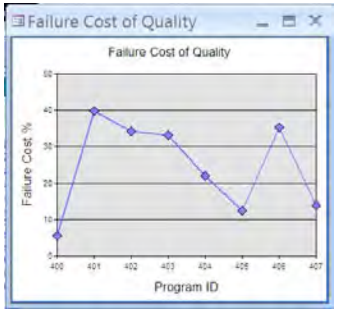
Program 4





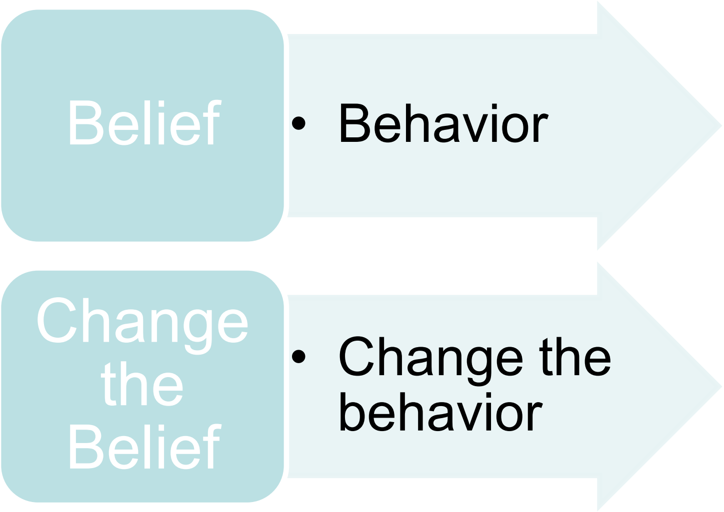






Belief Systems and Behavior

Belief drives behavior



Belief

- Behavior

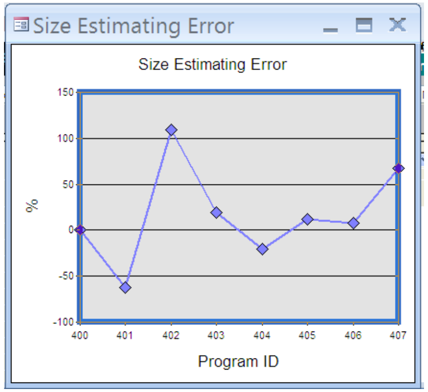
Change the Belief

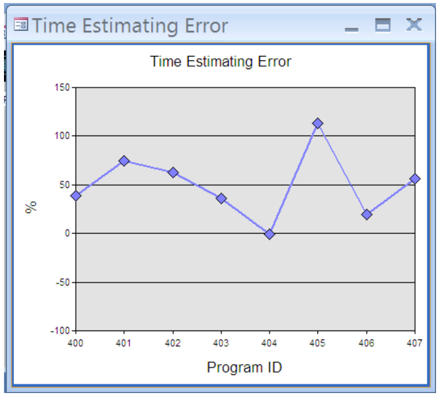
- Change the behavior

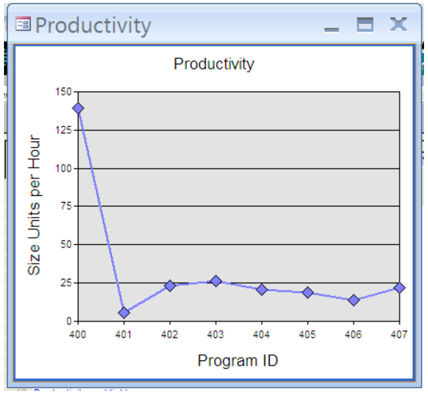
How to change a belief?

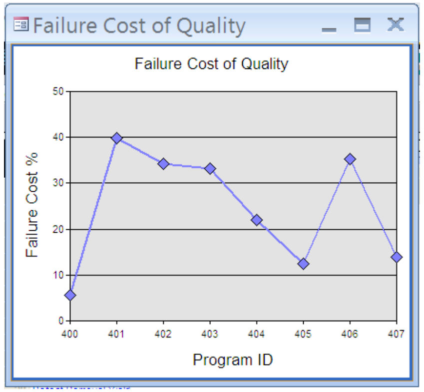
Show results inconsistent with the belief

My Beliefs-My Data-- My Journey



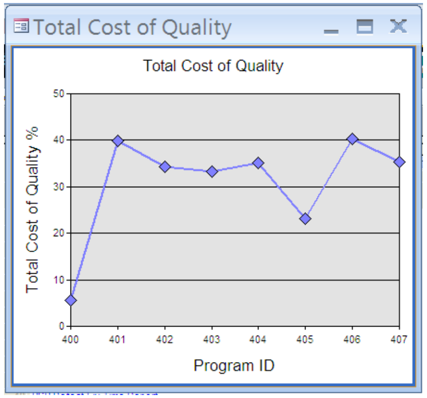




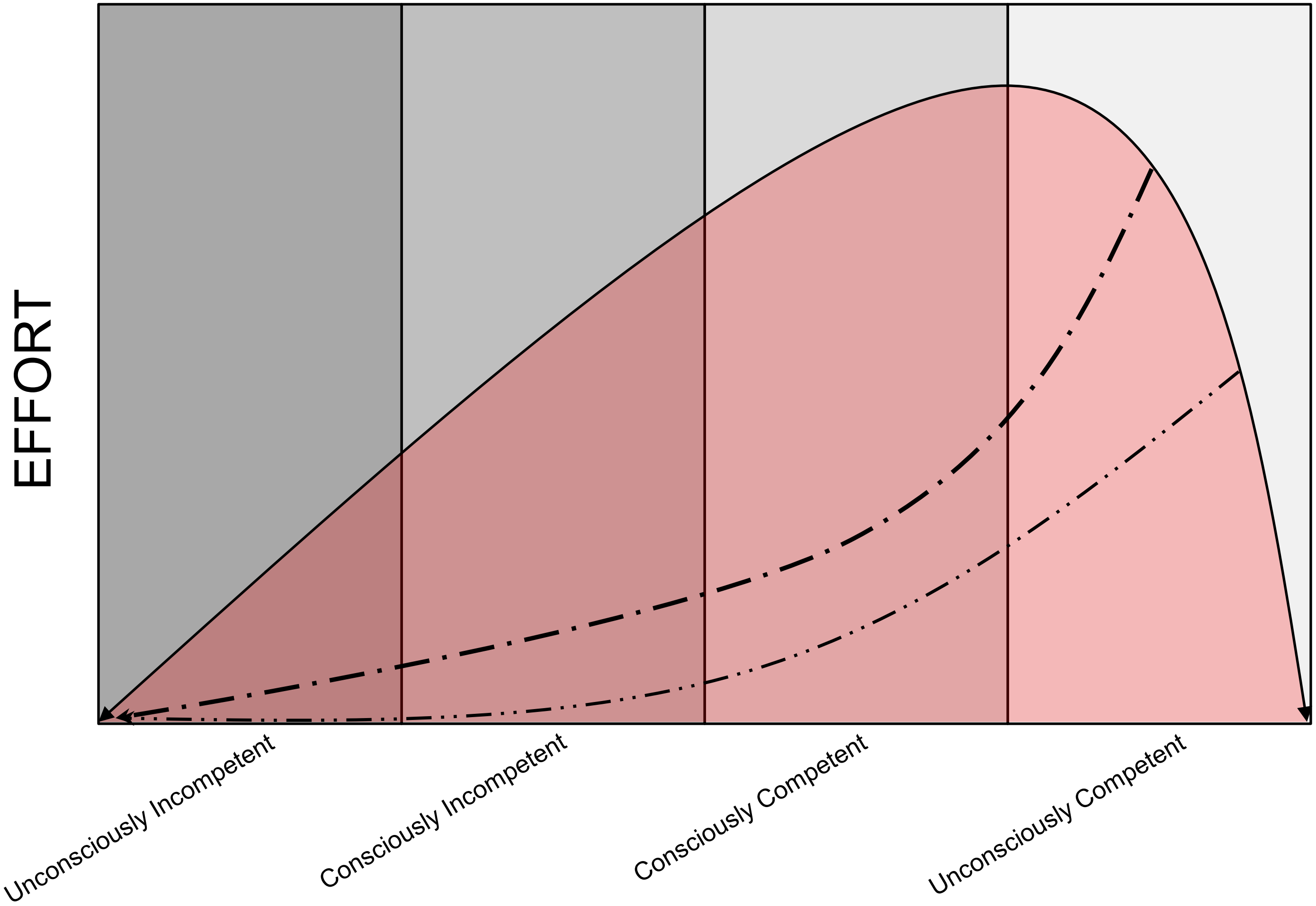


Think Change

Improve



Consciousness Model and Bandura Social Learning



Bayesian Belief networks

Bayesian Inference Model: Allow the use of prior knowledge.

Let $P(h|\xi)$ be a degree of belief in h given current state of information ξ.

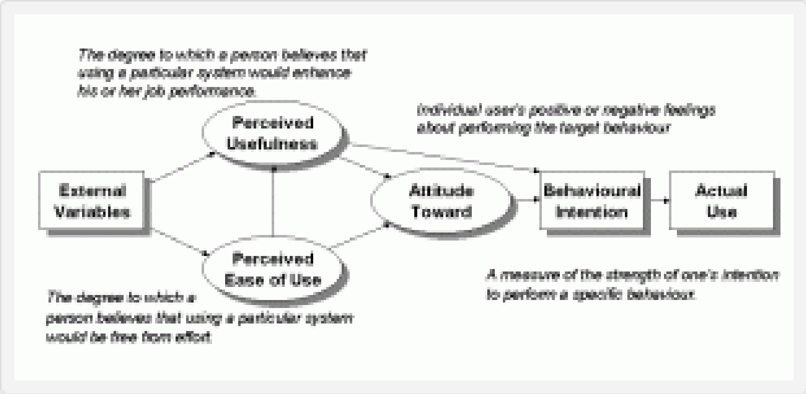
New evidence $\tilde{e}$ is presented.

Update using Bayes's Theorem:

$$P(h|\tilde{e},\xi)=\frac{P(h|\xi)P(\tilde{e}|h,\xi)}{P(\tilde{e}|\xi)}$$

Predicting Behavior based on Beliefs

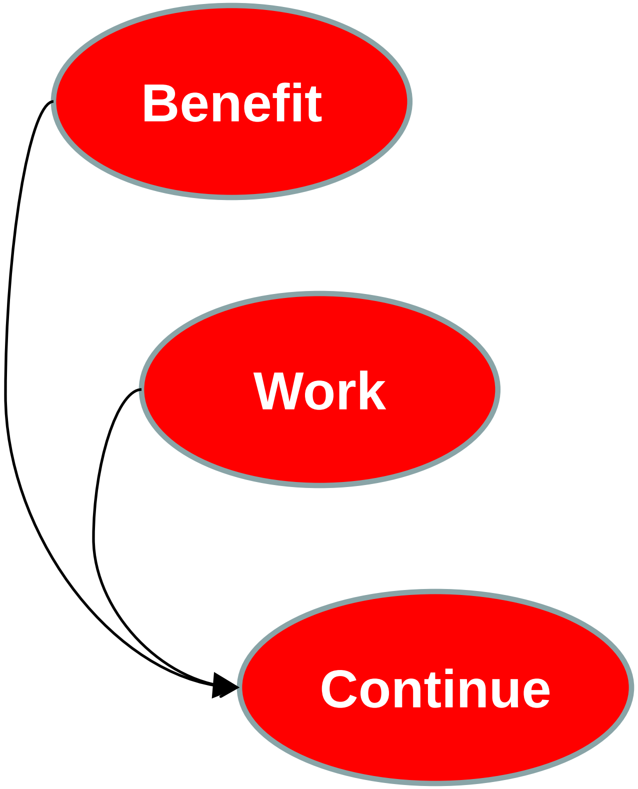
The Technology Acceptance Model is an information systems theory that models how users come to accept and use a technology



Bagozzi, R. P., Davis, F. D., & Warshaw, P. R. (1992). ***Development and test of a theory of technological learning and usage. Human Relations****, 45(7), 660-686.*

Simplified Acceptance Model based on Beliefs

Repeated for Contact, Awareness, Understanding, Trial use and Institutionalization

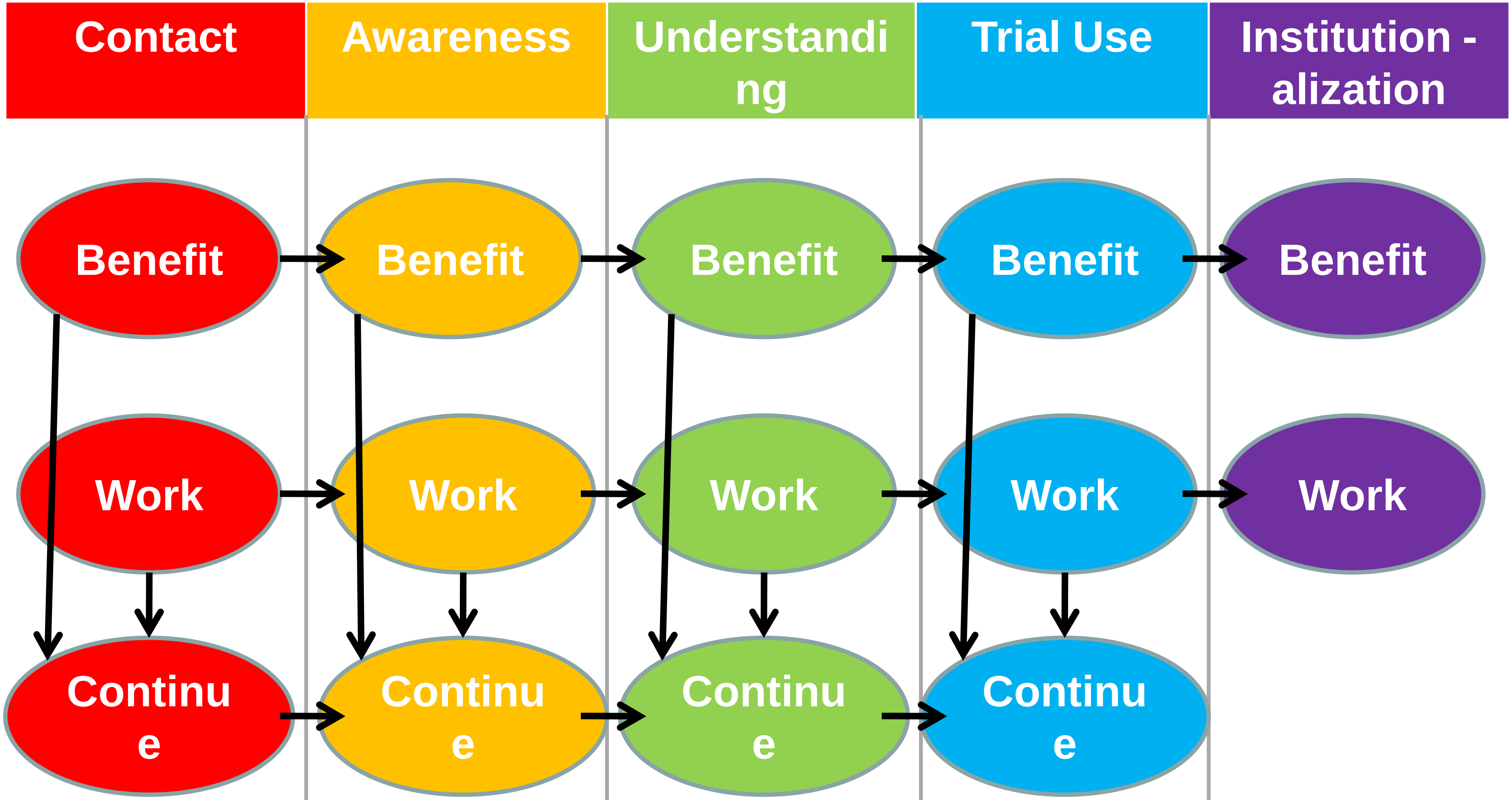


Benefit

Work

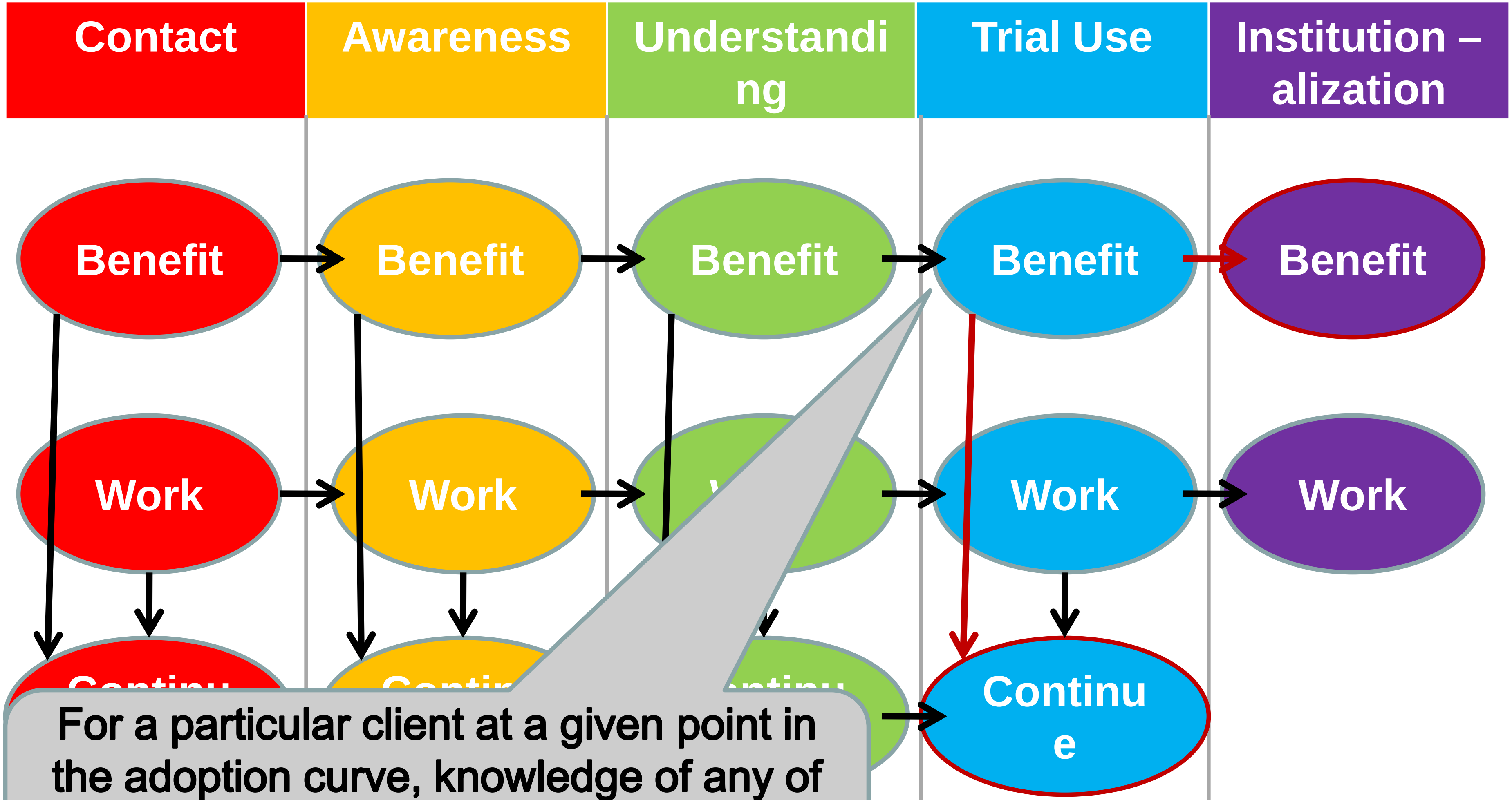
Continue

Concept of a BBN Model



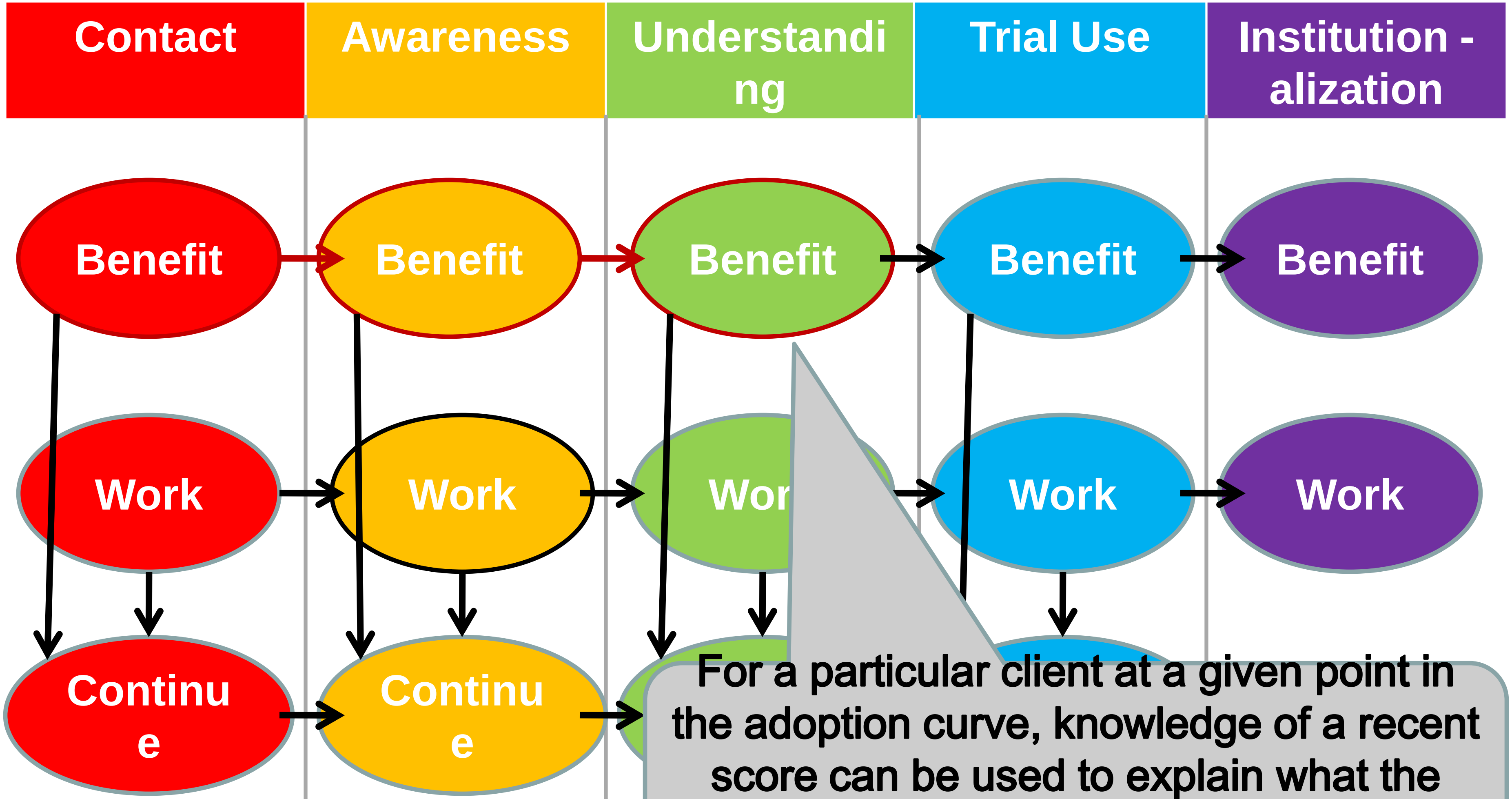
Contact	Awareness	Understandi ng	Trial Use	Institution - alization

Using BBN Model to Predict Future



For a particular client at a given point in the adoption curve, knowledge of any of the past or present scores can be used to predict the future scores!

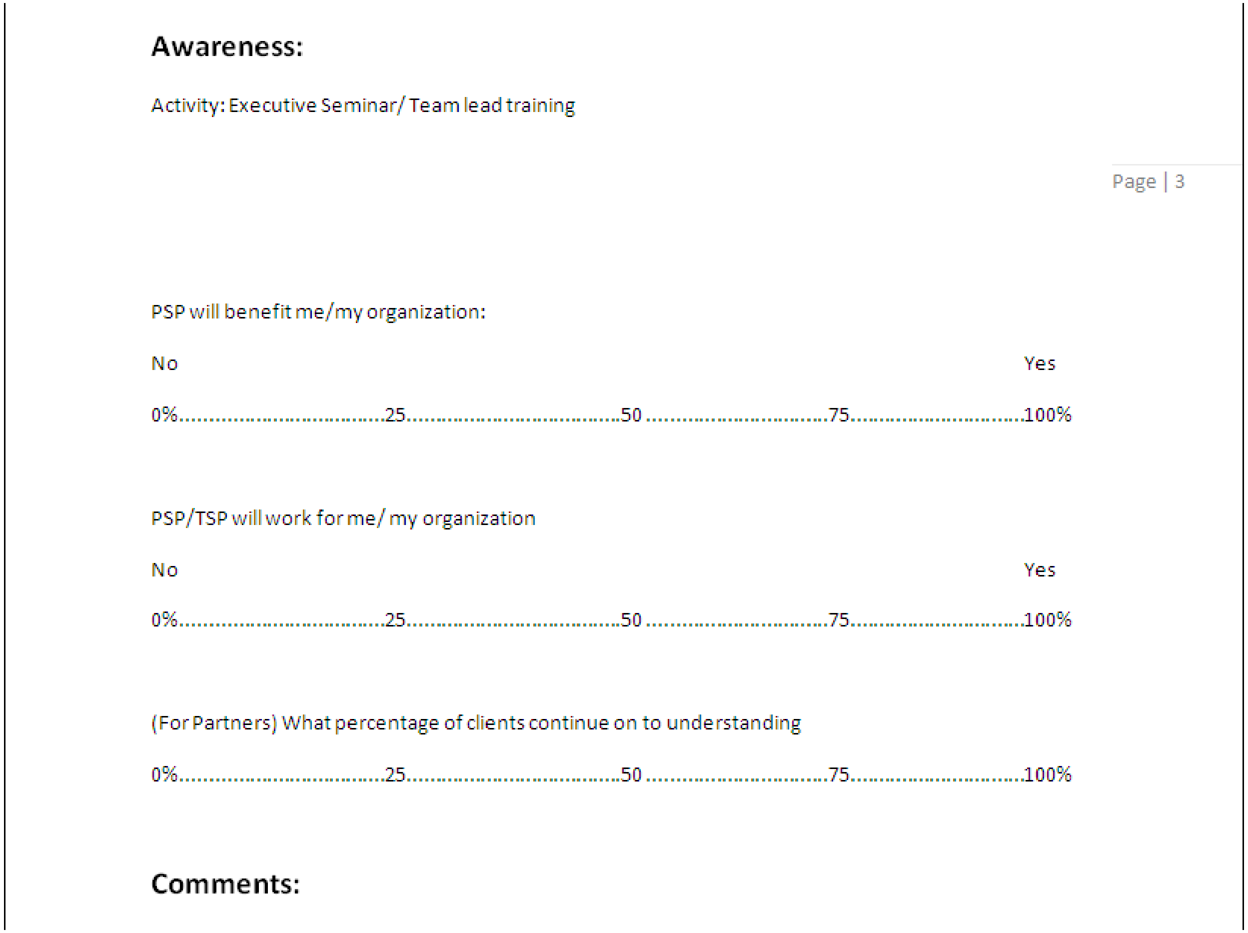
Using BBN Model to Explain Past



Contact	Awareness	Understanding	Trial Use	Institutionalization
Benefit	Benefit	Benefit	Benefit	Benefit
Work	Work	Wor	Work	Work
Continue	Continue			

For a particular client at a given point in the adoption curve, knowledge of a recent score can be used to explain what the historical, unknown scores most likely were!

Transition Survey



Awareness:

Activity: Executive Seminar/ Team lead training

Page | 3

PSP will benefit me/my organization:

No Yes

0%.................................25....................................50 ....75..............................100%

PSP/TSP will work for me/ my organization

No Yes

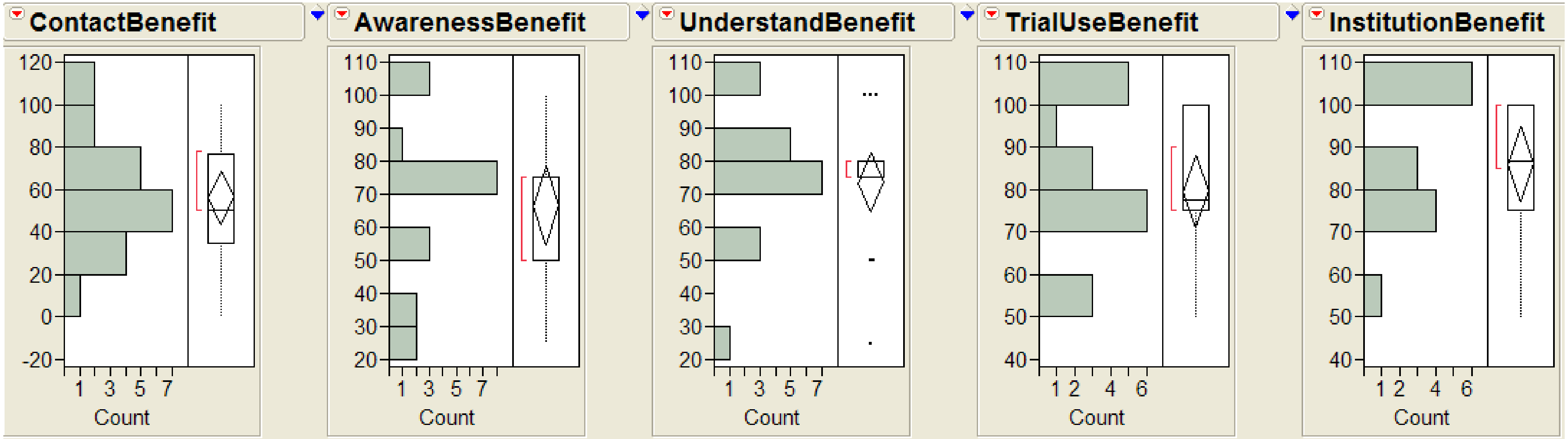
0%.................................25....................................50 ....75..............................100%

(For Partners) What percentage of clients continue on to understanding

0%.................................25....................................50 ....75..............................100%

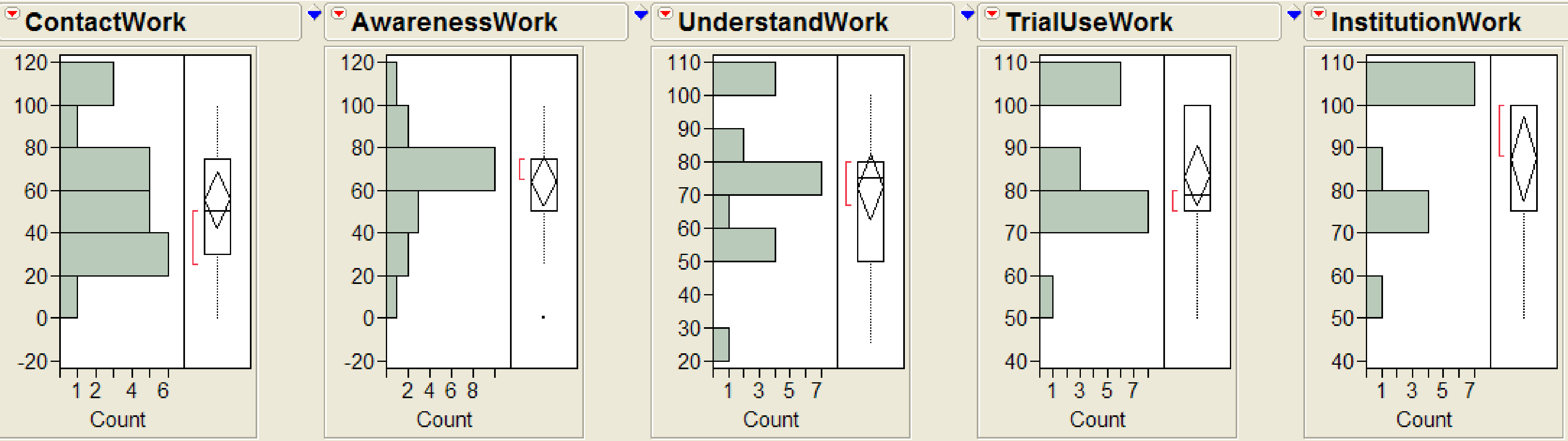
Comments:

Changing Benefit Profile



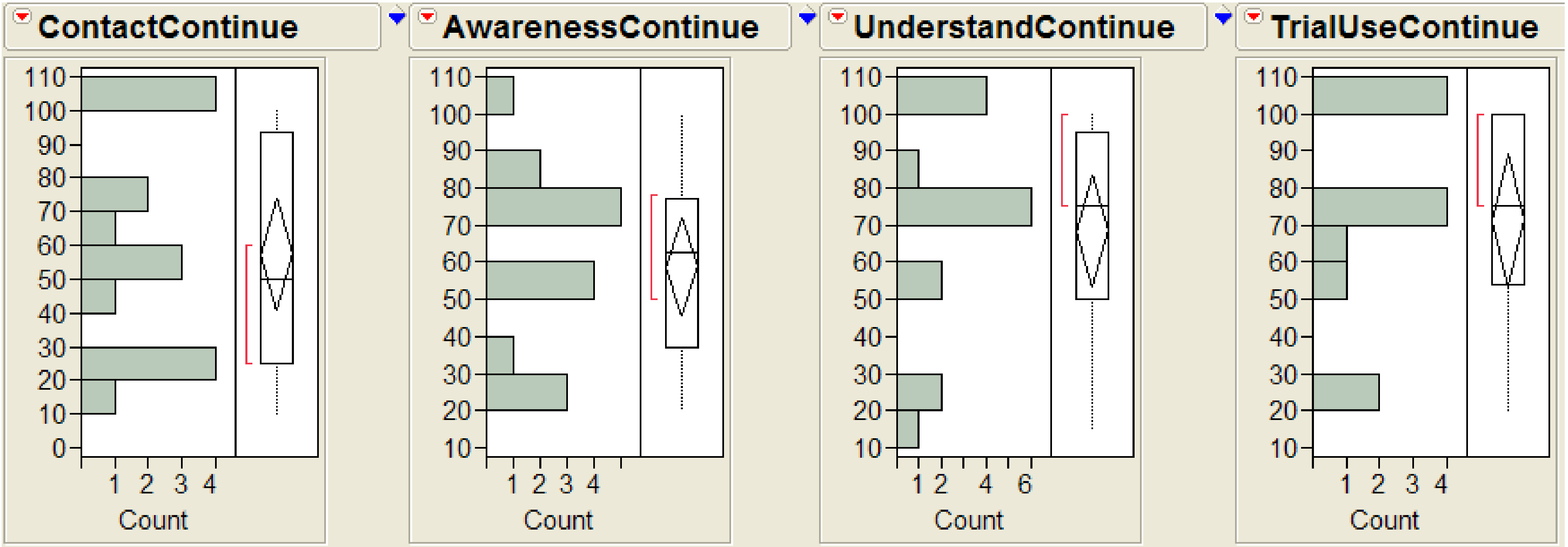
This distribution of the Benefit score is noticeably moving up across the adoption phases

Changing Work Profile



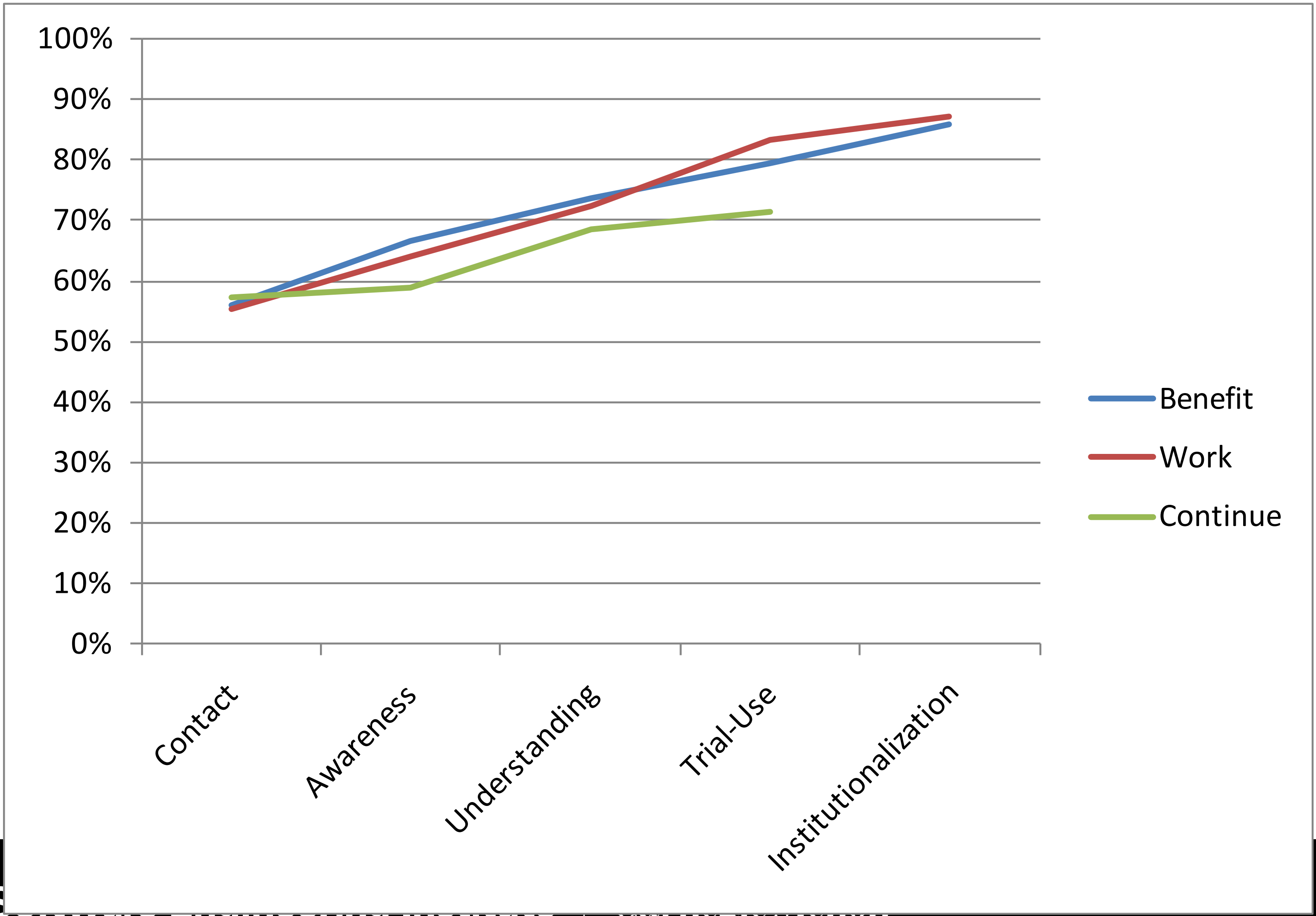
This distribution of the Work score is noticeably moving up across the adoption phases

Changing Continue Profile



This distribution of the Continue score is noticeably moving up across the adoption phases

Overall Trend of Average Responses



Some Initial Linear Models

Contact-Continue-Score = 4.3 + 0.85 * Contact-Work-Score

(Adj-Rsquare = 48%)

Understand-Be

Aware

(Adj

Although we prefer adjusted Rsquare values in the 80%+ range, these single factor prediction models show promise.

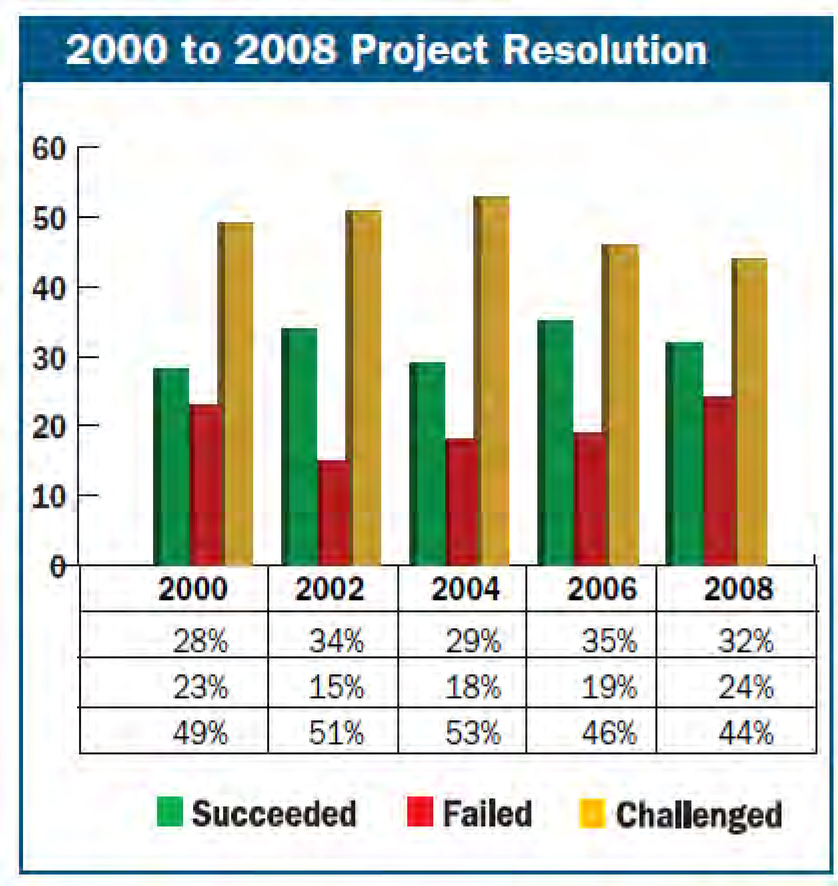
Remember, Adj-Rsquare is the amount of behavior of the outcome explained by the modeling factor

Questions?

Software Engineering Institute | Carnegie Mellon

Backup and Reference slides follow

Software Industry Project Performance



2000 to 2008 Project Resolution

2000	2002	2004	2006	2008
28%	34%	29%	35%	32%
23%	15%	18%	19%	24%
49%	51%	53%	46%	44%

Successful projects delivered on time, on budget, with required features and functions.

Challenged projects were late, over budget, and/or failed to deliver all of the required features and functions.

Failed projects were cancelled prior to completion or delivered and never used.

Source: Standish group 2009 Chaos report.

Software Industry Quality Performance

The software industry is the only modern high-tech industry that ignores quality until test.

Most software defects are found in or after test when defect removal costs are the highest and the methods are the least effective.

This strategy results in defective products and unnecessary rework that inflates development costs by 30% to 40% or more.

This strategy is also a principal cause of unexpected delays, system failures, and software security vulnerabilities.

Linux crash on Airbus Entertainment System

Competitive Advantage

As competition in the software industry increases, organizations seek:

- lower development cost
- shorter schedules
- more features per release
- predictable plans
- improved product quality
- fewer customer reported defects
- reduced staff turnover

Team Software Process supports these objectives.

Reliable Estimates

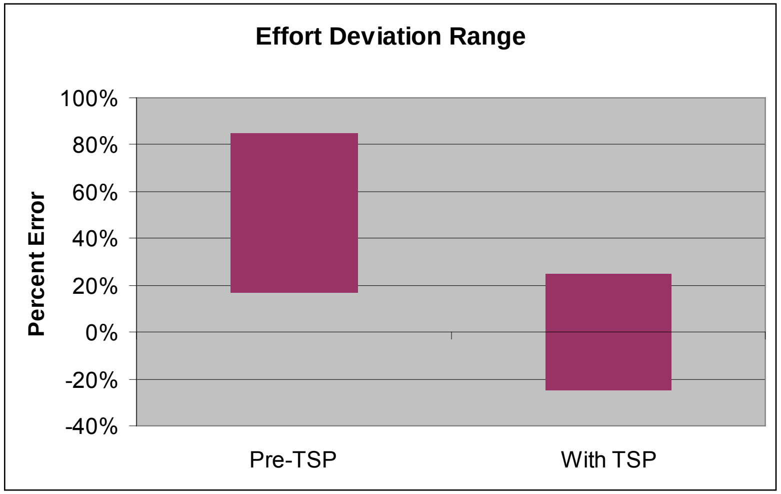
From a study published in 2000

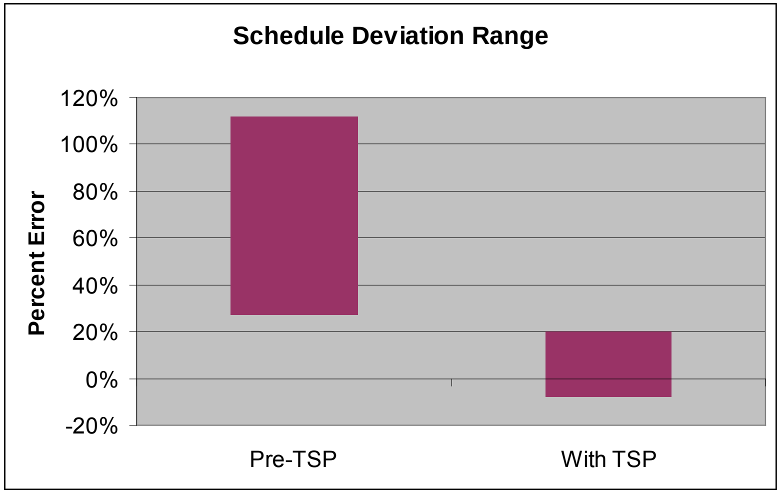
- fifteen projects in four organizations
- CMM ML1, ML2, ML3, and ML5
- TSP improved effort and schedule predictability at all maturity levels

Effort (Cost) Performance	
Study baseline	+17% to +85%
TSP	-25% to +25%

Schedule Performance	
Study baseline	+27% to +112%
TSP	-8% to +20%

Source: CMU/SEI-TR-2000-015



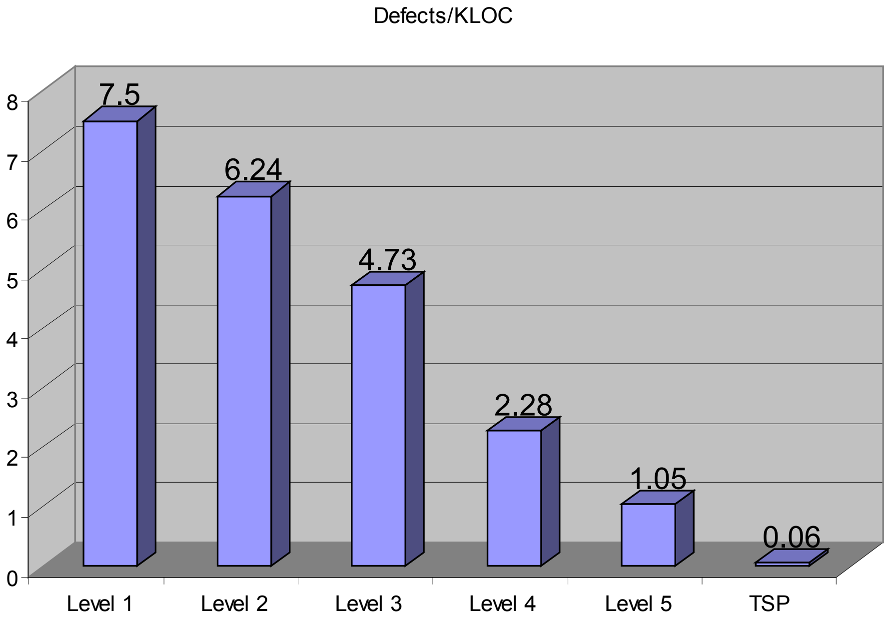


Reliable Products

An analysis of 20 projects in 13 organizations showed TSP teams averaged 0.06 defects per thousand lines of new or modified code.

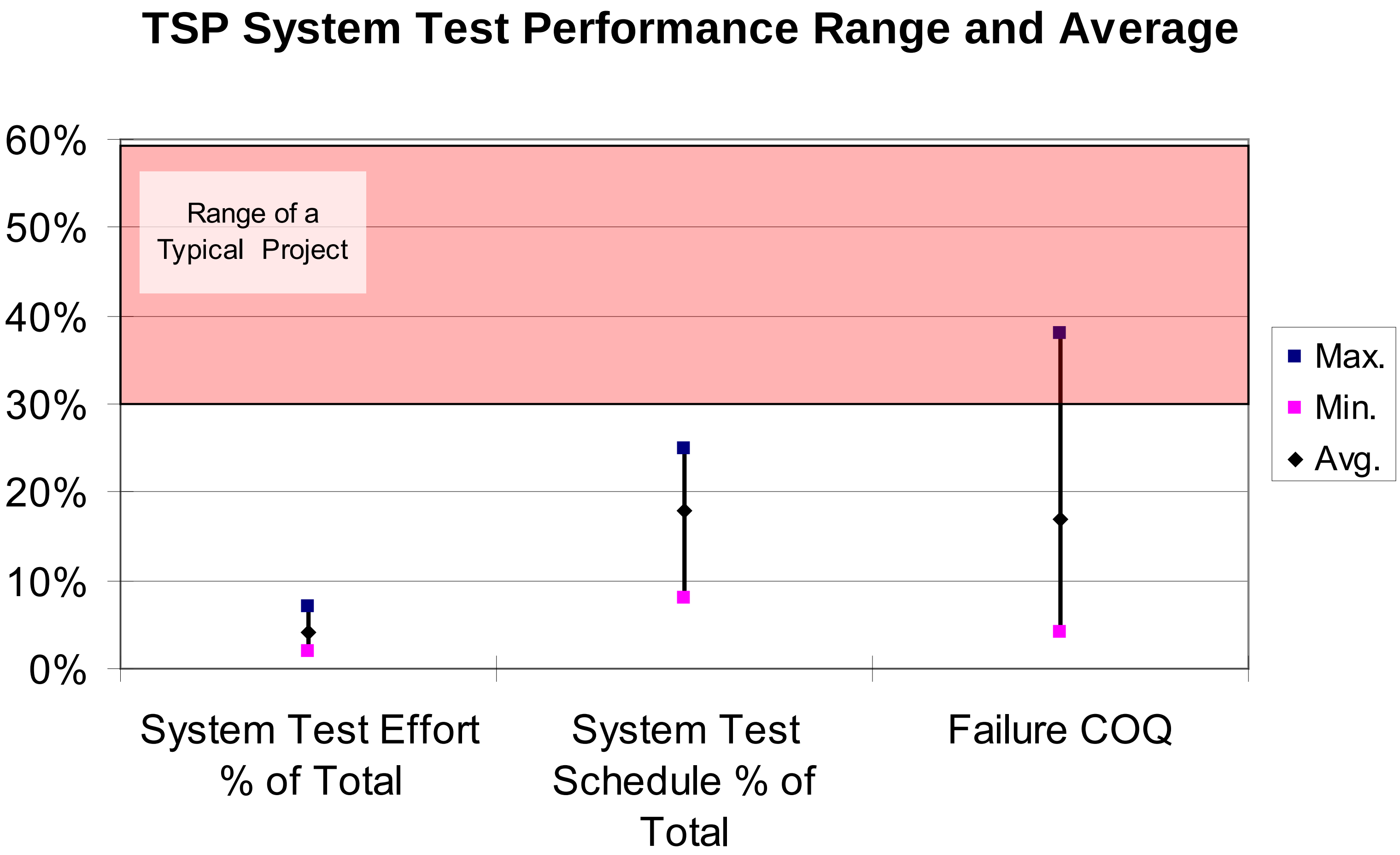
Approximately 1/3 of these projects were defect-free.

These results are substantially better than those achieved in high maturity organizations.



Source: CMU/SEI-2003-TR-014

Reduced Rework



Source: CMU/SEI-TR-2003-014

Productivity Improvement

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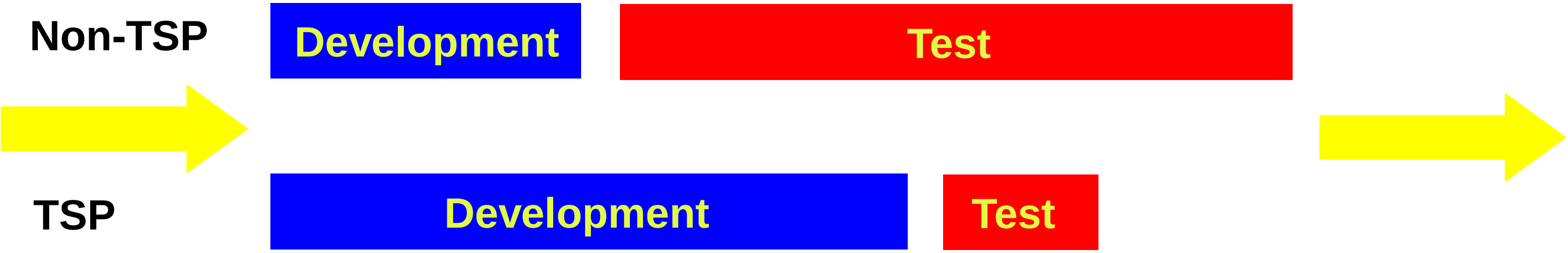
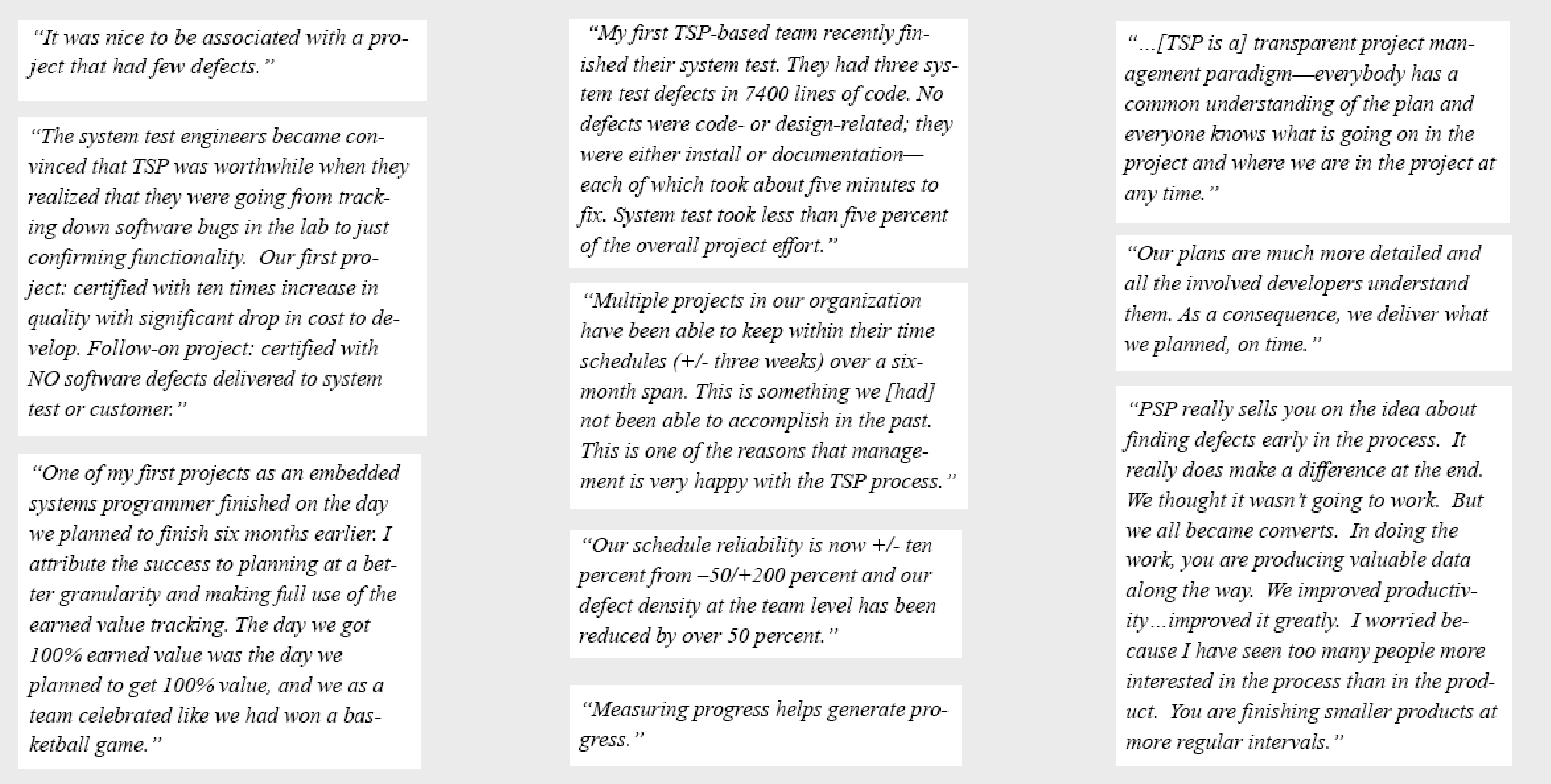


Organizations using TSP report productivity gains of 30% to 80% resulting in lower costs or more functionality in delivered software.

A Process for Managers and Developers



"It was nice to be associated with a project that had few defects."

"The system test engineers became convinced that TSP was worthwhile when they realized that they were going from tracking down software bugs in the lab to just confirming functionality. Our first project: certified with ten times increase in quality with significant drop in cost to develop. Follow-on project: certified with NO software defects delivered to system test or customer."

"One of my first projects as an embedded systems programmer finished on the day we planned to finish six months earlier. I attribute the success to planning at a better granularity and making full use of the earned value tracking. The day we got 100% earned value was the day we planned to get 100% value, and we as a team celebrated like we had won a basketball game."

"My first TSP-based team recently finished their system test. They had three system test defects in 7400 lines of code. No defects were code- or design-related; they were either install or documentation—each of which took about five minutes to fix. System test took less than five percent of the overall project effort."

"Multiple projects in our organization have been able to keep within their time schedules (+/- three weeks) over a six-month span. This is something we [had] not been able to accomplish in the past. This is one of the reasons that management is very happy with the TSP process."

"Our schedule reliability is now +/- ten percent from –50/+200 percent and our defect density at the team level has been reduced by over 50 percent."

"Measuring progress helps generate progress."

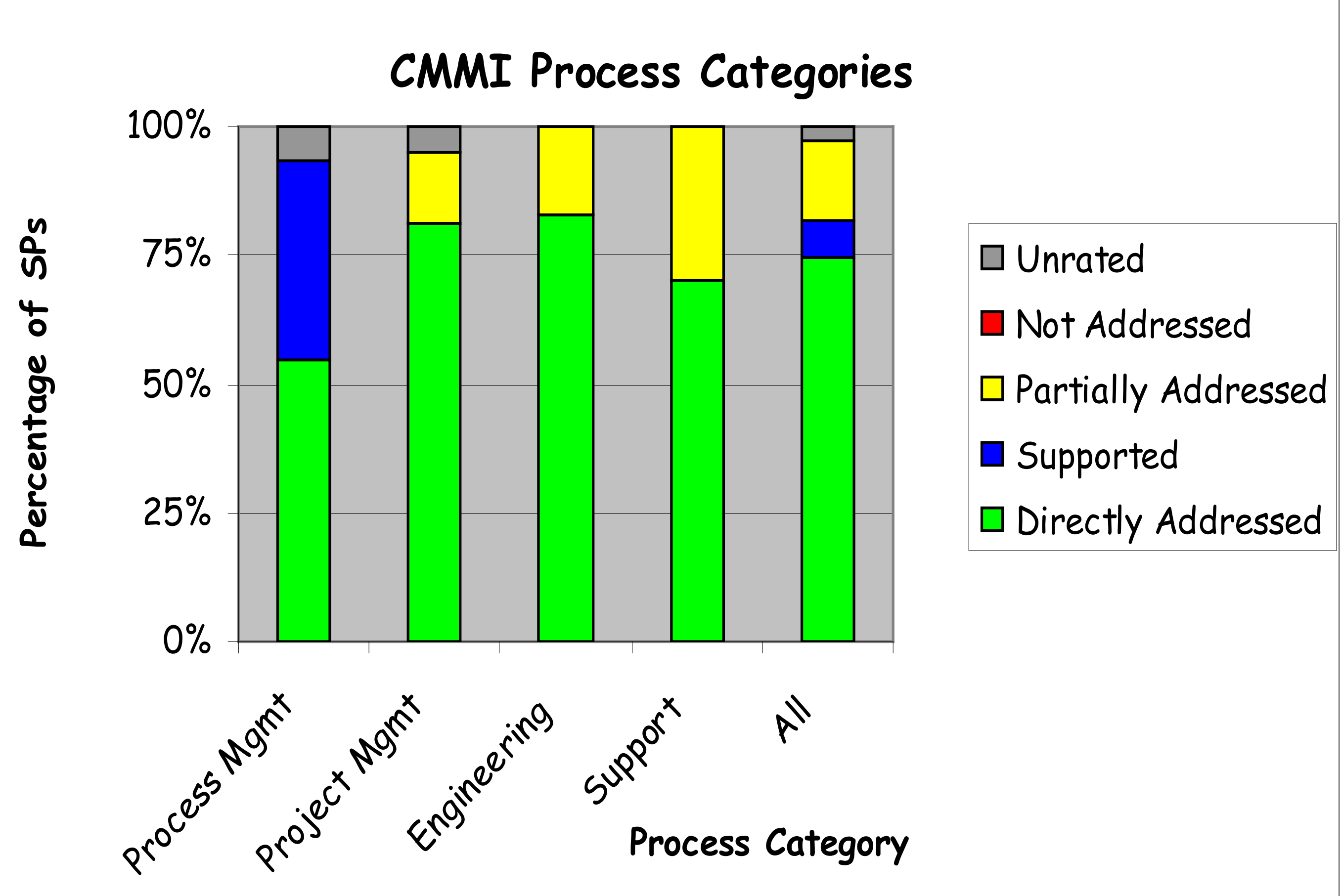
"…[TSP is a] transparent project management paradigm—everybody has a common understanding of the plan and everyone knows what is going on in the project and where we are in the project at any time."

"Our plans are much more detailed and all the involved developers understand them. As a consequence, we deliver what we planned, on time."

"PSP really sells you on the idea about finding defects early in the process. It really does make a difference at the end. We thought it wasn't going to work. But we all became converts. In doing the work, you are producing valuable data along the way. We improved productivity…improved it greatly. I worried because I have seen too many people more interested in the process than in the product. You are finishing smaller products at more regular intervals."

Source: CMU/SEI-TR-2003-014

TSP Implements CMMI -1



Unrated - out of scope for TSP.

Not addressed - project practice that TSP does not cover.

Partially addressed - project practices that TSP addresses with some weakness of omission

Supported - organizational practices that TSP supports.

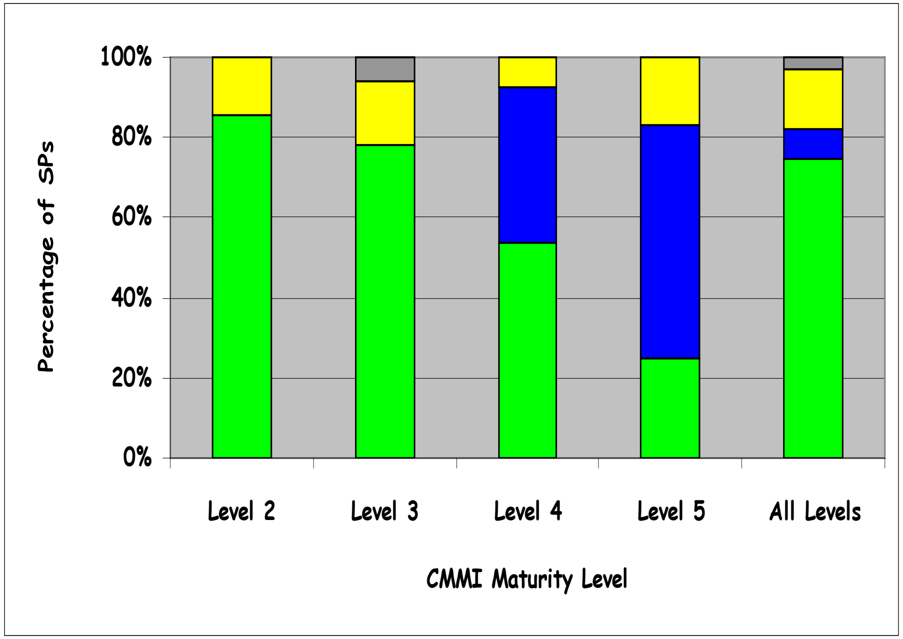
Directly Addressed - TSP practices meet the intent of the CMMI specific practice (SP) without significant reservations.

Based on a SCAMPI C of the latest version of TSP

TSP Implements CMMI -2

An organization using TSP has directly addressed or implemented most specific practices (SP).

- 85% of SPs at ML2
- 78% of SPs at ML3
- 54% of SPs at ML4
- 25% of SPs at ML5
- 80% of ML2 and ML3 SPs
- 75% of SPs through ML5



Most generic practices are also addressed.

Based on a SCAMPI C of the latest version of TSP

NAVAIR AV-8B TSP/CMMI Experience

AV-8B is a NAVAIR System Support Activity.

They integrate new features into the Marine Harrier aircraft.

They used TSP to reduce the time to go from CMMI Level 1 to CMMI Level 4.

SEI Average **6 Years**

AV-8B **2.5 Years**

Organizations Using TSP

Microsoft
Softtek
Intuit
EDS
Vicarious Visions
ORACLE
Adobe
IBM
Sun microsystems
TOSHIBA Leading Innovation
FUJIFILM

- Advanced Information Services, Inc.
- Centro De Investigacion En Matamaticas
- Chinasoft International, Inc.
- COmputing TechnologieS, Inc.
- Davis Systems
- DEK International GmbH
- Delaware Software, S.A. de C.V.
- Delivery Excellence
- Grupo Empresarial Eisei, S.A. de C.V.
- Herbert Consulting
- Hitachi Software Engineering Co., Ltd.
- Idea Entity Corp.
- InnerWorkings, Inc.
- Instituto Tecnologico y de Estudios Superiores de Monterrey
- It Era S,A, de C,.V.
- Kernel Technologies Group, S.A. de CV

- Knowldege Partner QR Pvt. Ltd.
- Kyushu Institute of Technology
- L. G. Electronics
- LogiCare
- Motiva, LLC
- National Aeronautics & Space Administration
- Next Process Institute Ltd.
- Praxis High Integrity Systems
- Process & Project Health Services
- Procesix
- PS&J Consulting - Software Six Sigma
- QuarkSoft
- Sandia National Laboratories
- Science Applications International Corporation (SAIC)
- Siemens AG

- SILAC Ingenieria de Software S.A. de C.V.
- SKIZCorp Technology
- Software Engineering Competence Center (SECC)
- Software Park Thailand
- STPP, Inc.
- TOWA INTEGRADADORA S.A. de C.V.
- TRX
- Universidad Autonoma De Zacatecas
- Universidad de Monterrey
- Universidad Regiomotana A.C.
- University of Aizu
- U.S. Air Force (CRSIP/STSC)
- U.S. Census Bureau
- U.S. Navy Air Systems Command (NAVAIR)
- U.S. Naval Oceanographic Office (NAVO)

Topics

Introduction

TSP concepts

- Self-directed teams and coaching
- Personal Software Process
- Process and measurement framework
- Comprehensive quality management

Team management with TSP

User experience

Getting Started

Key Features -1

Unlike many other software development methods TSP a uses self-directed team management style…the team owns the plan.

TSP has an operationally defined process that is also owned by the team.

The process is supported by an integrated measurement framework to help the team track their work and improve their estimating abilities.

TSP emphasizes quality with comprehensive quality management practices.

- build the right product the right way to avoid rework
- put quality product into test instead of trying to test-in quality

Key Features -2

Complete engineering process – system requirements through acceptance test.

Scalable – small to large organizational settings and projects.

Tailorable – TSP is tailored or is adapted to support existing processes.

Provides immediate and measurable benefits on first use.

Role specific training, documented process, and tools.

Topics

Introduction

TSP Concepts

- Self-directed teams and coaching
- Personal Software Process
- Process and measurement framework
- Comprehensive quality management

Team management with TSP

User experience

Getting Started

Management Styles

The principal management styles have been:

Frederick Taylor

Peter Drucker

Body Management

People as oxen that must be driven, directed, and motivated through fear.

Task Management

People as machines. Management knows the best way to get the work done. The workers follow.

Knowledge management

People as individuals. The knowledge worker knows the best way to get the work done. Management motivates, leads, and coaches.

Knowledge Work

“The key rule in managing knowledge work is this: managers can’t manage it, the workers must manage themselves.”

Software development is knowledge work.

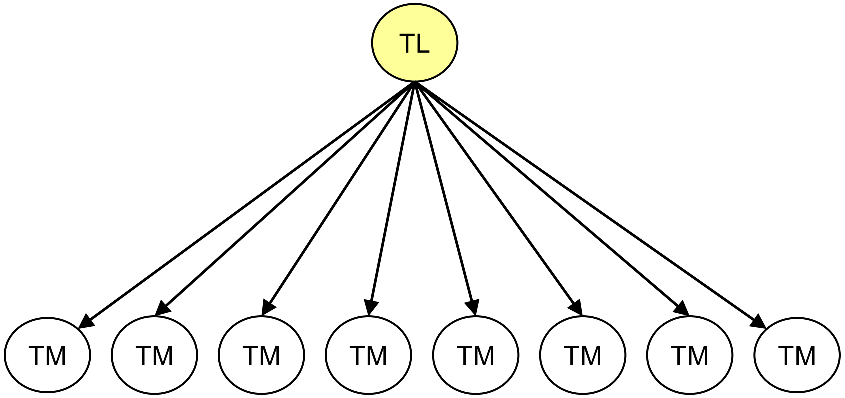
To manage software work, developers must

- be motivated
- make accurate plans
- negotiate commitments
- track their plans
- manage quality

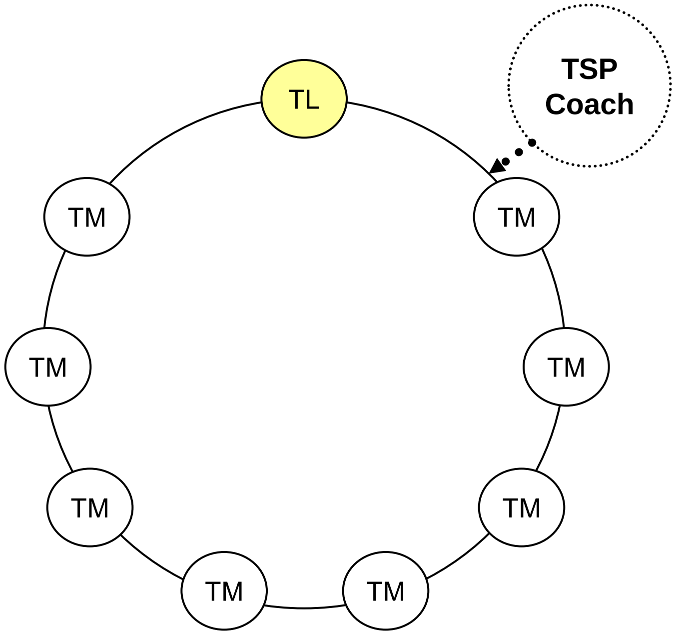
How is this accomplished?

Watts Humphrey,
creator of TSP

TSP Self-directed Team Management Style

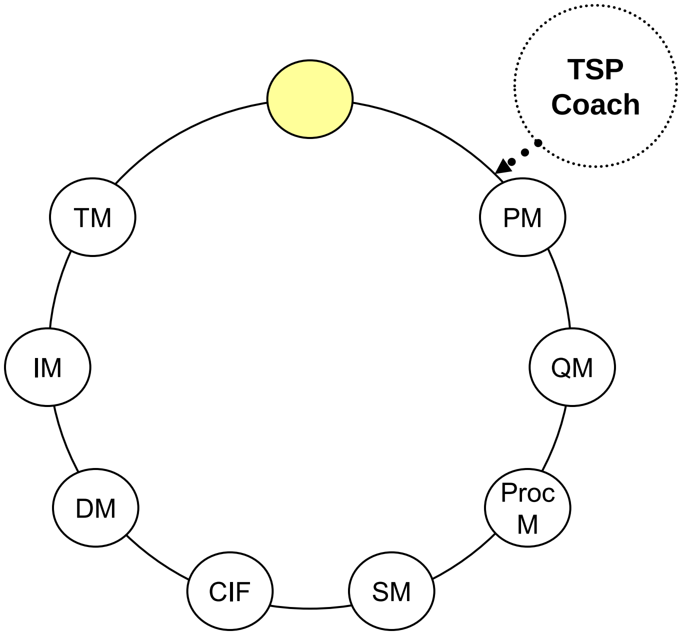


Traditional team
The leader plans, directs, and tracks the team's work.



Self-directed team
The team members participate in planning, managing, and tracking their own work.

Sharing the Team Management Responsibilities



Self-directed team roles

Eight pre-defined roles distribute traditional project management responsibilities across the team.

All team members have traditional roles, e.g. developer, tester, etc.

Project Management Roles
Planning manager – responsible for tracking the plan.
Quality manager – responsible for tracking the quality plan.
Process manager – responsible for ensuring process discipline and for process improvement.
Support manager – responsible for ensuring that support needs are met and for configuration management.
Technical Roles
Customer interface manager – responsible for the interface to the customer or customer representative.
Design manager – responsible for the design practices and quality.
Implementation manager – responsible for implementation practices and quality.
Test manager – responsible for test practices and quality.

The Team Leader’s Role

The team leader does not typically take one of the eight team member roles.

The team leader’s job on a TSP team is to

- guide and motivate the team in doing its work
- take the time to reach full consensus on all important issues
- ensure that the team establishes high standards for the work
- provide management support to the team
- support the team with management
- protect the team so that it can concentrate on the project

The TSP Coaching Role

The coach

- trains and facilitates the adoption of TSP
- works with the team leader to build the team
- observer that guides the team

Tiger Woods and his coach Hank Haney.

Team Leader vs. Coach

The team leader’s job is to use the team to build the product.

The coaches job is to use the project to build the team.

The Impact of Self-Directed Teams

A self-directed team

- builds its own plans, negotiating trade-offs with management.
- owns its process and is committed to following it.
- measures and tracks its own work.
- knows precisely where it stands.

Because of this the team members are highly motivated to help each other meet their commitments and achieve their best performance.

Topics

Introduction

TSP Concepts

- Self-directed teams and coaching
- Personal Software Process
- Integrated process and measurement framework
- Comprehensive quality management

Team management with TSP

User experience

Getting Started

Learning to Develop Software

In universities,

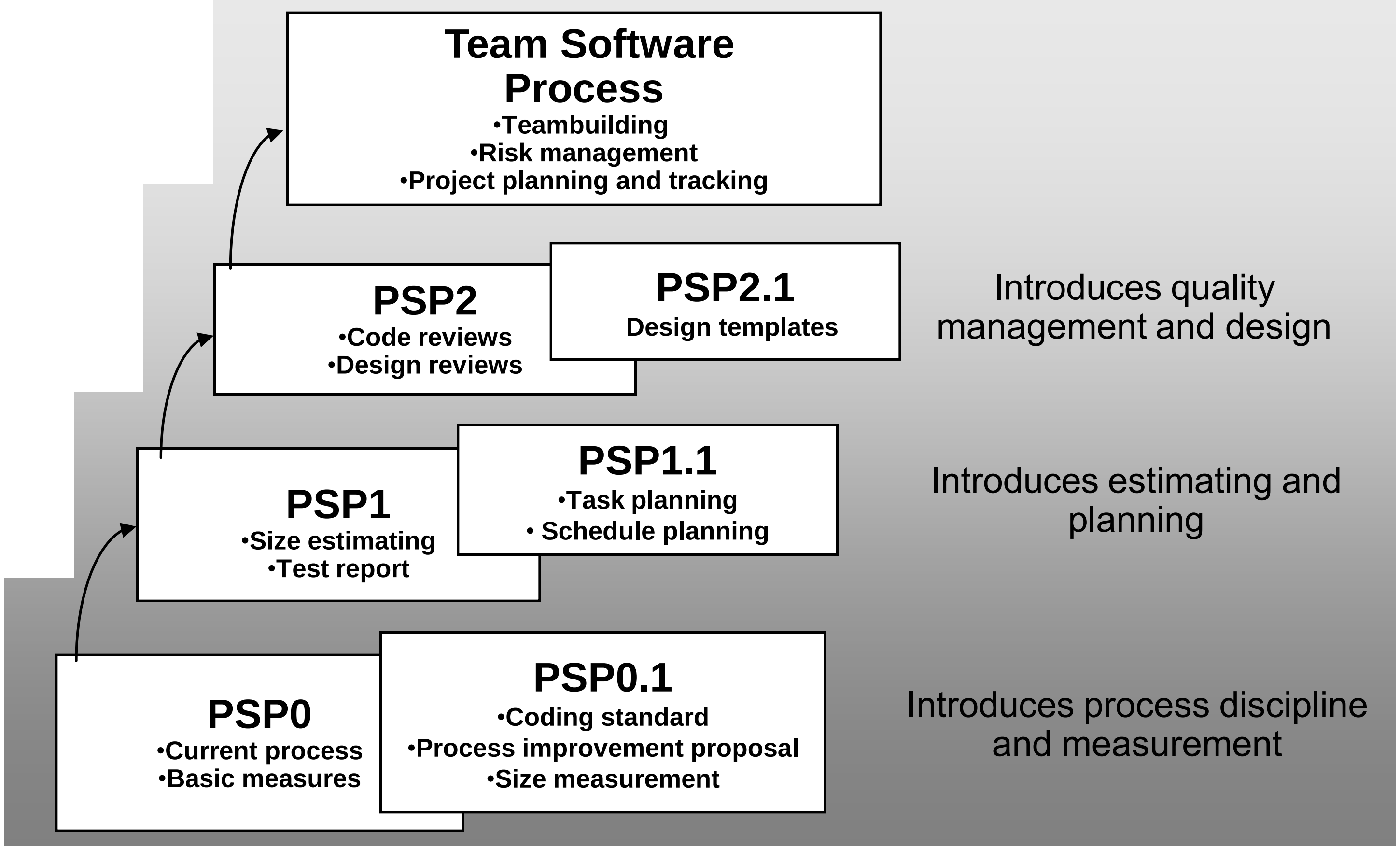
- the emphasis is on technical knowledge and individual performance.
- evaluation emphasizes code that runs, not how the student got there.
- the prevailing ethic is to code as quickly and fix the problems in test.

In industry, team-working skills are also needed.

TSP uses the Personal Software Process to build these skills.

- planning and tracking the work
- measuring and managing quality
- anticipating and correcting problems

PSP Learning Stages



Team Software Process
- Teambuilding
- Risk management
- Project planning and tracking

PSP2
- Code reviews
- Design reviews

PSP2.1
Design templates

Introduces quality management and design

PSP1
- Size estimating
- Test report

PSP1.1
- Task planning
- Schedule planning

Introduces estimating and planning

PSP0
- Current process
- Basic measures

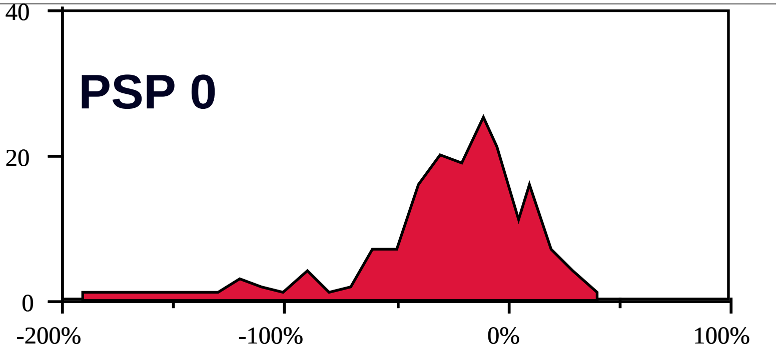
PSP0.1
- Coding standard
- Process improvement proposal
- Size measurement

Introduces process discipline and measurement

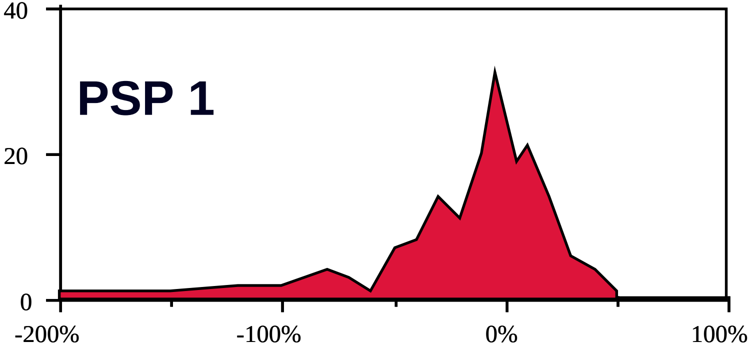
Developers write one or more programs at each PSP level

PSP Estimating Accuracy

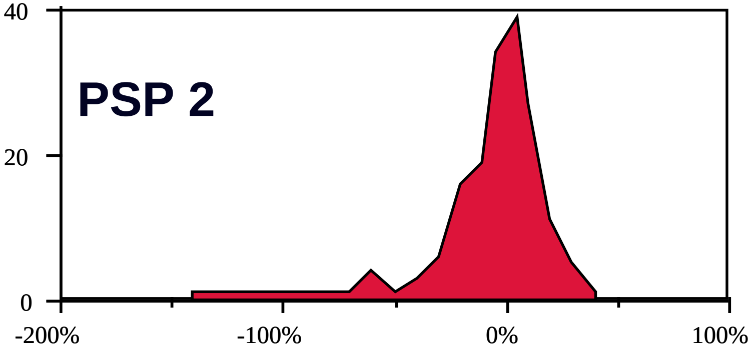
Majority are under-estimating



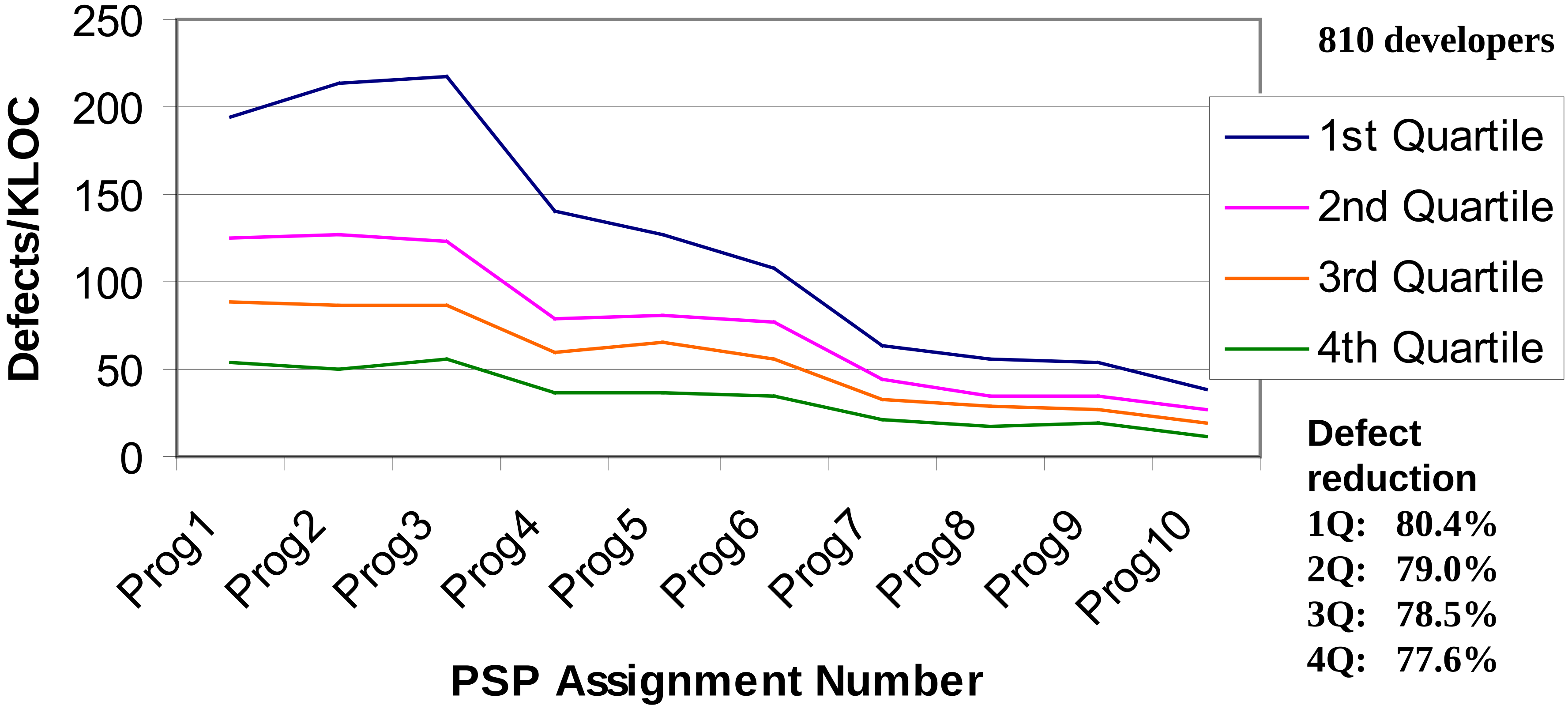
Balance of over-estimates and under-estimates



Much tighter balance around zero



Compile and Test Defects - from PSP Training

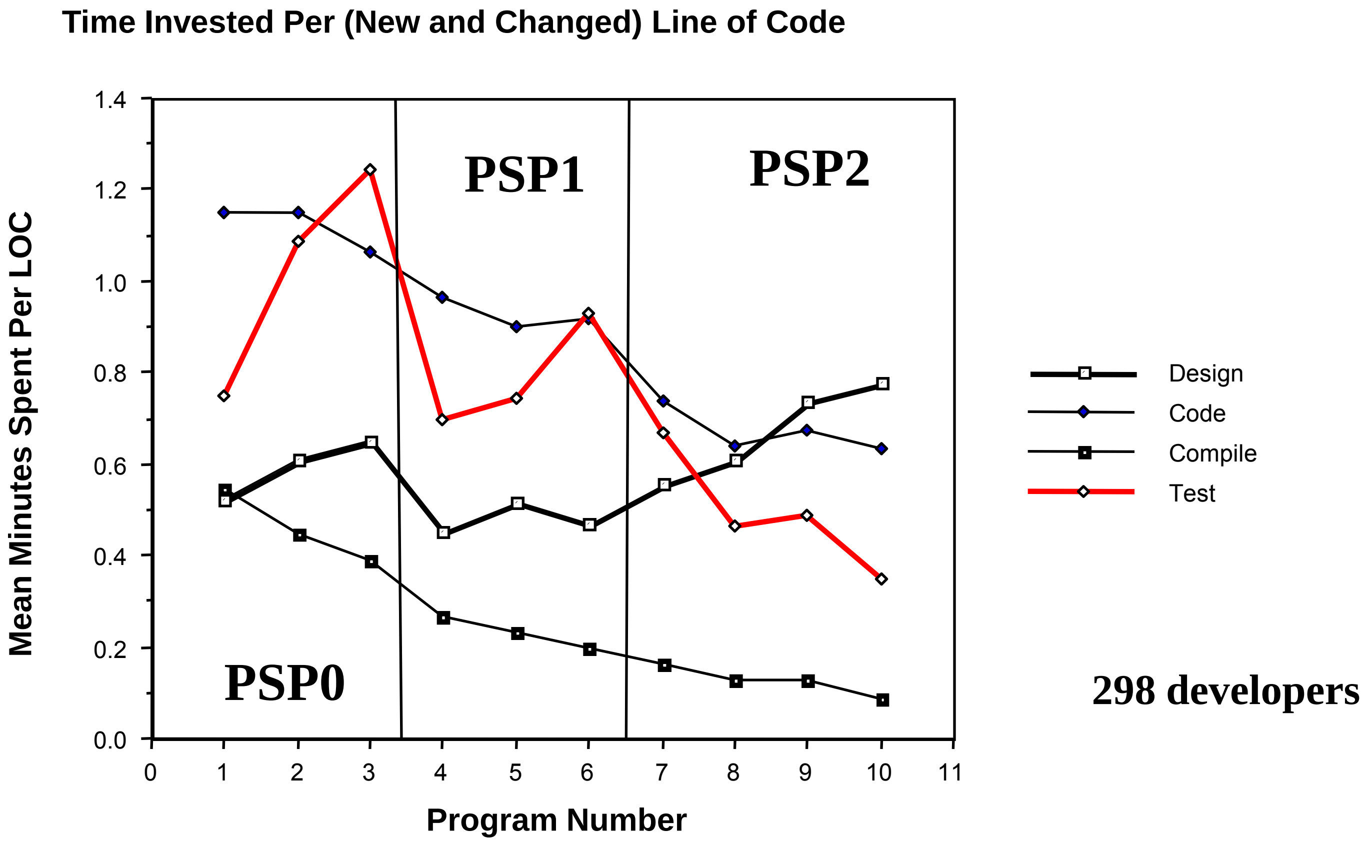


810 developers

Defect reduction

1Q: 80.4%
2Q: 79.0%
3Q: 78.5%
4Q: 77.6%

PSP Design Time Results



Topics

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TSP Operational Processes and Measures

TSP is defined operationally.

- The processes provide guidance without being too detailed or inflexible.
- They are easily tailored to fit existing organizational processes.
- The measurement definitions are precise but also extensible.

Benefits

- Allows self-directed teams to own their processes.
- Instills *process discipline* rather than enforcing *process institutionalization* with auditing methods.

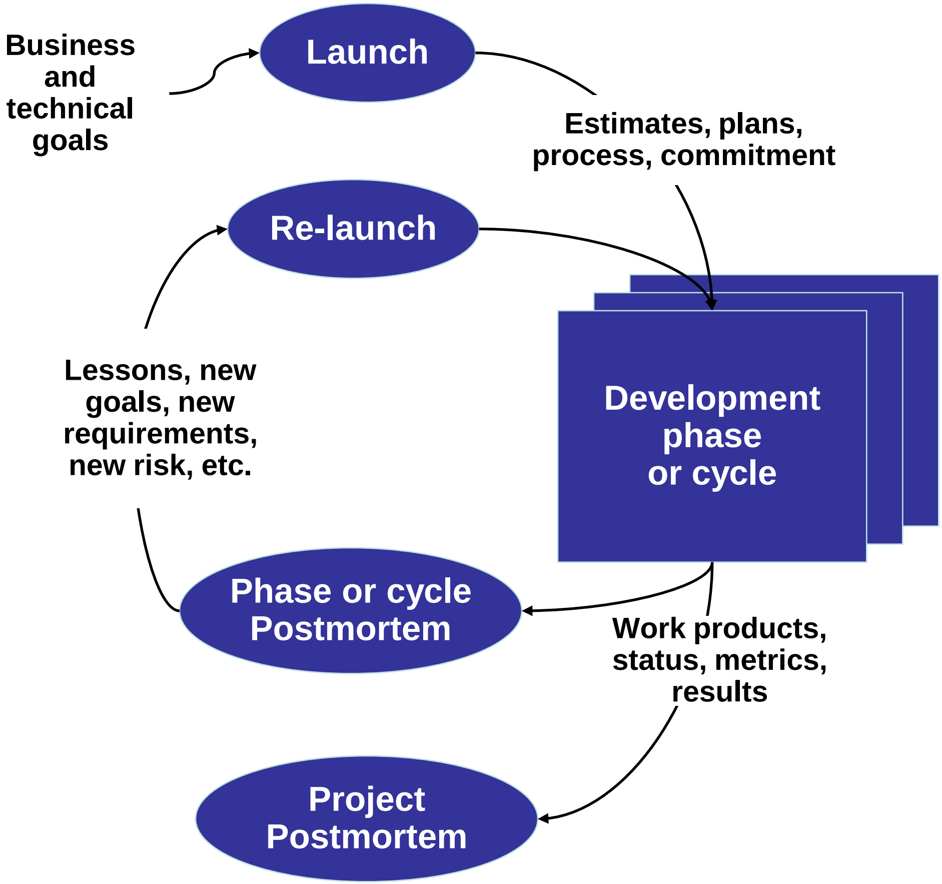
TSP Process Structure

The TSP process elements can be organized into whatever process structure makes the most business and technical sense.

The phases can be implemented iteratively in small cycles, in a spiral with increasing cycle content, or sequentially as in a waterfall,

TSP projects can start on any phase or any cycle.

Each cycle starts with a launch or re-launch and ends with a postmortem.



Business and technical goals

Launch

Estimates, plans, process, commitment

Re-launch

Lessons, new goals, new requirements, new risk, etc.

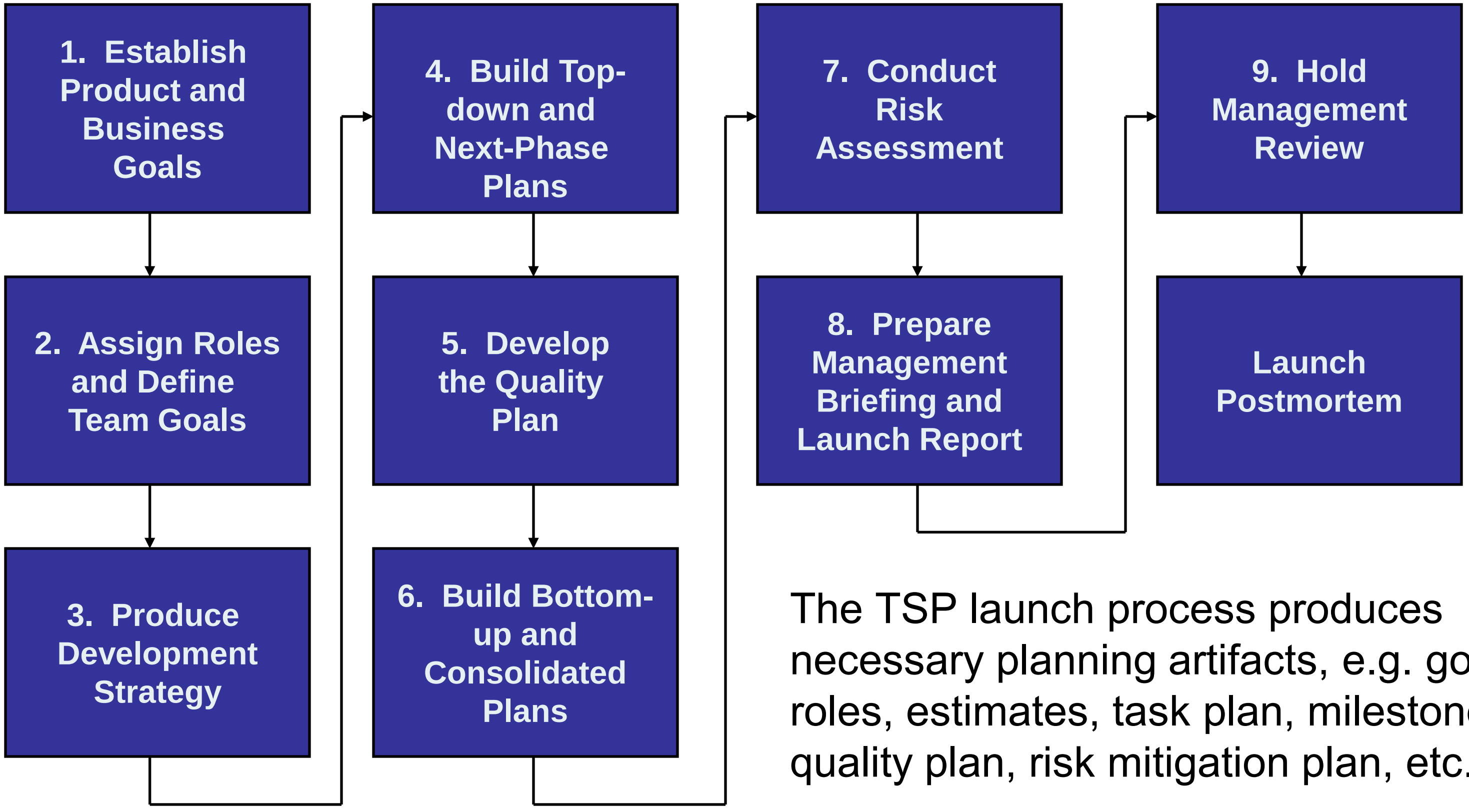
Development phase or cycle

Phase or cycle Postmortem

Work products, status, metrics, results

Project Postmortem

The TSP Launch Process



1. Establish Product and Business Goals

2. Assign Roles and Define Team Goals

3. Produce Development Strategy

4. Build Top-down and Next-Phase Plans

5. Develop the Quality Plan

6. Build Bottom-up and Consolidated Plans

7. Conduct Risk Assessment

8. Prepare Management Briefing and Launch Report

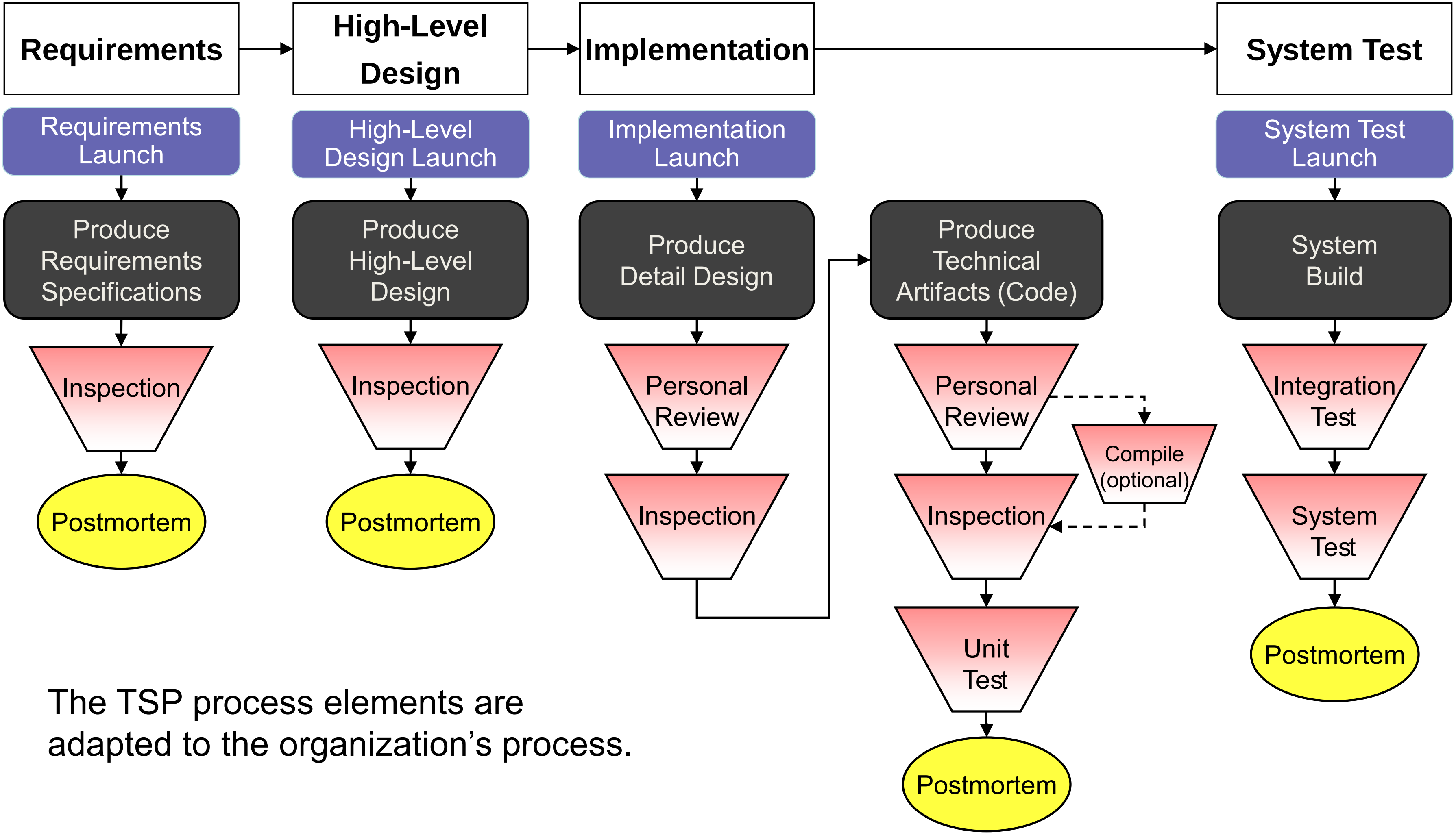
9. Hold Management Review

Launch Postmortem

The TSP launch process produces necessary planning artifacts, e.g. goals, roles, estimates, task plan, milestones, quality plan, risk mitigation plan, etc.

The most important outcome is a committed team.

The TSP Development Process



The TSP process elements are adapted to the organization’s process.

Measurement Framework

Schedule

Effort

Size

Quality

Four base measures

Apply to all processes and products

Estimates made during planning

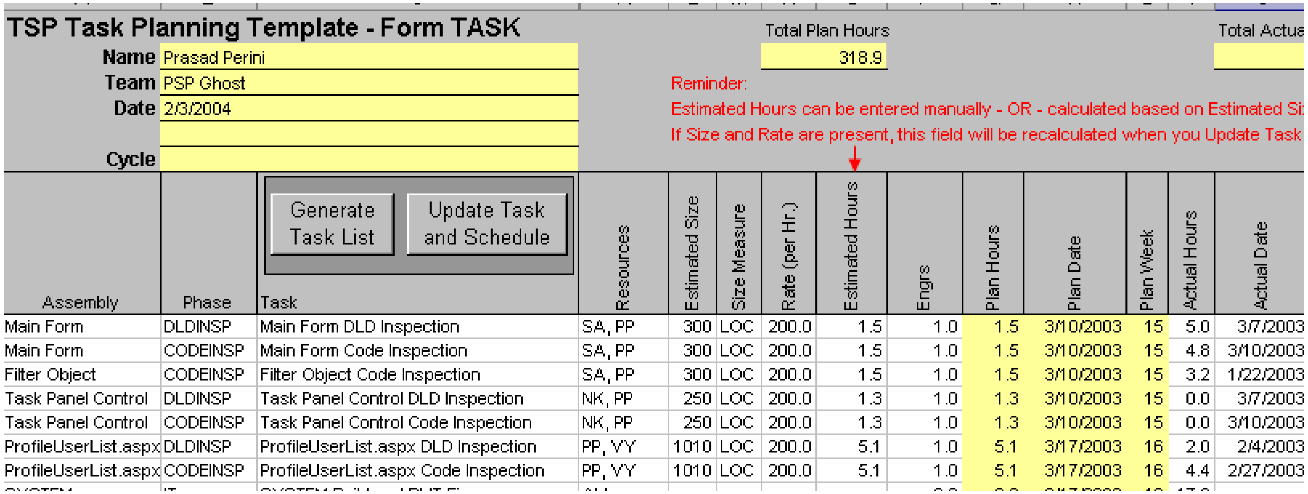
Directly measured by team members while working

Schedule

Schedule is the most commonly used project measure.

Schedule accuracy depends on granularity.

TSP schedule granularity is in hours, not days, weeks, or months.



TSP Task Planning Template - Form TASK

Name Prasad Perini
Team PSP Ghost
Date 2/3/2004
Cycle

Total Plan Hours 318.9

Total Actua

Reminder:
Estimated Hours can be entered manually - OR - calculated based on Estimated Si
If Size and Rate are present, this field will be recalculated when you Update Task

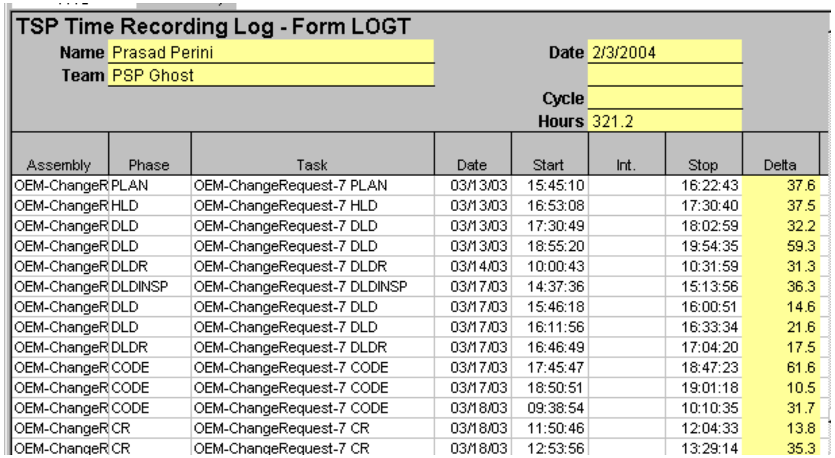
Assembly	Phase	Task	Resources	Estimated Size	Size Measure	Rate (per Hr.)	Estimated Hours	Engrs	Plan Hours	Plan Date	Plan Week	Actual Hours	Actual Date
Main Form	DLDINSP	Main Form DLD Inspection	SA, PP	300	LOC	200.0	1.5	1.0	1.5	3/10/2003	15	5.0	3/7/2003
Main Form	CODEINSP	Main Form Code Inspection	SA, PP	300	LOC	200.0	1.5	1.0	1.5	3/10/2003	15	4.8	3/10/2003
Filter Object	CODEINSP	Filter Object Code Inspection	SA, PP	300	LOC	200.0	1.5	1.0	1.5	3/10/2003	15	3.2	1/22/2003
Task Panel Control	DLDINSP	Task Panel Control DLD Inspection	NK, PP	250	LOC	200.0	1.3	1.0	1.3	3/10/2003	15	0.0	3/7/2003
Task Panel Control	CODEINSP	Task Panel Control Code Inspection	NK, PP	250	LOC	200.0	1.3	1.0	1.3	3/10/2003	15	0.0	3/10/2003
ProfileUserList.aspx	DLDINSP	ProfileUserList.aspx DLD Inspection	PP, VY	1010	LOC	200.0	5.1	1.0	5.1	3/17/2003	16	2.0	2/4/2003
ProfileUserList.aspx	CODEINSP	ProfileUserList.aspx Code Inspection	PP, VY	1010	LOC	200.0	5.1	1.0	5.1	3/17/2003	16	4.4	2/27/2003

Time

Time is a measure of time on task.

The TSP time measure is task hours, i.e. the time spent on a project task, minus interruption time.

TSP team members record their time as they work, not at the end of the day, week, or month.



TSP Time Recording Log - Form LOGT

Name Prasad Perini
Team PSP Ghost
Date 2/3/2004
Cycle
Hours 321.2

Assembly	Phase	Task	Date	Start	Int.	Stop	Delta
OEM-ChangeR	PLAN	OEM-ChangeRequest-7 PLAN	03/13/03	15:45:10		16:22:43	37.6
OEM-ChangeR	HLD	OEM-ChangeRequest-7 HLD	03/13/03	16:53:08		17:30:40	37.5
OEM-ChangeR	DLD	OEM-ChangeRequest-7 DLD	03/13/03	17:30:49		18:02:59	32.2
OEM-ChangeR	DLD	OEM-ChangeRequest-7 DLD	03/13/03	18:55:20		19:54:35	59.3
OEM-ChangeR	DLDR	OEM-ChangeRequest-7 DLDR	03/14/03	10:00:43		10:31:59	31.3
OEM-ChangeR	DLDINSP	OEM-ChangeRequest-7 DLDINSP	03/17/03	14:37:36		15:13:56	36.3
OEM-ChangeR	DLD	OEM-ChangeRequest-7 DLD	03/17/03	15:46:18		16:00:51	14.6
OEM-ChangeR	DLD	OEM-ChangeRequest-7 DLD	03/17/03	16:11:56		16:33:34	21.6
OEM-ChangeR	DLDR	OEM-ChangeRequest-7 DLDR	03/17/03	16:46:49		17:04:20	17.5
OEM-ChangeR	CODE	OEM-ChangeRequest-7 CODE	03/17/03	17:45:47		18:47:23	61.6
OEM-ChangeR	CODE	OEM-ChangeRequest-7 CODE	03/17/03	18:50:51		19:01:18	10.5
OEM-ChangeR	CODE	OEM-ChangeRequest-7 CODE	03/18/03	09:38:54		10:10:35	31.7
OEM-ChangeR	CR	OEM-ChangeRequest-7 CR	03/18/03	11:50:46		12:04:33	13.8
OEM-ChangeR	CR	OEM-ChangeRequest-7 CR	03/18/03	12:53:56		13:29:14	35.3

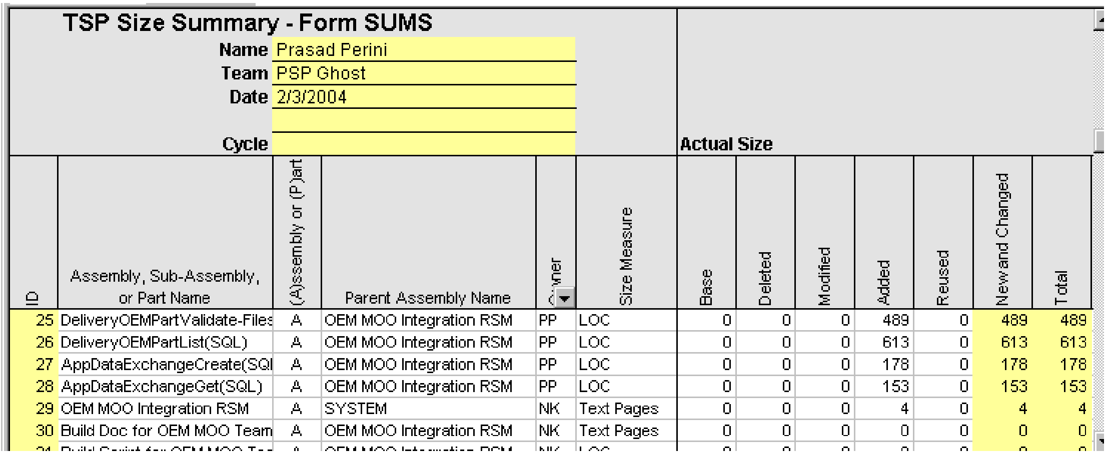
Size

Size is a measure of the magnitude of the deliverable, e.g. lines of code or function points, pages.

TSP size measures are selected based on their correlation with time.

TSP also uses size data to

- normalize other measures
- track progress



TSP Size Summary - Form SUMS

Name Prasad Perini
Team PSP Ghost
Date 2/3/2004
Cycle

						Actual Size						
ID	Assembly, Sub-Assembly, or Part Name	(A)ssembly or (P)art	Parent Assembly Name	Owner	Size Measure	Base	Deleted	Modified	Added	Reused	New and Changed	Total
25	DeliveryOEMPartValidate-Files	A	OEM MOO Integration RSM	PP	LOC	0	0	0	489	0	489	489
26	DeliveryOEMPartList(SQL)	A	OEM MOO Integration RSM	PP	LOC	0	0	0	613	0	613	613
27	AppDataExchangeCreate(SQl	A	OEM MOO Integration RSM	PP	LOC	0	0	0	178	0	178	178
28	AppDataExchangeGet(SQL)	A	OEM MOO Integration RSM	PP	LOC	0	0	0	153	0	153	153
29	OEM MOO Integration RSM	A	SYSTEM	NK	Text Pages	0	0	0	4	0	4	4
30	Build Doc for OEM MOO Team	A	OEM MOO Integration RSM	NK	Text Pages	0	0	0	0	0	0	0

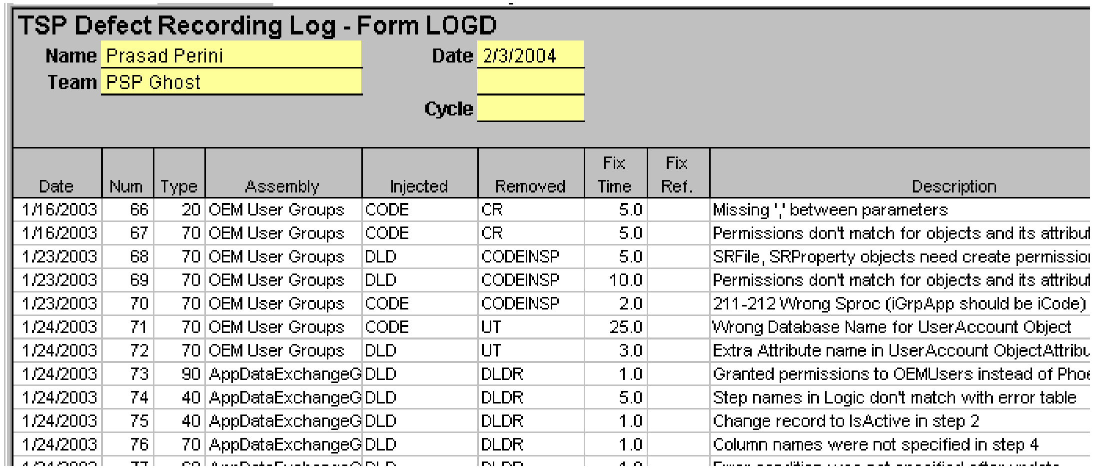
Defects

Defects are the measure of quality in the TSP.

Any change to an interim or final work product, made to ensure proper design, implementation, test, use, or maintenance, is a defect in the TSP.

Defects are logged as they are found and fixed.

Defect tracking takes place throughout the process.



TSP Defect Recording Log - Form LOGD

Name Prasad Perini
Team PSP Ghost
Date 2/3/2004
Cycle

Date	Num	Type	Assembly	Injected	Removed	Fix Time	Fix Ref.	Description
1/16/2003	66	20	OEM User Groups	CODE	CR	5.0		Missing ',' between parameters
1/16/2003	67	70	OEM User Groups	CODE	CR	5.0		Permissions don't match for objects and its attribu
1/23/2003	68	70	OEM User Groups	DLD	CODEINSP	5.0		SRFile, SRProperty objects need create permissio
1/23/2003	69	70	OEM User Groups	DLD	CODEINSP	10.0		Permissions don't match for objects and its attribu
1/23/2003	70	70	OEM User Groups	CODE	CODEINSP	2.0		211-212 Wrong Sproc (iGrpApp should be iCode)
1/24/2003	71	70	OEM User Groups	CODE	UT	25.0		Wrong Database Name for UserAccount Object
1/24/2003	72	70	OEM User Groups	DLD	UT	3.0		Extra Attribute name in UserAccount ObjectAttribu
1/24/2003	73	90	AppDataExchangeG	DLD	DLDR	1.0		Granted permissions to OEMUsers instead of Pho
1/24/2003	74	40	AppDataExchangeG	DLD	DLDR	5.0		Step names in Logic don't match with error table
1/24/2003	75	40	AppDataExchangeG	DLD	DLDR	1.0		Change record to IsActive in step 2
1/24/2003	76	70	AppDataExchangeG	DLD	DLDR	1.0		Column names were not specified in step 4

What the Base Measures Provide

Management measures derived from the base measures are used by the team to manage the project and manage quality.

Project management measures: earned value, productivity , estimation accuracy, estimation size and effort prediction intervals, cost performance index, time in phase distributions, …

Quality management measures: defects injected and removed in each process phase, defect density, defect injection and removal rates, process yield, phase yield, review and inspection rates, cost of quality, percent defect free, quality profiles, quality profile index, …

Topics

Introduction

TSP Concepts

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Team management with TSP

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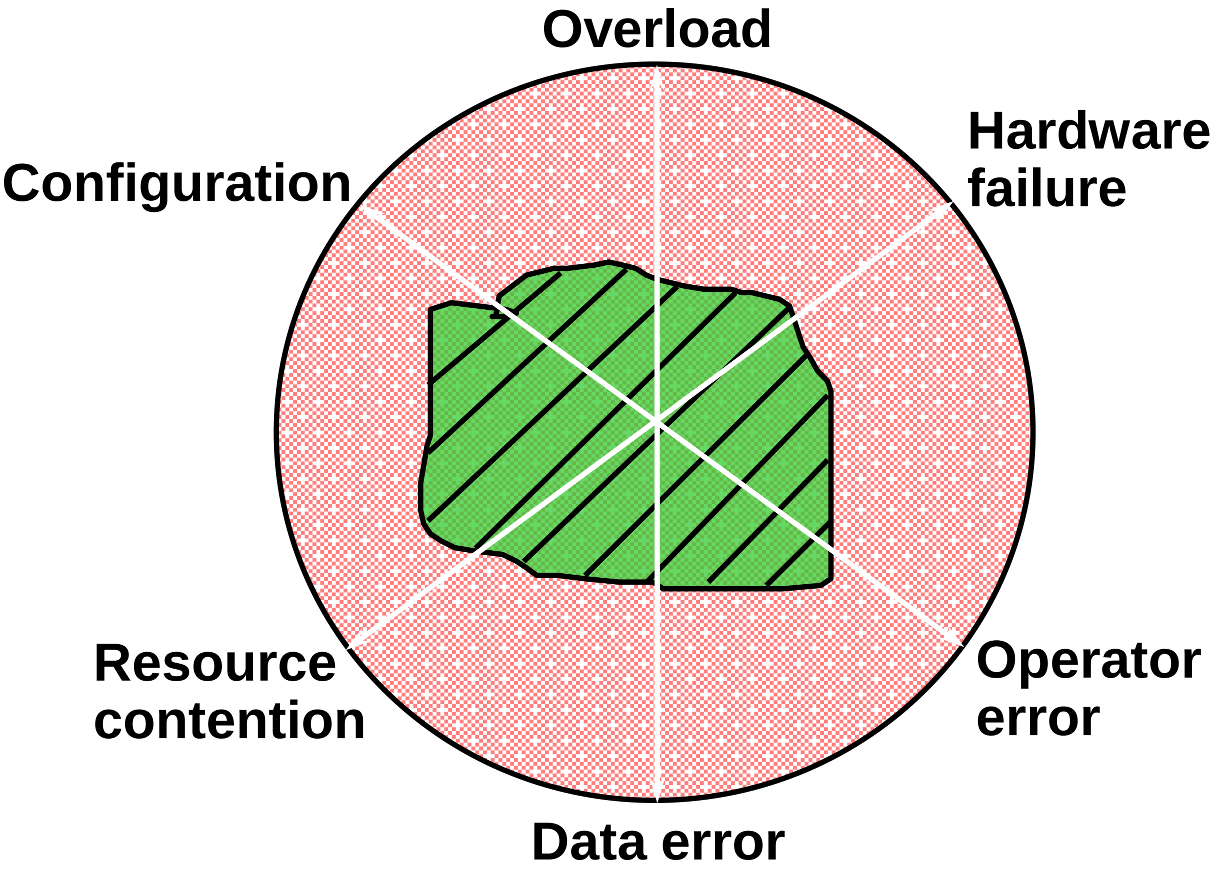
Getting Started

Testing Coverage



Safe and secure region = tested (shaded green)

Unsafe and insecure region = untested (shaded red)

Put a Quality Product into Test

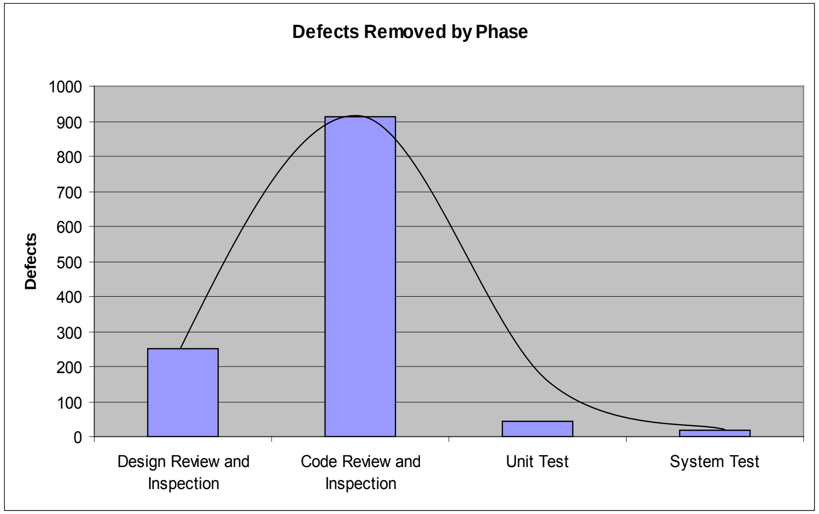
IBM’s Dr. Harlan Mills asked: “*How do you know that you’ve found the last defect in system test?*”

“You never find the first one.”

If you want a quality product out of test, you must put a quality product into test.

How do you put a quality product into test?

Quality Management!



TSP Quality Management Practices -1

Planning for quality

- TSP quality planning estimates the number of defects injected and removed at each phase based on historical injection rates and phase yields.
- Removal rates, review rates, phase time ratios, defect densities, and other quality indicators are then calculated by the tools.

Measuring and tracking quality

- Developers track every defect found and fixed.
- Quality is reviewed weekly by the quality manager and the team.

TSP Quality Management Practices -2

Defect removal filters

- Every activity that finds and removes defects can be thought of as a defect removal filter, e.g. reviews, inspections, compilers, static analyzers, etc.
- TSP has many such filters.

Capture/Recapture

- TSP uses capture/recapture to estimate the defects missed in inspections.

Defect prevention

- Every defect found in system test or later is analyzed to prevent future escapes.
- Every defective module is re-inspected.

Quality and the Team

High quality can only be achieved by the development team.

To manage quality they must

- have control of their process
- have the proper data to track quality
- be properly trained and motivated

The self-directed team management style empowers the team to manage quality.

The integrated measurement framework provides the data.

PSP provides the training, motivation, and commitment.

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Team Management with TSP

With the TSP measurement framework, teams know exactly where they stand in several dimensions.

- Schedule
- Resources
- Product quality

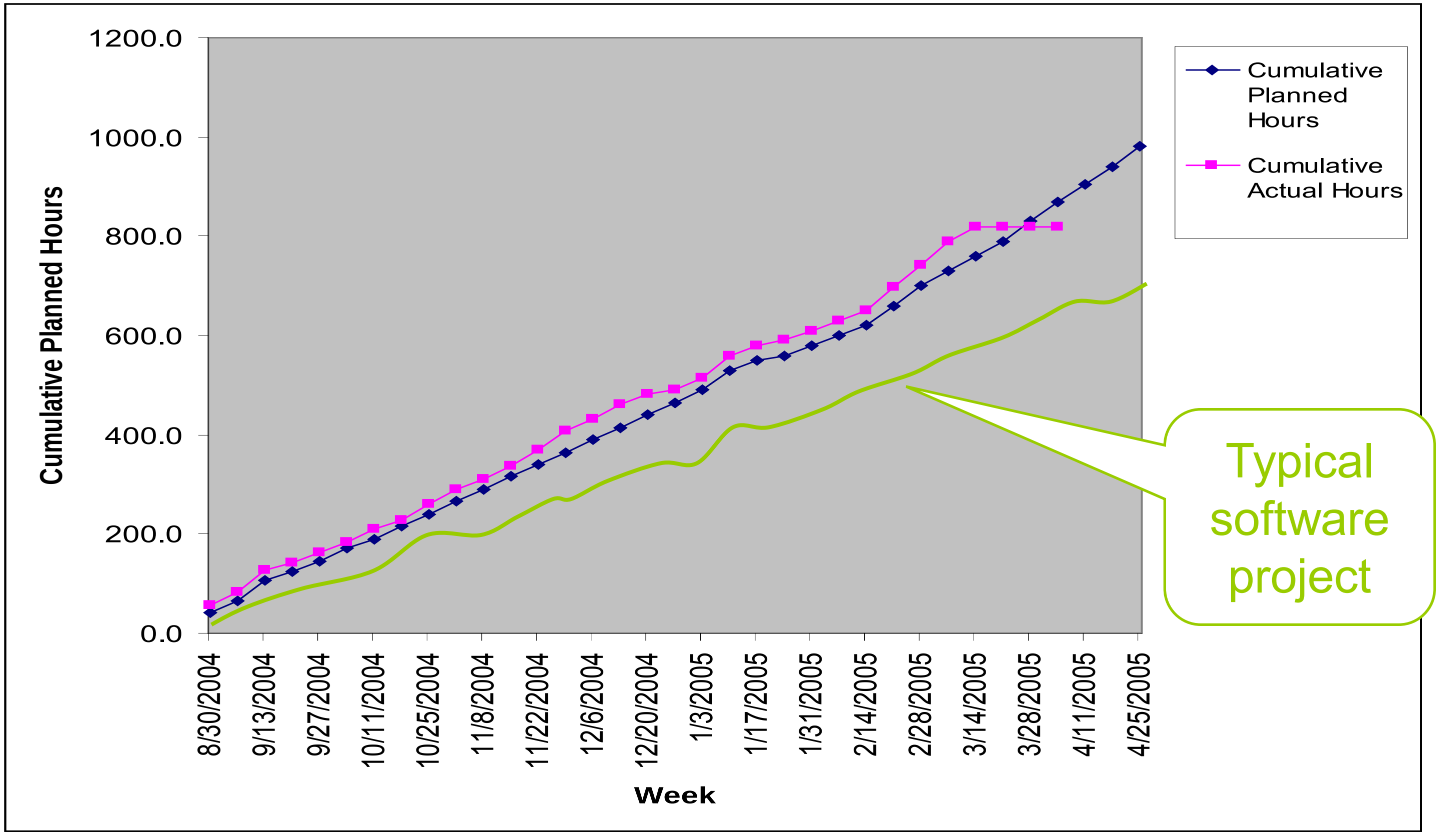
Teams use the data to

- manage their work
- anticipate and address problems early
- improve cost, schedule, and quality

The teams and their managers use the same data to manage the project as illustrated in the following sample of TSP charts and forms.

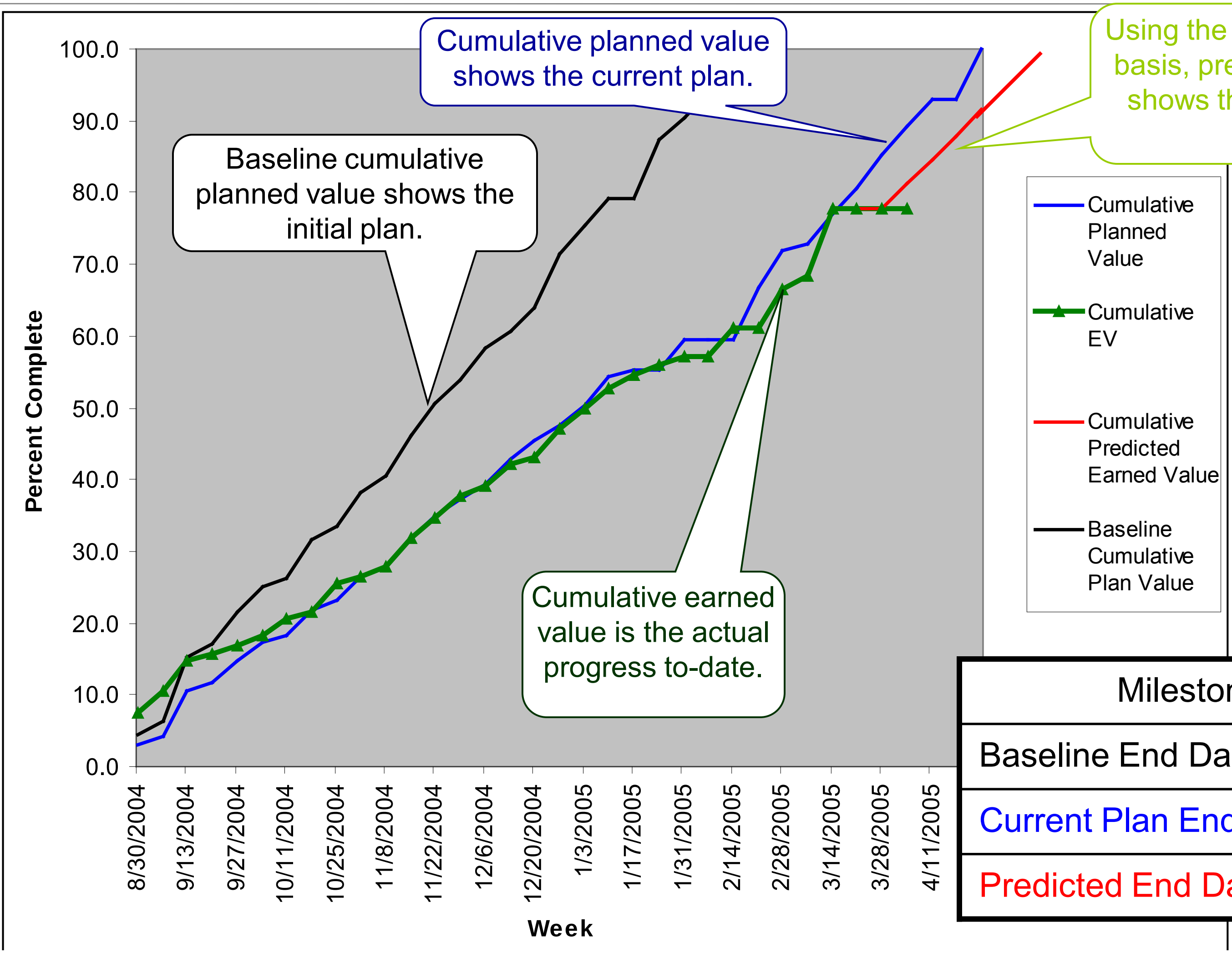
Resource Tracking

Cumulative plan and actual resource hours shows resource burn rate and potential source of slip



Typical software project

Earned Value Tracking



Cumulative planned value shows the current plan.

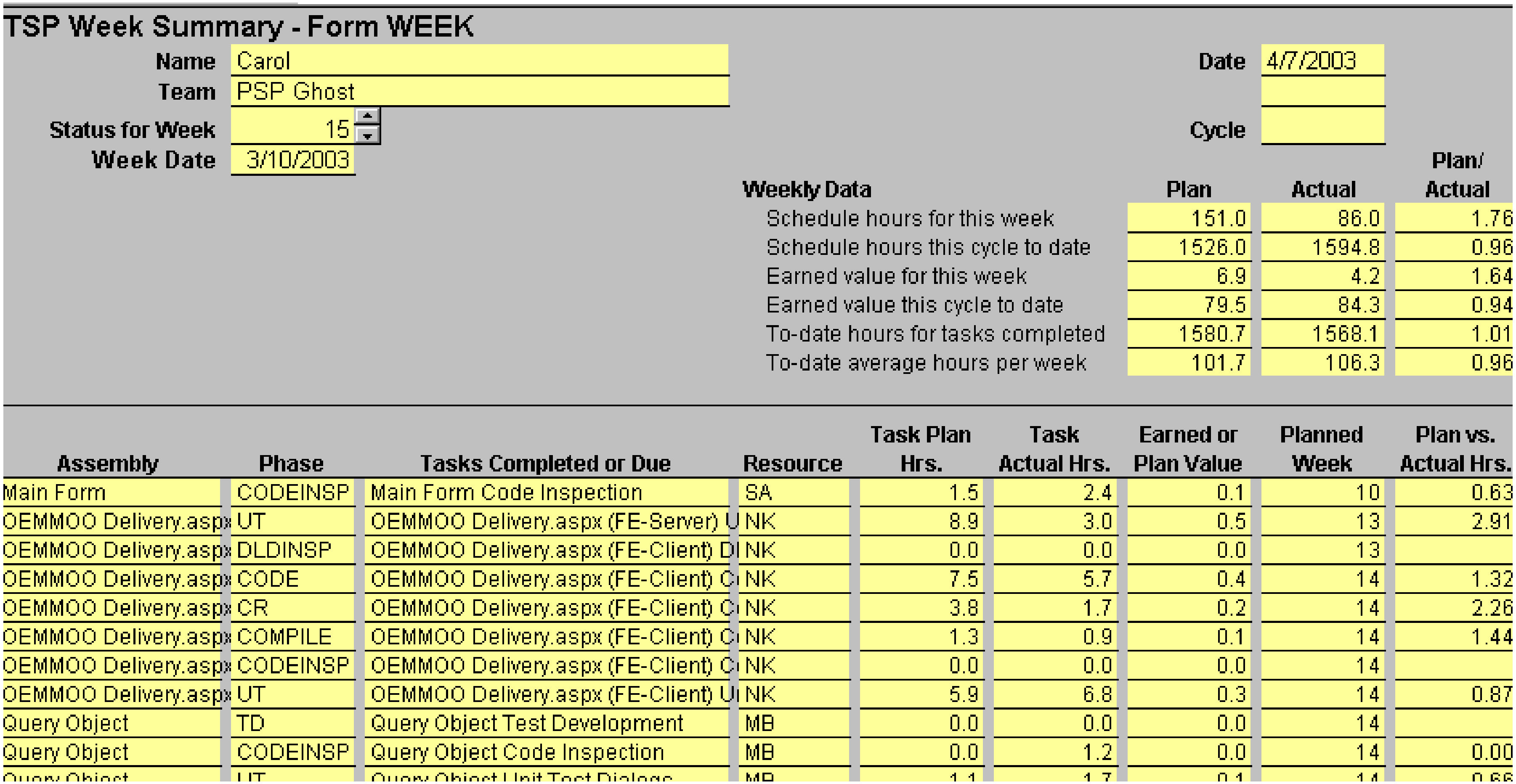
Baseline cumulative planned value shows the initial plan.

Cumulative earned value is the actual progress to-date.

Using the rate of progress as a basis, predicted earned value shows the likely completion date.

Milestone	Date
Baseline End Date	2/14
Current Plan End Date	4/25
Predicted End Date	5/16

TSP Weekly Status Report



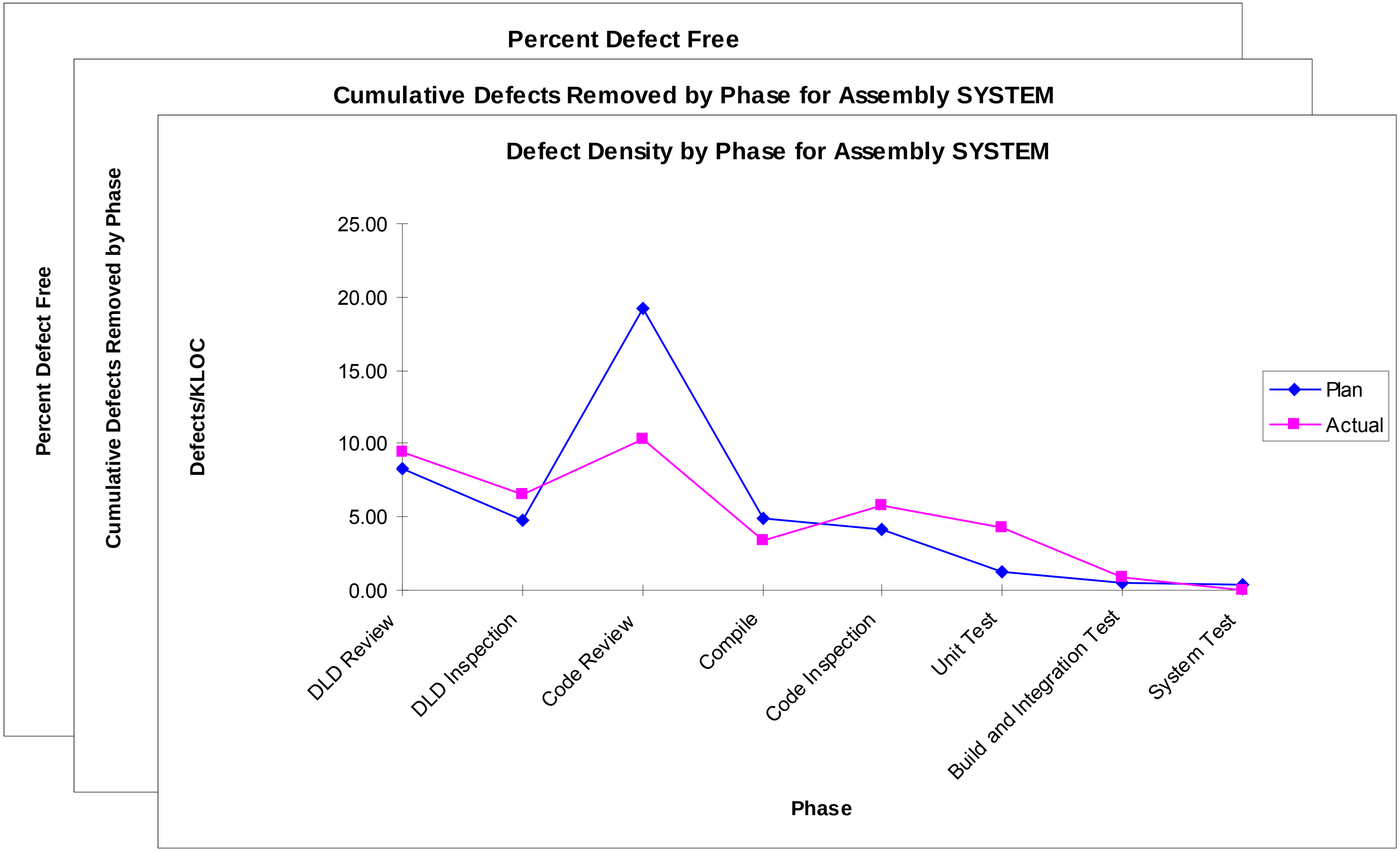
TSP Week Summary - Form WEEK

Name	Carol	**Date**	4/7/2003
Team	PSP Ghost		
Status for Week	15	**Cycle**	
Week Date	3/10/2003		

Weekly Data	**Plan**	**Actual**	**Plan/ Actual**
Schedule hours for this week	151.0	86.0	1.76
Schedule hours this cycle to date	1526.0	1594.8	0.96
Earned value for this week	6.9	4.2	1.64
Earned value this cycle to date	79.5	84.3	0.94
To-date hours for tasks completed	1580.7	1568.1	1.01
To-date average hours per week	101.7	106.3	0.96

Assembly	**Phase**	**Tasks Completed or Due**	**Resource**	**Task Plan Hrs.**	**Task Actual Hrs.**	**Earned or Plan Value**	**Planned Week**	**Plan vs. Actual Hrs.**
Main Form	CODEINSP	Main Form Code Inspection	SA	1.5	2.4	0.1	10	0.63
OEMMOO Delivery.aspx	UT	OEMMOO Delivery.aspx (FE-Server) U	NK	8.9	3.0	0.5	13	2.91
OEMMOO Delivery.aspx	DLDINSP	OEMMOO Delivery.aspx (FE-Client) Dl	NK	0.0	0.0	0.0	13	
OEMMOO Delivery.aspx	CODE	OEMMOO Delivery.aspx (FE-Client) C	NK	7.5	5.7	0.4	14	1.32
OEMMOO Delivery.aspx	CR	OEMMOO Delivery.aspx (FE-Client) C	NK	3.8	1.7	0.2	14	2.26
OEMMOO Delivery.aspx	COMPILE	OEMMOO Delivery.aspx (FE-Client) C	NK	1.3	0.9	0.1	14	1.44
OEMMOO Delivery.aspx	CODEINSP	OEMMOO Delivery.aspx (FE-Client) C	NK	0.0	0.0	0.0	14	
OEMMOO Delivery.aspx	UT	OEMMOO Delivery.aspx (FE-Client) U	NK	5.9	6.8	0.3	14	0.87
Query Object	TD	Query Object Test Development	MB	0.0	0.0	0.0	14	
Query Object	CODEINSP	Query Object Code Inspection	MB	0.0	1.2	0.0	14	0.00
Query Object	UT	Query Object Unit Test Dialogs	MB	1.1	1.7	0.1	14	0.66

Quality Tracking



Quality Profile

The TSP Quality Profile is a quality early warning indicator.

It examines criteria that are effective predictors of system test and post-release quality, and produces a graph of the result.

It supports drill down to any level for further analysis, e.g. in software:

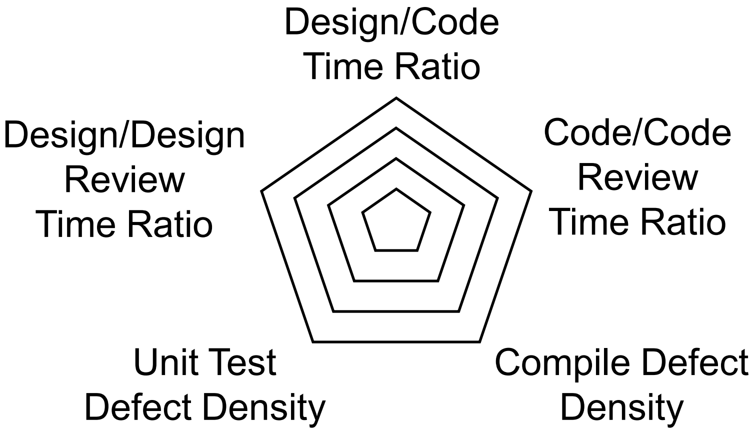
system → component → module → class.

Quality Profile Criteria

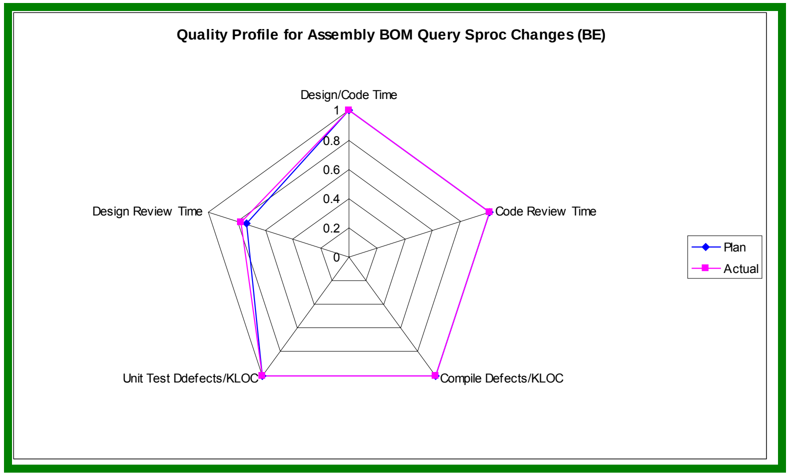
1. Design time = coding time
2. Design review time = ½ design time
3. Code review time = ½ coding time
4. Compile defects < 10 per KLOC
5. Unit test defects < 5 per KLOC

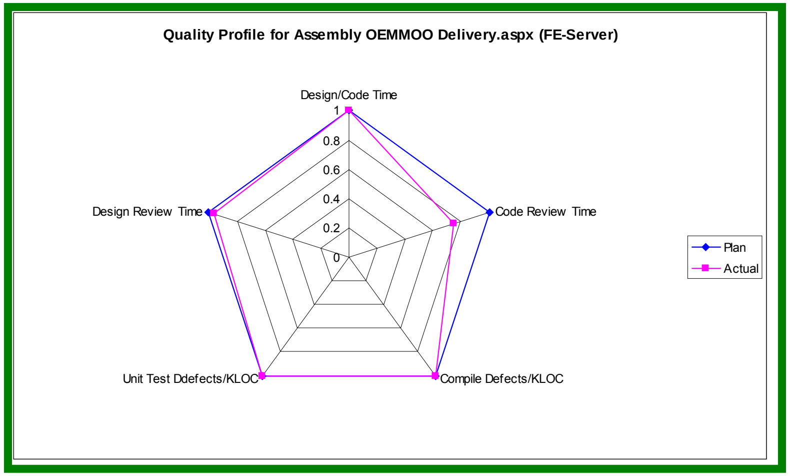
If satisfied, a criterion has a value of 1, and is drawn along the outer edge of the chart.

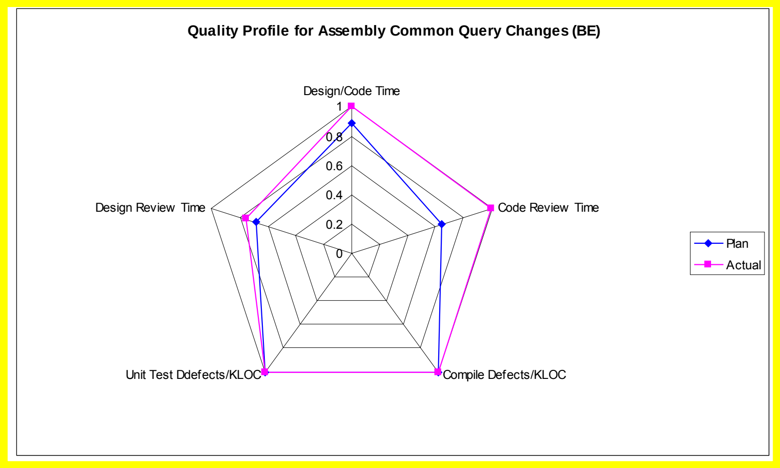
Quality Profile

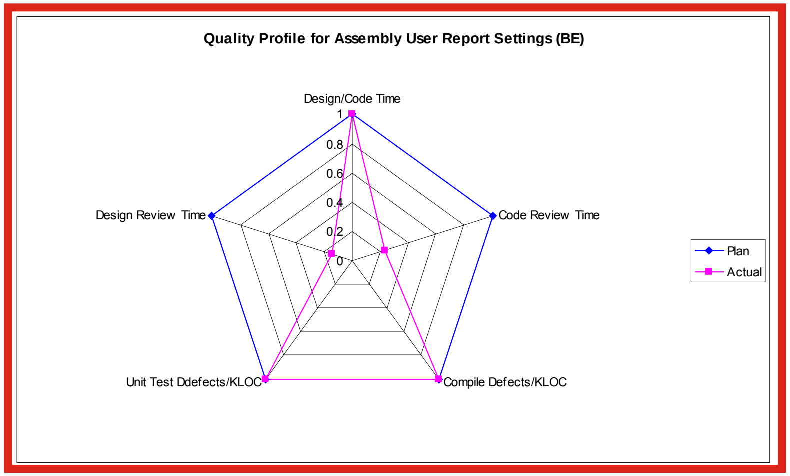


Using the Quality Profile


Quality Profile for Assembly BOM Query Sproc Changes (BE)


Quality Profile for Assembly OEMMOO Delivery.aspx (FE-Server)


Quality Profile for Assembly Common Query Changes (BE)


Quality Profile for Assembly User Report Settings (BE)

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The Business Case for TSP

The principal cost of introducing TSP are training costs and lost opportunity cost resulting from time spent in training.

The principal benefits are

- lower development costs and shorter schedules
- more functionality per release and improved productivity
- lower defect density in both system test and in the delivered product
- improved work-life balance for the developers
- improved customer satisfaction

Schedule Management

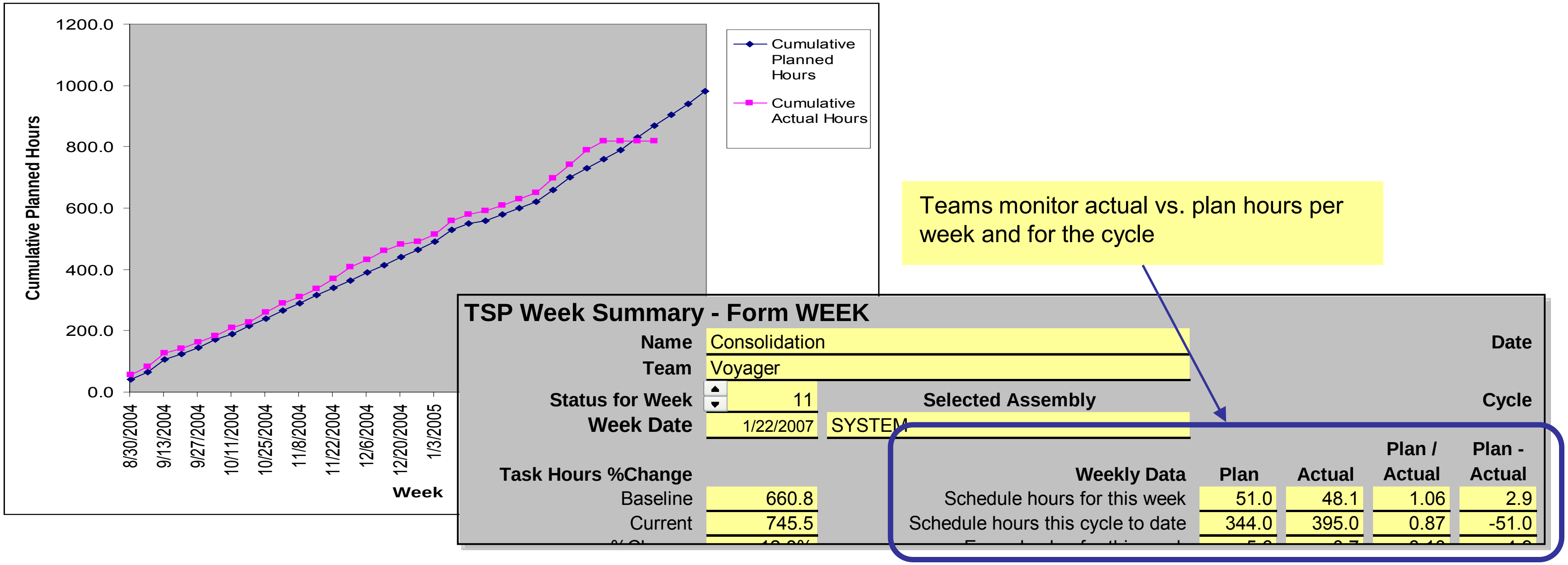
First-time TSP projects at Microsoft had a 10 times better mean schedule error than non-TSP projects at Microsoft as reflected in the following table.

Microsoft Schedule Results	Non-TSP Projects	TSP Projects
Released on Time	42%	66%
Average Days Late	25	6
Mean Schedule Error	10%	1%
Sample Size	80	15

Managing Task Hours

Task hours are the hours that teams spend on planned tasks and do not include unplanned but necessary tasks like meetings, courses, coordination, handling mail, etc.

When measured, tracked, and managed, the team can usually improve task hours, but management can't. ***Why?***



Teams monitor actual vs. plan hours per week and for the cycle

TSP Week Summary - Form WEEK

Name Consolidation **Date**

Team Voyager

Status for Week 11 **Selected Assembly** **Cycle**

Week Date 1/22/2007 SYSTEM

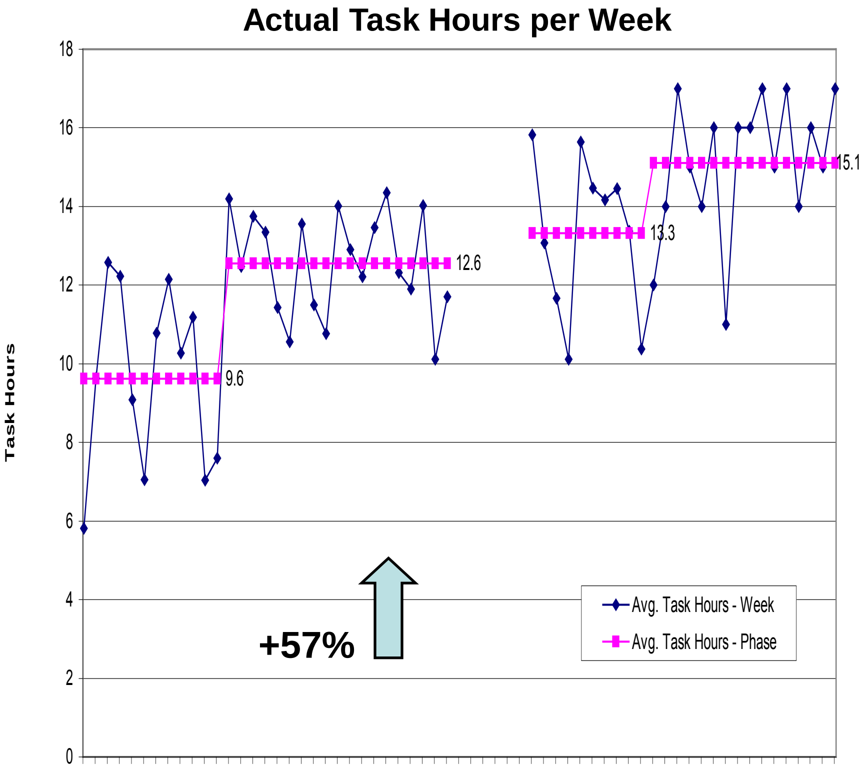
Task Hours %Change	
Baseline	660.8
Current	745.5

Weekly Data	**Plan**	**Actual**	**Plan / Actual**	**Plan - Actual**
Schedule hours for this week	51.0	48.1	1.06	2.9
Schedule hours this cycle to date	344.0	395.0	0.87	-51.0

Improving Task Hours

At Allied Signal average task hours per developer per week were improved from 9.6 hours to 15.1 hours through quiet time, process documentation, more efficient meetings, etc.

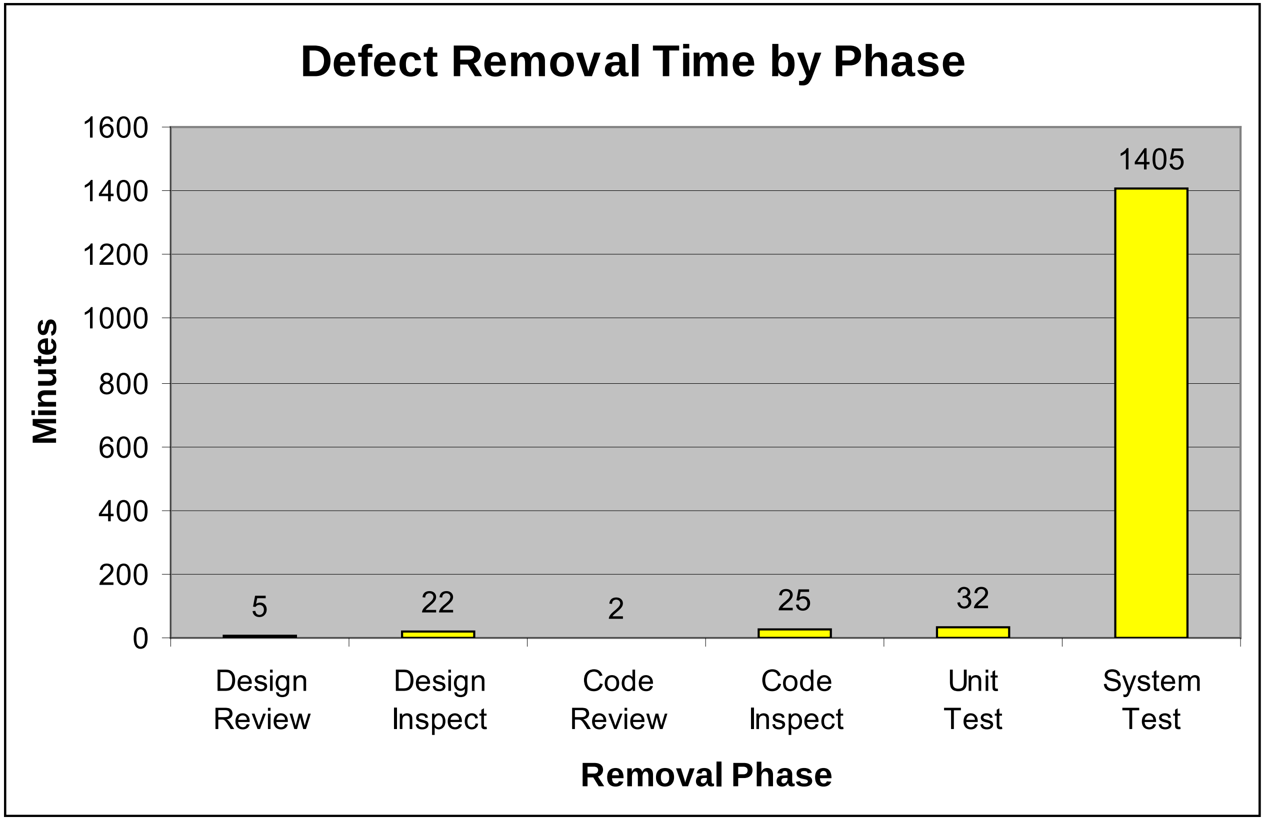
This is equivalent to a 57% increase in productivity.



Source: Allied Signal

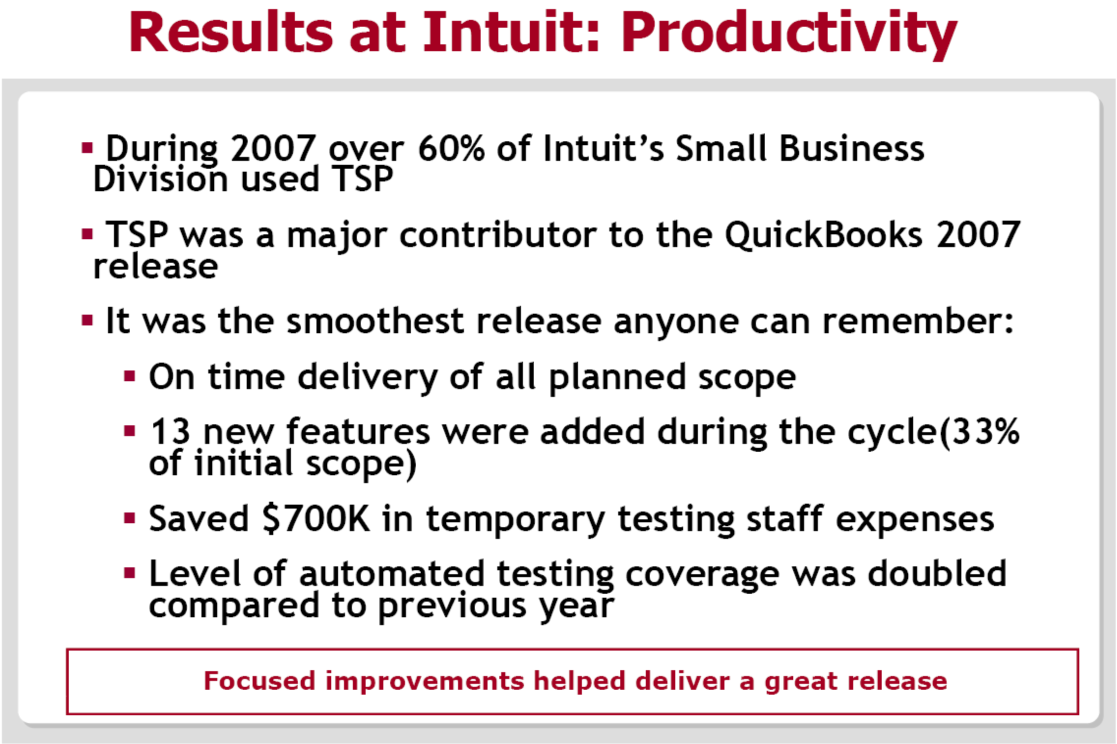
Reviews and Inspections Save Time

Xerox found that TSP quality management practices reduced the cost of poor quality by finding and removing defects earlier when costs are lower.



Intuit Productivity Improvement

By putting a quality product into system test Intuit improved productivity and reduced cost while delivering 33% more functionality than planned.



Results at Intuit: Productivity

- During 2007 over 60% of Intuit's Small Business Division used TSP
- TSP was a major contributor to the QuickBooks 2007 release
- It was the smoothest release anyone can remember:
  - On time delivery of all planned scope
  - 13 new features were added during the cycle(33% of initial scope)
  - Saved $700K in temporary testing staff expenses
  - Level of automated testing coverage was doubled compared to previous year

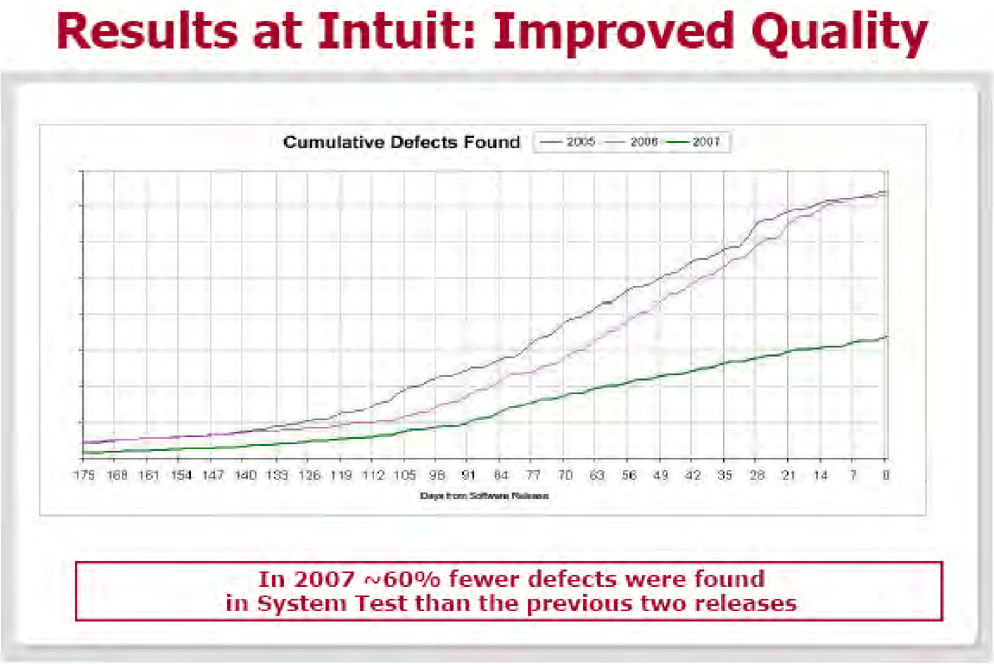
Focused improvements helped deliver a great release

Source: Intuit

Intuit Quality Improvement

TSP reduced defects found in system test by 60% over the previous two releases of QuickBooks 2007 release.

Intuit has also recently reported a savings of $20M from a reduction in customer support calls on QuickBooks 2007.



Results at Intuit: Improved Quality

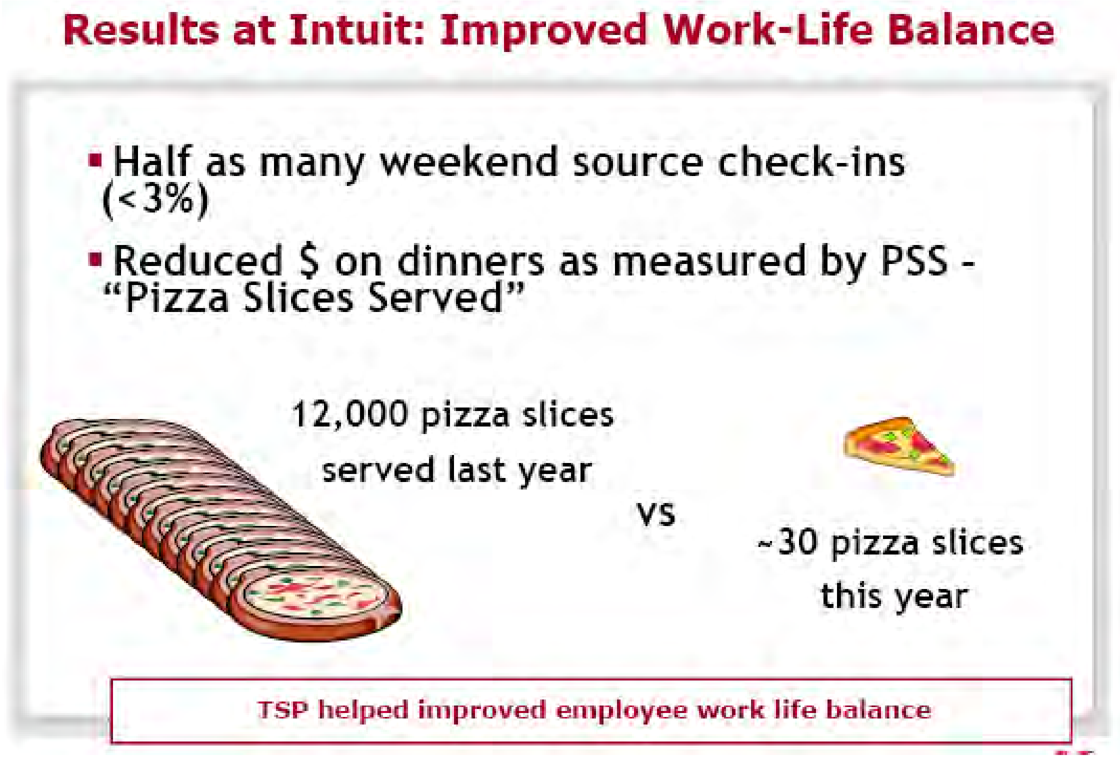
In 2007 ~60% fewer defects were found in System Test than the previous two releases

Source: Intuit

Work-Life Balance

Finding and retaining good people is critical to long-term success.

Intuit found that TSP improved work-life balance, a key factor in job satisfaction.



Results at Intuit: Improved Work-Life Balance

- Half as many weekend source check-ins (<3%)
- Reduced $ on dinners as measured by PSS - “Pizza Slices Served”

12,000 pizza slices served last year

vs

~30 pizza slices this year

TSP helped improved employee work life balance

Source: Intuit

Topics

Introduction

TSP Concepts

Team management with TSP

User experience

Getting Started

TSP Product Suite: Process, Training, Tools

Process Notebook

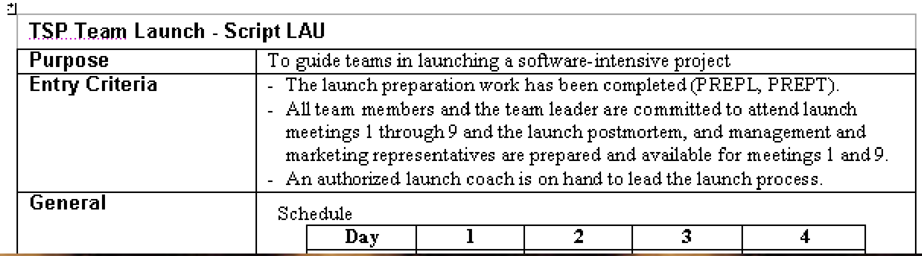
- Process scripts
- Forms
- Guidelines and standards
- Role descriptions

Training and Textbooks

- Executives
- Project Managers
- Engineering
- TSP Coach
- TSP Trainer

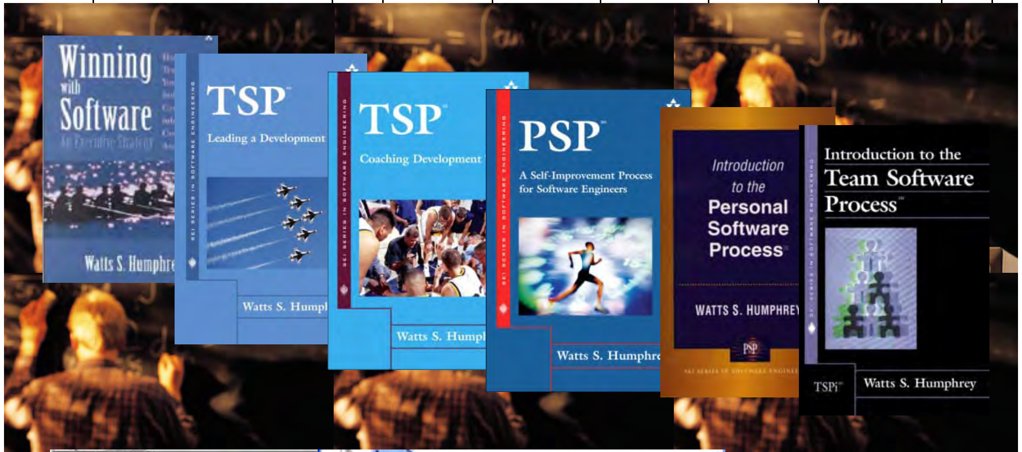
Tools

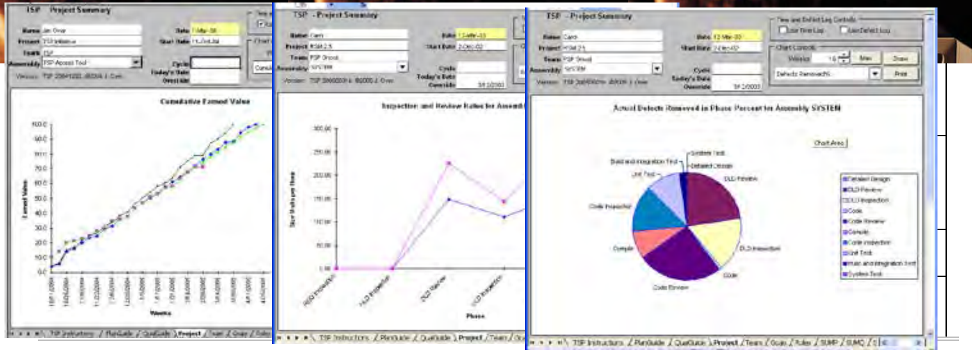
- TSP Workbook
- PSP Workbook
- Coach/Trainer Workbook



TSP Team Launch - Script LAU	
Purpose	To guide teams in launching a software-intensive project
Entry Criteria	- The launch preparation work has been completed (PREPL, PREPT). - All team members and the team leader are committed to attend launch meetings 1 through 9 and the launch postmortem, and management and marketing representatives are prepared and available for meetings 1 and 9. - An authorized launch coach is on hand to lead the launch process.
General	Schedule

Day	1	2	3	4





TSP Implementation Strategy

TSP is implemented on a project-by-project or team-by-team basis

Start with two or three teams.

- train the team members and their managers
- launch these teams with TSP
- evaluate and fine tune the approach

This cycle is then repeated, increasing scope at a sustainable pace.

Deployment Timeline

Task	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
TSP Executive Strategy Seminar	♦											
Leading Development Teams	♦											
PSP Fundamentals		♦										
Launch Initial Teams		♦										
Cycle Postmortem for Initial Teams				♦								
Re-launch Initial Teams				♦								
Train instructors and coaches		→	→									
Project Postmortem for Initial Teams						♦						
Train and launch remaining projects and teams at a sustainable pace.				→	→	→	→	→	→	→	→	→

The training schedule can be compressed to as short as one month for a faster start.

The gating factor for most organizations is the availability of projects.

SEI recommends training internal coaches as soon as possible.

Selecting Pilot Projects

Pick 2 to 3 pilot projects.

- 3 to 15 team members
- 4 to 18 month schedule
- software-intensive new development or enhancement
- representative of the organization’s work
- important projects

Select teams with members and managers who are willing to participate.

Consider the group relationships.

- contractors
- organizational boundaries
- internal conflicts

Build Internal Capability

Organizations should develop internal capability to support TSP.

- SEI-certified TSP coaches are essential
- SEI-authorized trainers are optional as training can be outsourced

The initial pilot projects provide the “hands-on” experience.

- first SEI leads the effort and internal staff observe
- then internal staff lead and SEI mentors

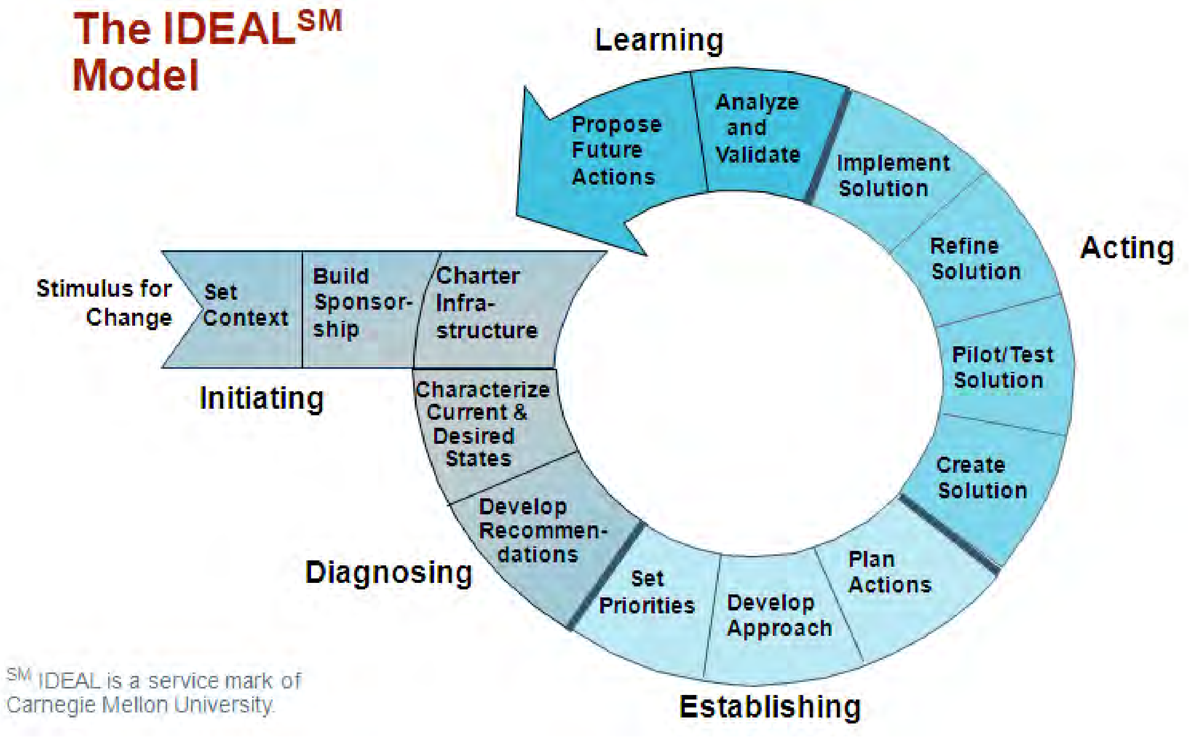
Training and authorization requirements

- Coach – one week training course, exam, and a launch observation
- Instructor – one week training course and an exam

Training for Participants

Participant	CBT Option	Course	Notes
Executives and senior management	No	*TSP Executive Strategy Seminar*	1 day + optional ½ day strategic planning session.
Middle and first-line managers	No	*Leading Development Teams*	3 days
Software developers	Yes	*PSP Fundamentals* *PSP Advanced*	5 days 5 days (optional)
Team members other than software developers		*TSP Team Member Training*	2.5 days (will replace *Introduction to Personal Process in 2009)*
Instructors	No	*PSP Instructor Training*	5 days Pre-requisite training: *PSP Fundamentals and PSP Advanced or PSP I and PSP II*
Coaches	No	*TSP Coach Training*	5 days Pre-requisite training: *PSP Fundamentals and PSP Advanced or PSP I and PSP II*

Questions?


The IDEAL^SM Model
Learning
Propose Future Actions
Analyze and Validate
Implement Solution
Refine Solution
Acting
Pilot/Test Solution
Create Solution
Plan Actions
Develop Approach
Set Priorities
Establishing
Develop Recommendations
Characterize Current & Desired States
Diagnosing
Stimulus for Change
Set Context
Build Sponsorship
Charter Infrastructure
Initiating
SM IDEAL is a service mark of Carnegie Mellon University.

Contact

- Conversation
- Website
- Article

Awareness

- Conferences
- Books
- Articles
- Training

Understanding

- Books
- Classes
- Conferences
- Consultants

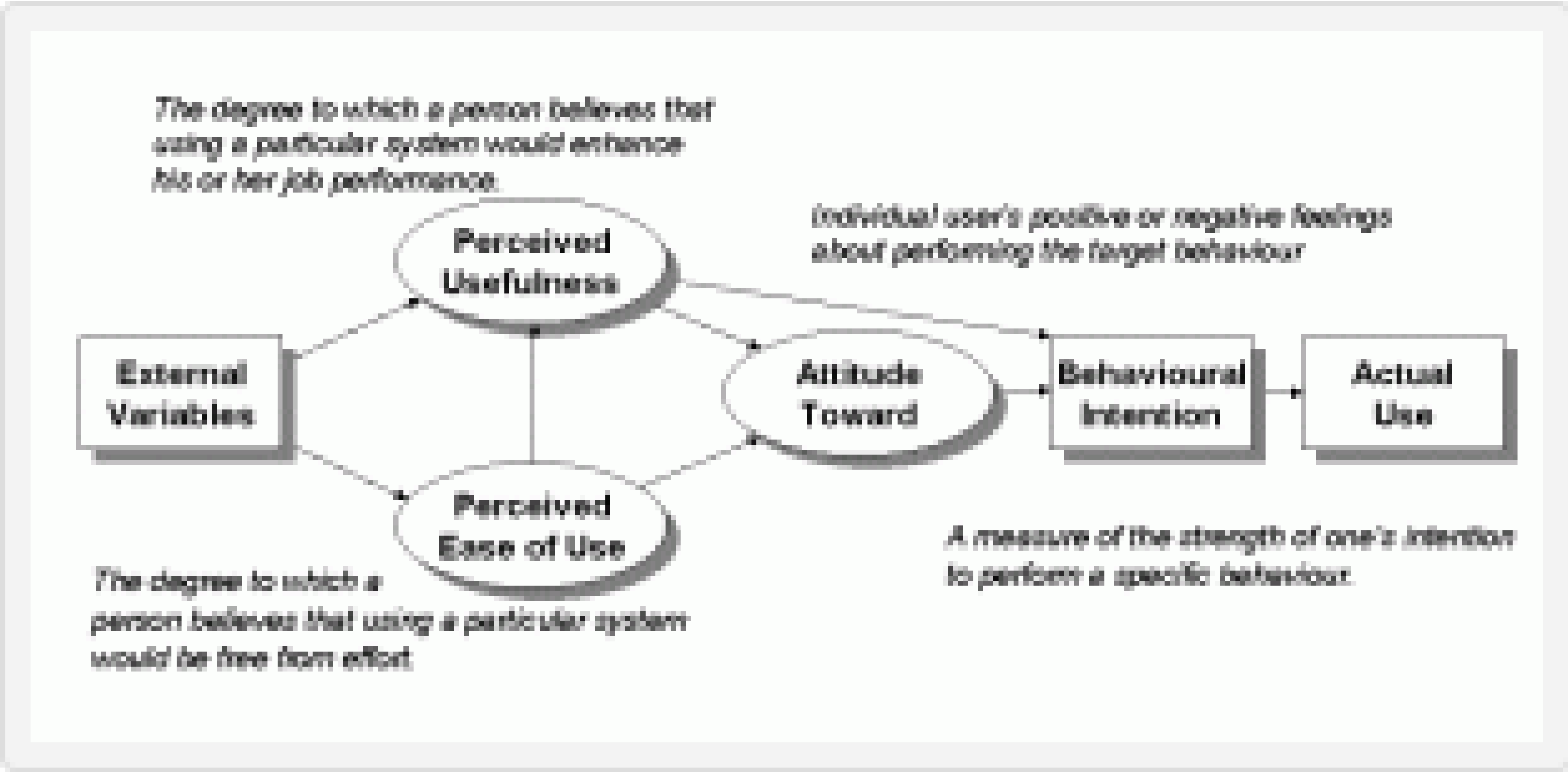
Trial Use

- Org Sponsorship (MSG)
- Change Agency (EPG)
- Action Teams (PATS)
- New Organizational Processes/Innovation
- Pilot Projects

Adoption

- Rollout Strategy
- Training
- Support

The Technology Acceptance Model is an information systems theory that models how users come to accept and use a technology.



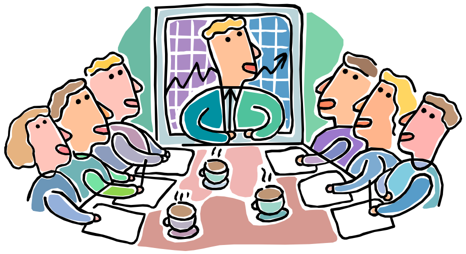
Bagozzi, R. P., Davis, F. D., & Warshaw, P. R. (1992). ***Development and test of a theory of technological learning and usage. Human Relations****, 45(7), 660-686.*

CMMI for Services: An Approach to Improve Your Program Management Office

NDIA CMMI Technology Conference

November 17, 2009

Pat Mitryk



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Topics

- Situation Discussion
  - Current Situation
  - Problems/Questions
- Scoping
  - Challenges
  - Before We Can Get Started
  - Scoping Decisions and Decisions
- Some Steps Toward the Improvement
- Benefits
- Lessons Learned

Situation Discussion

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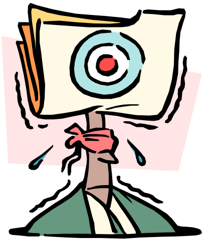
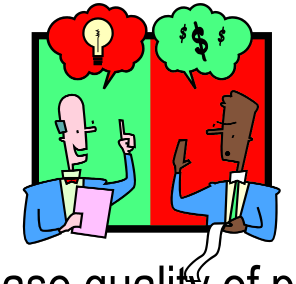
Current Situation – What Business Are We In?

Government Contracts for a variety of Strategic Support Services

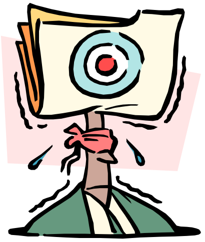
- IDIQ – Indefinite Delivery, Indefinite Quantity
- Program Support & Leadership
- Technical Support – Engineering, Communications, IT, etc.
- Resource sourcing for a wide variety of services



Improve Customer Satisfaction



Increase quality of product and service delivery and support while reducing costs



Improve profitability ≡ Increase Direct Labor

Current Situation – 2: What is the “PMO”?

Program Management Office Entities – Functional Groups, as typically* defined…in this/these scenario’s

Typical Make-up of PMO

Function	Main Responsibilities
Program Management	Oversight of the contract vehicle and the specific Deliveries or Taskings; Main customer interface for satisfaction and ongoing business development
Project Management	Management of specific Delivery Orders / Task Orders and the resources that perform the technical and management requests of the customer
Contracts	Expert in government contracts establishment and change management or maintenance
Pricing	Pricing for all direct charges to the original contract and any change orders
Subcontracts	Fulfillment of resource requests from partner companies for expertise in support of Deliveries/Taskings
Finance	Establishment and change management of budget; Regular ongoing performance reporting to Program/Project Management and Customer(s)

*Your company may define these entities differently, or combine them; they are here to assist in the depiction of this CMMI-SVC implementation approach / example

Current Situation - 2: What is the "PMO"?

Program Management Office Functional Groups – continued

Function	Main Responsibilities
Acquisition/Procurement	Materials procurement (and management) in support of Delivery/Task Orders
Facilities	Ensuring contract resources (onsite and govt site) have office space and equipment; Oversight of current company (onsite) facility and any issues or requests
Security	Handles security clearance and security logistics and access for all resources both here and abroad
Recruiting	Procurement of new hires to fulfill corporate positions and new requests for contract support
Human Resources	Onboarding and training for resources
Quality Assurance	Ensuring quality in each Functional Group and Project processes/deliverables
IT	Computer (Hardware & Software) procurement, configuration, and support for onsite resources

Current Situation - 3

PMO Operations

Functional Groups

Focus on "customer service" without defining "who is the customer"

Lacking communication & coordination with one another

Accepting Requests for services from any source in any way

Lacking understanding of current performance

Ignoring linkage to business goals

Lacking understanding of a "Project" and how they relate to it

Current Situation – 4: Typical Problems

People ↔ Process ↔ Technology

People

- Feel like everyone comes to them with a business or customer “priority”
- Frustrated at their jobs
- Not fully trained
- Work as firefighters, not as a team
- Not coached or mentored
- Lack open communications, respect
- Do not understand where they belong – under an organization and structure
- Are constantly overburdened

Process

- Are not using a well documented and repeatable standard process
- Processes that exist are not deployed/trained in a timely fashion or to the appropriate groups
- Little or no SLA’s and measures are in place
- Continuous improvement is not a widely understood
- QA process rarely occurs and perception is “policing” and negative
- Best practices are rarely developed, and not typically shared, and refined

Technology

- Tools exist, but are not documented
- People have not been trained and are not using them consistently
- Requests, Problems, Changes, and Issues are not captured, tracked and managed
- Not easily accessible by people when out of the office - at home or on the customer site
- Version updates are pushed out without notification

Questions that Needed Answers

- We use CMMI-SVC Process Areas to answer the following questions?
  - What are the requirements for the PMO and all functional groups within it?
  - How do we estimate and allocate resources for a project?
  - How do we measure improvement?
  - What is a Service Request – how do we handle each one?
  - What can we promise within a Service Level Agreement to the end customer?
  - What is our current capacity and availability and how do we estimate and forecast - for "project" work and new proposals?

Scoping

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Scoping Challenges

Typical scenario – everyone is maxed out so….

- Where do we begin?
  - It's a big model, what are our most important issues or business objectives?
  - It's a big company, where are we going to focus our initial efforts?
  - How much improvement is too much?
  - How can we achieve (and show) smaller and/or shorter term success?
- How should we organize the improvement infrastructure?
- Who should be involved in the improvement strategy, plan, creation and implementation?
- How do we get started?

Getting Started – 1: Define Basic Terminology

We could not begin until we made sure we had agreement on some basic common terminology:

Program* – a collection of related projects and the infrastructure that supports them, including objectives, methods, activities, plans and success measures. In our language – "The Award" – The **Contract Vehicles** that were proposed outlining management objectives and techniques for the customer

- Contract level (very high level) requirements and management activities
- Success criteria/measures – but no actual funding, but a bucket of $$

Project* – a managed set of interrelated resources that delivers one or more products or services to a customer or end user. In our language – the awarded **Delivery/Task Orders** within a Program/Contract Vehicle that outlines specific work, resources and deliverables and is "funded"

- Task Order level requirements for resources and services
- PMO related schedule of status and performance

* CMMI-SVC Glossary

Getting Started – 2: Define Basic Terminology

Requirements* – a condition or capability needed by and end user to solve a problem or achieve an objective; a condition or capability that must be met or possessed by a product, service to satisfy a supplier agreement, standard, specification, or other formally imposed documents.

Represented by contractual agreements such as:

- Technical Execution Plan (TEP or RTEP)
- Program/Project Work Statement (PWS)
- Statement Of Work (SOW)

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* CMMI-SVC Glossary

Getting Started – 3: Define Basic Terminology

Service Request* – a communication from a customer or end user that one or more specific instances of service delivery are desired. In our language, they are:

- Task Order Requirements
  - Requests for resources (a “body” to fill a Labor Category)
  - Requests for management services for the contract (e.g., regularly scheduled meetings and management reports)
- Contract Modification Requests
- Internally generated requests / changes
- Request for proposal

Note: A request typically requires many, if not all functional groups (Pricing, contracts, finance, subcontracts, recruiting, etc.) to play a role in providing the Program/Project managers with the information and deliverables they need to answer the customer request

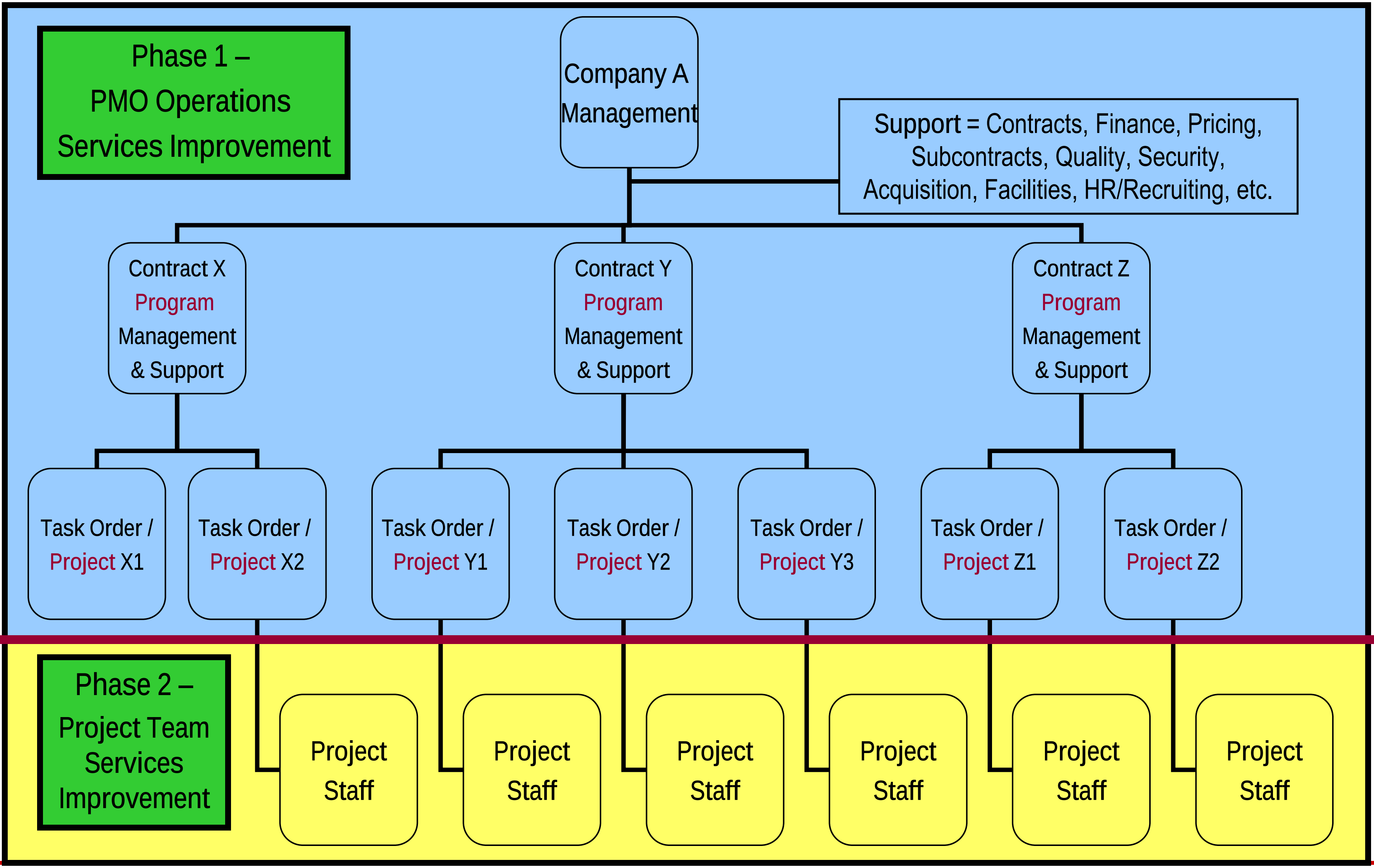
* CMMI-SVC Glossary

Scoping Decisions - Where Do We Begin?

Divide and Conquer!!!

1. Improvement in Phases
   - Phase 1: “Above the line” - PMO Operations (on-site at company x)
     - Will allow us to control two factors:
       - Customer Satisfaction – Many contracts won initially and on re-compete with how we can manage the contract activities to maintain and improve customer satisfaction
       - Deliverable control – we can show shorter-term success by separating “controllable” groups and activities from “uncontrollable” ones – IDIQ-based projects
   - Phase 2: “Below the line” - Project team processes (customer site and typically IDIQ related activities), some covered by CMMI-DEV

Scoping Decisions : The Organizational Unit



Phase 1 –
PMO Operations
Services Improvement

Company A
Management

Support = Contracts, Finance, Pricing, Subcontracts, Quality, Security, Acquisition, Facilities, HR/Recruiting, etc.

Contract X
Program
Management
& Support

Contract Y
Program
Management
& Support

Contract Z
Program
Management
& Support

Task Order /
Project X1

Task Order /
Project X2

Task Order /
Project Y1

Task Order /
Project Y2

Task Order /
Project Y3

Task Order /
Project Z1

Task Order /
Project Z2

Phase 2 –
Project Team
Services
Improvement

Project
Staff

Project
Staff

Project
Staff

Project
Staff

Project
Staff

Project
Staff

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Scoping Decisions – Who, What, How?

Divide and Conquer!!!

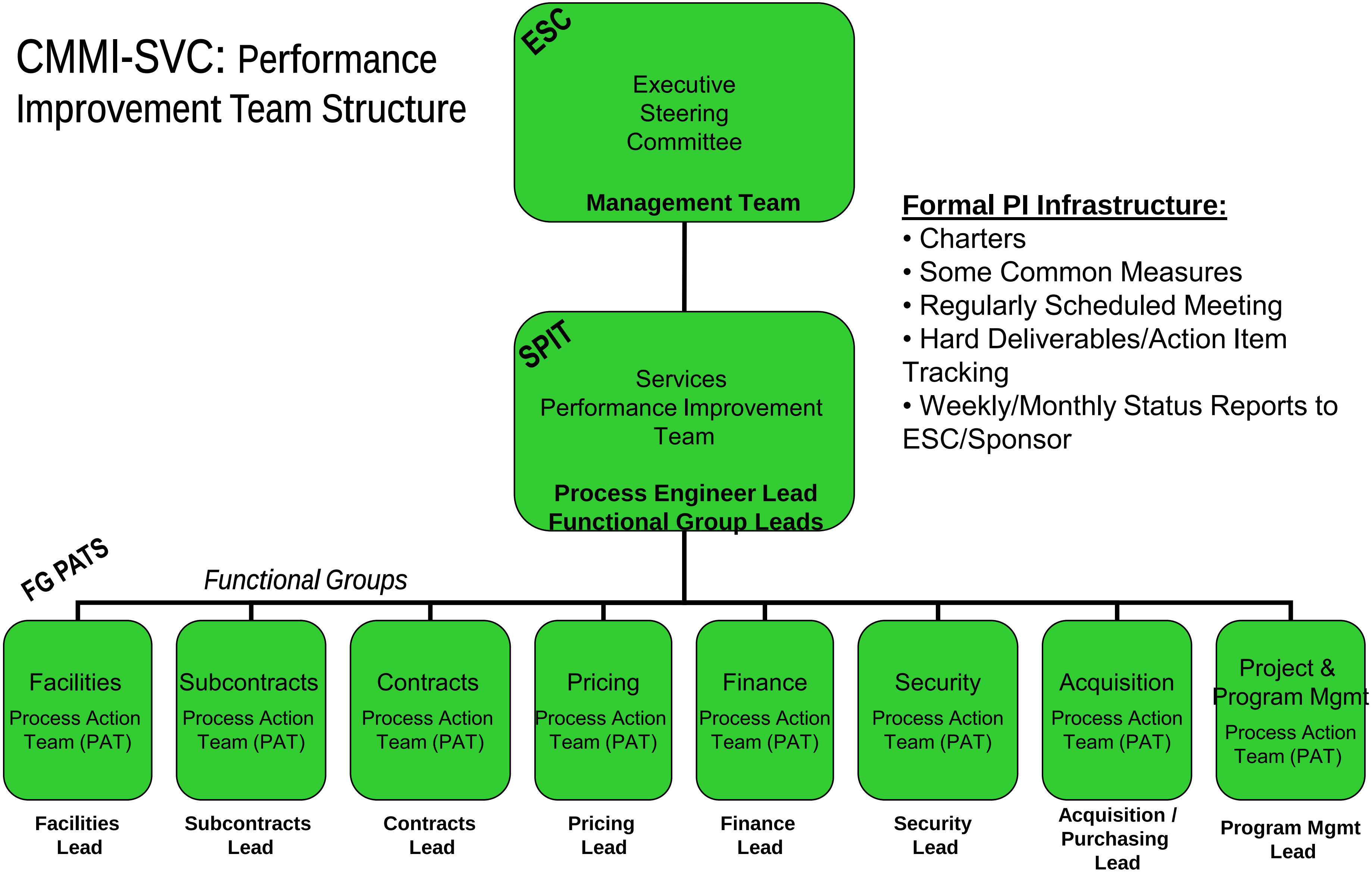
2. To utilizes our prior experience with CMMI-DEV, structure (or keep) a similar PI infrastructure
   - Divide the improvement activities into PMO Entities – "Functional Groups" (e.g, Program/Project Management, Finance, Pricing, Subcontracts, etc.);
     - Utilize a familiar improvement infrastructure
     - Utilize the FG leads as EPG members
     - Design PATs around those functional groups
3. Enables Functional Groups (FGs) to be autonomous in many of their own improvement activities while contributing to Organizational Unit level improvement

Scoping Decisions – Who, What, How?

CMMI-SVC: Performance Improvement Team Structure

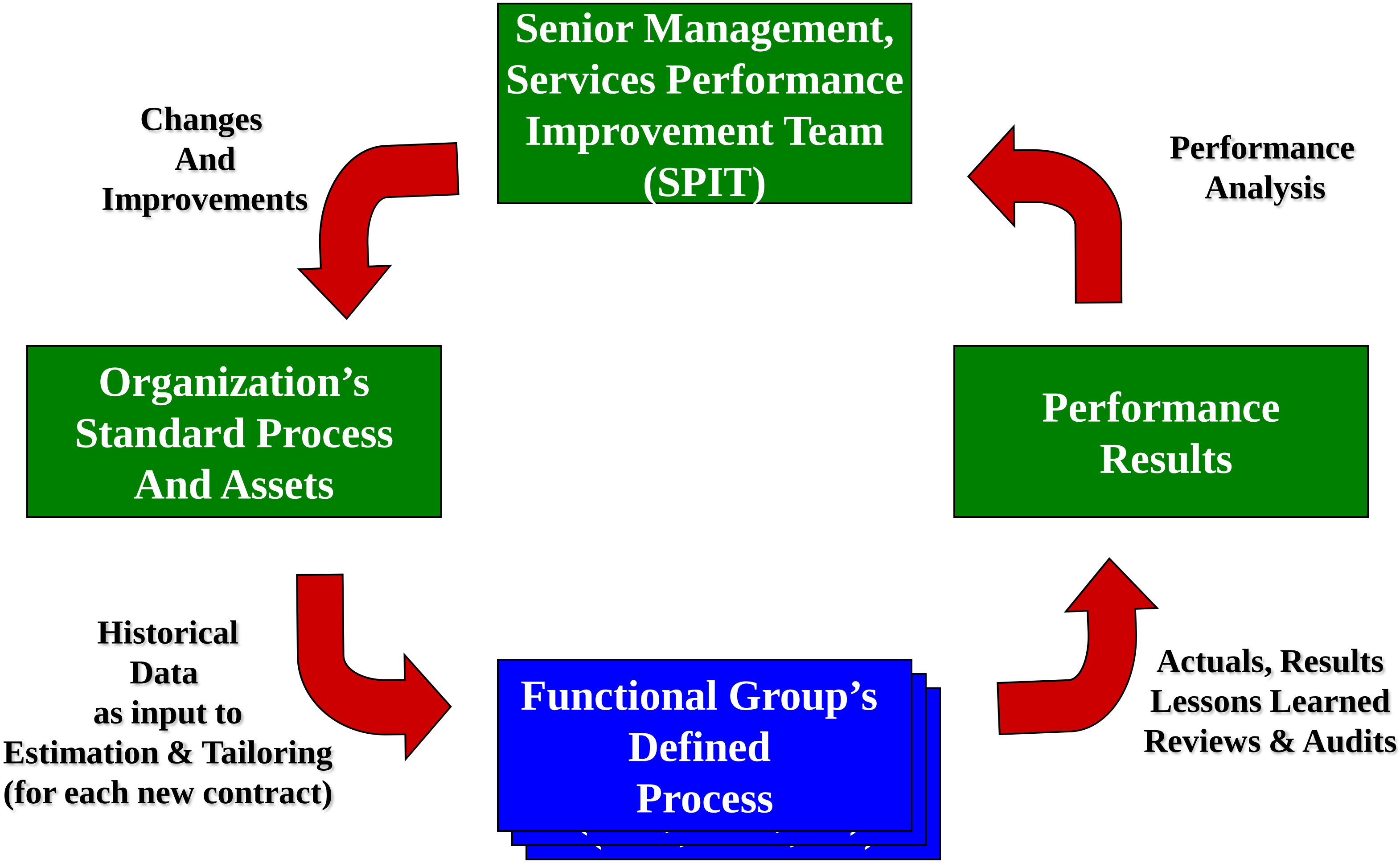
Formal PI Infrastructure:

- Charters
- Some Common Measures
- Regularly Scheduled Meeting
- Hard Deliverables/Action Item Tracking
- Weekly/Monthly Status Reports to ESC/Sponsor



Position for Performance Improvement

Ongoing Performance Improvement - Simple Flow



Senior Management, Services Performance Improvement Team (SPIT)

Changes And Improvements

Organization's Standard Process And Assets

Historical Data as input to Estimation & Tailoring (for each new contract)

Functional Group's Defined Process

Actuals, Results Lessons Learned Reviews & Audits

Performance Results

Performance Analysis

Some Steps Toward Improvement

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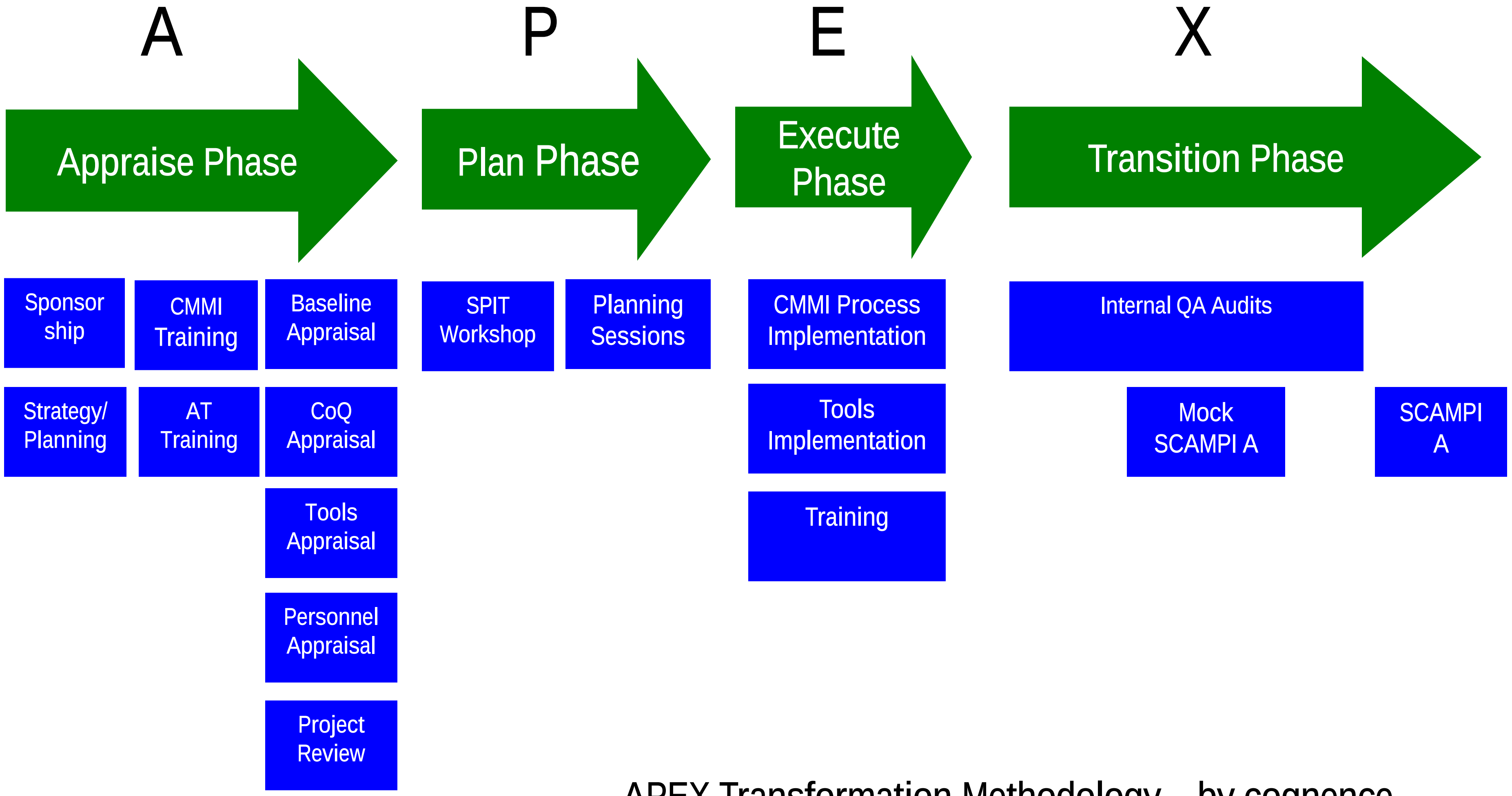
Step 1 – Identify the Target

Collect baseline data

- Perform a baseline appraisal - SCAMPI C (or SCAMPI B) using SPIT and/or PAT team members - this front-end investment will pay off over the long run
  - Increased organization knowledge of what is required and why
  - Assistance in breaking down barriers to improvement activities
- If the appraisal does not include interviews, hold meetings or focus groups or do a survey to understand all the current issues/frustrations/"pain points" – from everyone's perspective
- Collect any measures of current performance –may require some data mining or a Cost of Quality Appraisal/Project Retrospective

Step 2 – Strategize the Transformation



A

P

E

X

Appraise Phase

Plan Phase

Execute Phase

Transition Phase

Sponsor ship

CMMI Training

Baseline Appraisal

Strategy/ Planning

AT Training

CoQ Appraisal

Tools Appraisal

Personnel Appraisal

Project Review

SPIT Workshop

Planning Sessions

CMMI Process Implementation

Tools Implementation

Training

Internal QA Audits

Mock SCAMPI A

SCAMPI A

APEX Transformation Methodology – by cognence

Step 2 – Strategize the Transformation

Why?

- To rapidly collect appropriate levels of information and identify:
  - Opportunities for improvement
  - Barriers and risks to the improvement effort
- To understand the As-Is – current health and maturity levels
- To determine the To-Be – improvement that can be achieved through application of best practices
- To identify short term wins and long-term direction

Step 3 – Approach from Top-Down & Bottom-Up

Multi-dimensional nature of implementation includes definition at the EPG/SPIT level as well as each Functional Group level

1. SPIT defines:
   - High level strategic items (driven, with input from the Executive Steering Committee)
     - Needs, capabilities, objectives
     - External Customer(s)
     - Common measures – customer facing SLAs
     - Common tools
     - Overall planning and implementation approach
     - Integrated training materials and plans
2. Each Functional Group defines:
   - Specific items that define Functional Group operational processes
   - Specific training – for Functional Groups members and for interfacing FGs

Step 3 – Example: Service Delivery

1. SPIT defines:
   - Service Request from the customer or customers to projects
   - General guidelines for identifying and managing service requests
   - High Level Flow for each request type

2. Each Functional Group defines:
   - FG flow for each request type
   - Process and tools for identifying and managing each request type
   - Identification of any additional requests (that may be particular to the FG)

Step 3 – Example: Measurement & Analysis

1. SPIT defines:
   - Business Objectives
   - Common measures to support business objectives
   - Measurements reports provided from the PMO to the Customer(s)
     - Aggregation of Functional Group Measures and other Contract supporting measures
   - Integrates Functional Group measures into Customer reports
2. Each Functional Group defines:
   - Specific measures that will trace FG process to overall business objectives
   - Measurements provided to the organization (internally) e.g.,
     - Request response time
     - Request throughput
   - Details of collection, storage and analysis processes

Step 3 – Example: Configuration Management

1. SPIT defines:
   - Organization Repository
   - General change control guidelines

2. Each Functional Group defines:
   - Their group CI's – documents, deliverable and internal
   - Specific storage, archival and access

Step 3 – Example: Strategic Service Management

1. SPIT defines:
   - Business Objectives
   - Business Capabilities, Strategic Needs
   - Customers (External)
   - Services provided from the PMO to the Customer(s) – catalog of services

2. Each Functional Group defines:
   - Customers – which include other Functional Groups (Internal & External)
   - Functional Group Capabilities
   - Functional Group Business Process Flow
   - Specific FG services – cataloged

Step 3 – Example: Capacity & Availability Management

1. SPIT defines:
   - General guidelines for establishing a strategy for capacity and availability
   - Guidelines for aggregating measures to manage (analyze and report) capacity and availability
2. Each Functional Group defines:
   - Specific strategy to handle FG capacity and availability
   - Estimation methods (used for PP as well) for pricing
   - Specific measures and tools for monitoring and reporting FG capacity and availability

Step 4 – Show The Benefits

- Sample Performance Improvement Success Story
  1. Development of measures and standard processes for the way they deliver services support within their Functional Group – handling requests
  2. They measured their service request cycle times and have made significant improvement:

Reductions in cycle times:

✓ 31% - Subcontract Processing

✓ 69% - Modification processing

✓ 85% - Task Order Processing

Increase in Capacity

✓ 350%

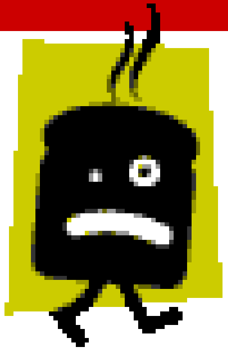
	Throughput		TAT (# Days)	
	2008	**2009**	**2008**	**2009**
Subcontracts	69	182	58	39
Modifications	979	3513	16	5
Task Orders	171	624	17	3
Total Capacity	1219	4319		

Step 4 – Show The Benefits

Other Benefits:

- The use of CMMI-SVC enabled us to do what the CMMI-DEV did not – use (i.e., manage) the “Service Request”
- Top-Down, Bottom-Up Improvement allows folks at various levels of the organization some “say-so” which achieves buy-in
- Once the folks who participate in providing the service know how they relate to the end customer as well as their direct customers, request handling is much more simplified/understood and easier to measure
- Provides functions autonomy as well as participation in the overall business performance improvement – effective service delivery to the end customer

Step 5 – Learn Your Lessons



"First Time "Victim", Second Time "Volunteer"!

- Not defining the basic terminology first
  - And don't forget to identify the "customer" and the "requests"…..all of them
- Not keeping to a "KISS" principle
  - Focus on simple processes and put more effort into training and mentoring through deployment
- Taking on too much too soon
  - Put a realistic schedule into place and account for already overtaxed resources
  - Look for small, but meaningful wins (use the FG that the organization complains about the most to show improvement) to get the most "converts"
- Not cataloging resistance factors, risks, issues
  - Keep a centralized, easily accessible repository so Individuals and Functional Group PATs can document items and EPG/SPIT can work to resolve them
- Too much multitasking – attempting to do process in the margins
  - Outline a spend plan, track it, report it and get management to act
- Insufficient membership and skills
  - Ensure process improvement teams have adequate skill sets
  - "Seed" the organization with folks who will carry the "banner"
- Failure to maintain momentum (i.e., visibility)
  - Weekly and Monthly Status

Questions Contact

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Supporting High Maturity Process Improvement and Understanding the Application of SCAMPI^{SM} Method to it

Agenda and Topics

- Opening
- Recap High Maturity Process Areas
- Main Questions for High Maturity Process Improvement
- Pilot Lessoned Learned

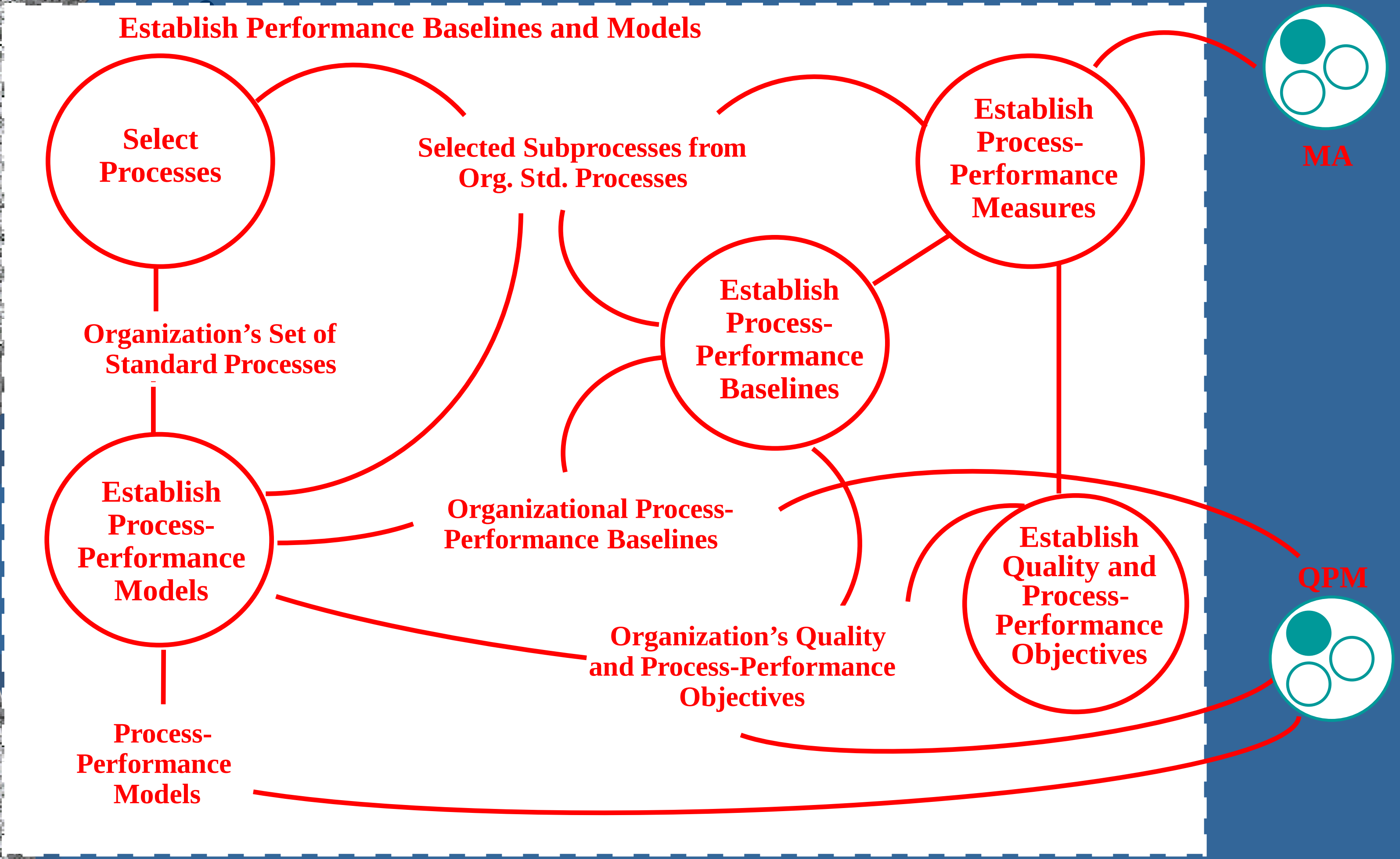
CMMI ML 4 & 5 PAs Recap

- Organizational Process Performance
- Quantitative Project Management
- Causal Analysis and Resolution
- Organizational Innovation and Deployment

Specific Practices of OPP

- SG 1 Establish Performance Baselines and Models
  - SP 1.1 Select Processes
  - SP 1.2 Establish Process-Performance Measures
  - SP 1.3 Establish Quality and Process-Performance Objectives
  - SP 1.4 Establish Process-Performance Baselines
  - SP 1.5 Establish Process-Performance Models

Organizational Process Performance Context



OPP Summary

- The first three SPs establish processes (subprocesses), measures, and objectives at the organization level that focus and align the quantitative management activities of projects (QPM) with the business objectives of the organization.
- The last two SPs take the actual results obtained from projects to create baselines and models that enable the next project to predict what performance to expect from selecting certain subprocesses for its use, and thereby assess its ability to meet its objectives.

Specific Practices of QPM

- SG 1 Quantitatively Manage the Project
  - SP 1.1 Establish the Project’s Objectives
  - SP 1.2 Compose the Defined Process
  - SP 1.3 Select the Subprocesses That Will Be Statistically Managed
  - SP 1.4 Manage Project Performance
- SG 2 Statistically Manage Subprocess Performance
  - SP 2.1 Select Measures and Analytic Techniques
  - SP 2.2 Apply Statistical Methods to Understand Variation
  - SP 2.3 Monitor Performance of the Selected Subprocesses
  - SP 2.4 Record Statistical Management Data

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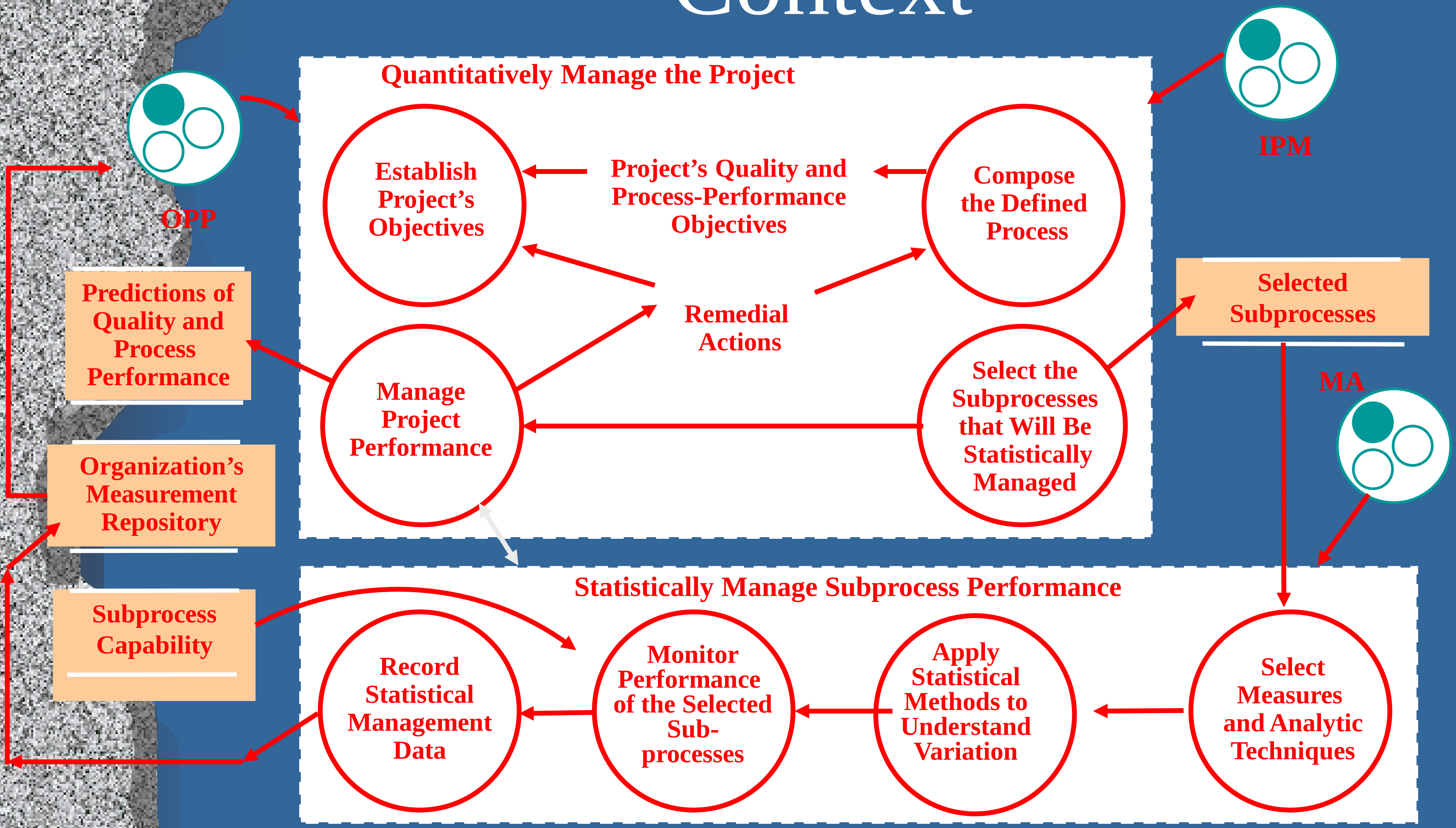
Multi Disciplines Surrounding (MDS)

Quantitative Project Management Context



Quantitatively Manage the Project

Establish Project's Objectives

Project's Quality and Process-Performance Objectives

Compose the Defined Process

Remedial Actions

Manage Project Performance

Select the Subprocesses that Will Be Statistically Managed

IPM

OPP

MA

Predictions of Quality and Process Performance

Organization's Measurement Repository

Selected Subprocesses

Subprocess Capability

Statistically Manage Subprocess Performance

Record Statistical Management Data

Monitor Performance of the Selected Sub-processes

Apply Statistical Methods to Understand Variation

Select Measures and Analytic Techniques

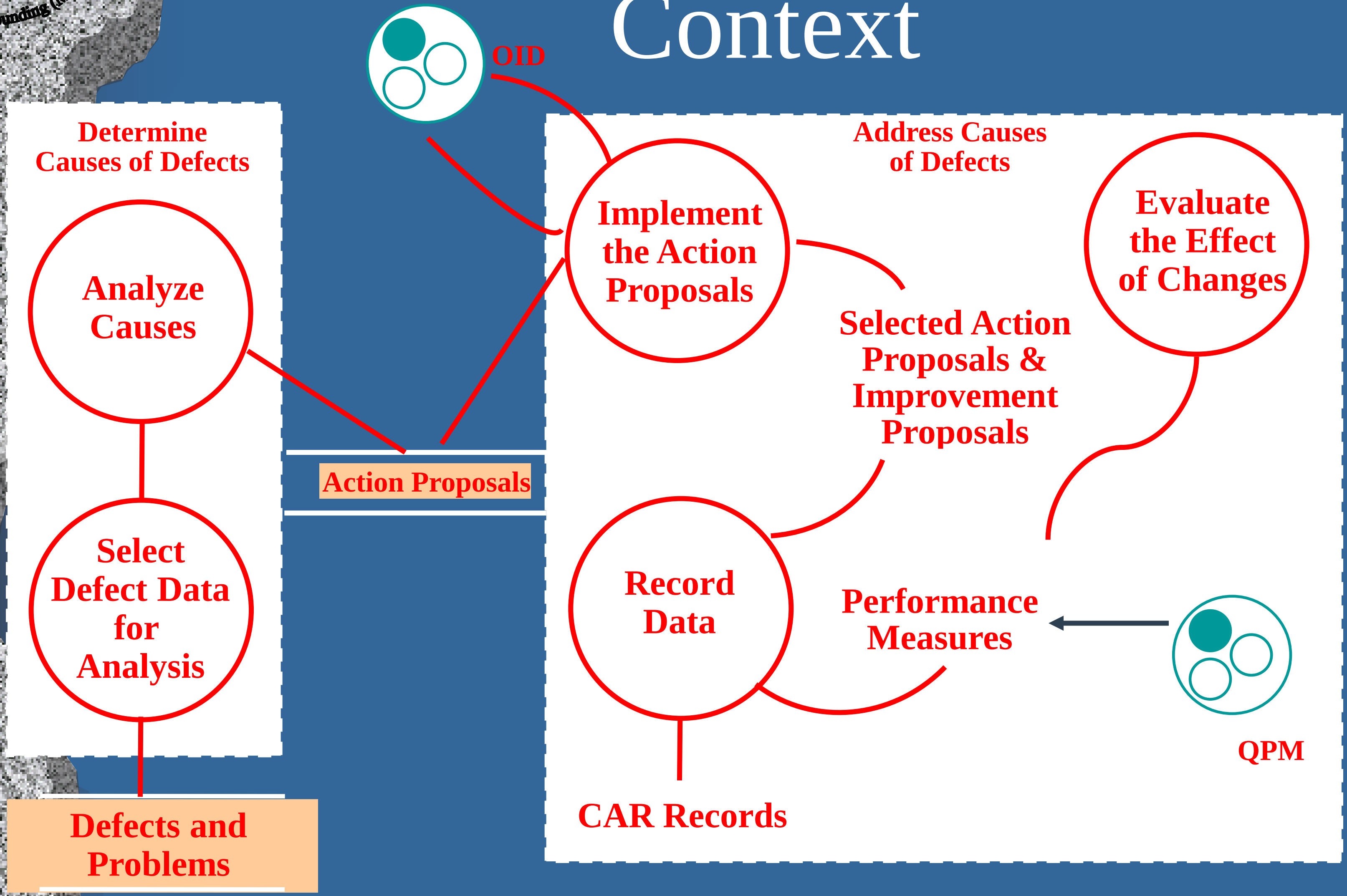
QPM Summary

- QPM involves both quantitative and statistical management. The project
  - establishes quantitative objectives based on the organization’s business objectives and needs of the customer
  - composes a defined process based on historical capability data that will help it meet those objectives
  - monitors the project quantitatively to assess whether the project is on course to achieve its objectives.
- For each subprocess to be statistically managed,
  - objectives are established for its process performance
  - its variation is understood (subprocess is stable)
  - when the subprocess fails to achieve its objectives, corrective action is taken

Specific Practices of CAR

- SG 1 Determine Causes of Defects
  - SP 1.1 Select Defect Data for Analysis
  - SP 1.2 Analyze Causes
- SG 2 Address Causes of Defects
  - SP 2.1 Implement the Action Proposals
  - SP 2.2 Evaluate the Effect of Changes
  - SP 3.2 Record Data

Causal Analysis and Resolution Context



OID

Determine Causes of Defects

Analyze Causes

Select Defect Data for Analysis

Defects and Problems

Action Proposals

Address Causes of Defects

Implement the Action Proposals

Selected Action Proposals & Improvement Proposals

Evaluate the Effect of Changes

Record Data

Performance Measures

CAR Records

QPM

CAR Summary

- CAR has its greatest value when performed in the context of a quantitatively managed process.
- CAR involves
  - a selection of defects or problems whose resolution would benefit the organization
  - a root cause analysis
  - development and implementation of an action plan to remove the root causes of the defects or problems

Specific Practices of OID

SG 1 Select Improvements

- SP 1.1 Collect and Analyze Improvement Proposals
- SP 1.2 Identify and Analyze Innovations
- SP 1.3 Pilot Improvements
- SP 1.4 Select Improvements for Deployment

SG 2 Deploy Improvements

- SP 2.1 Plan the Deployment
- SP 2.2 Manage the Deployment
- SP 2.3 Measure Improvement Effects

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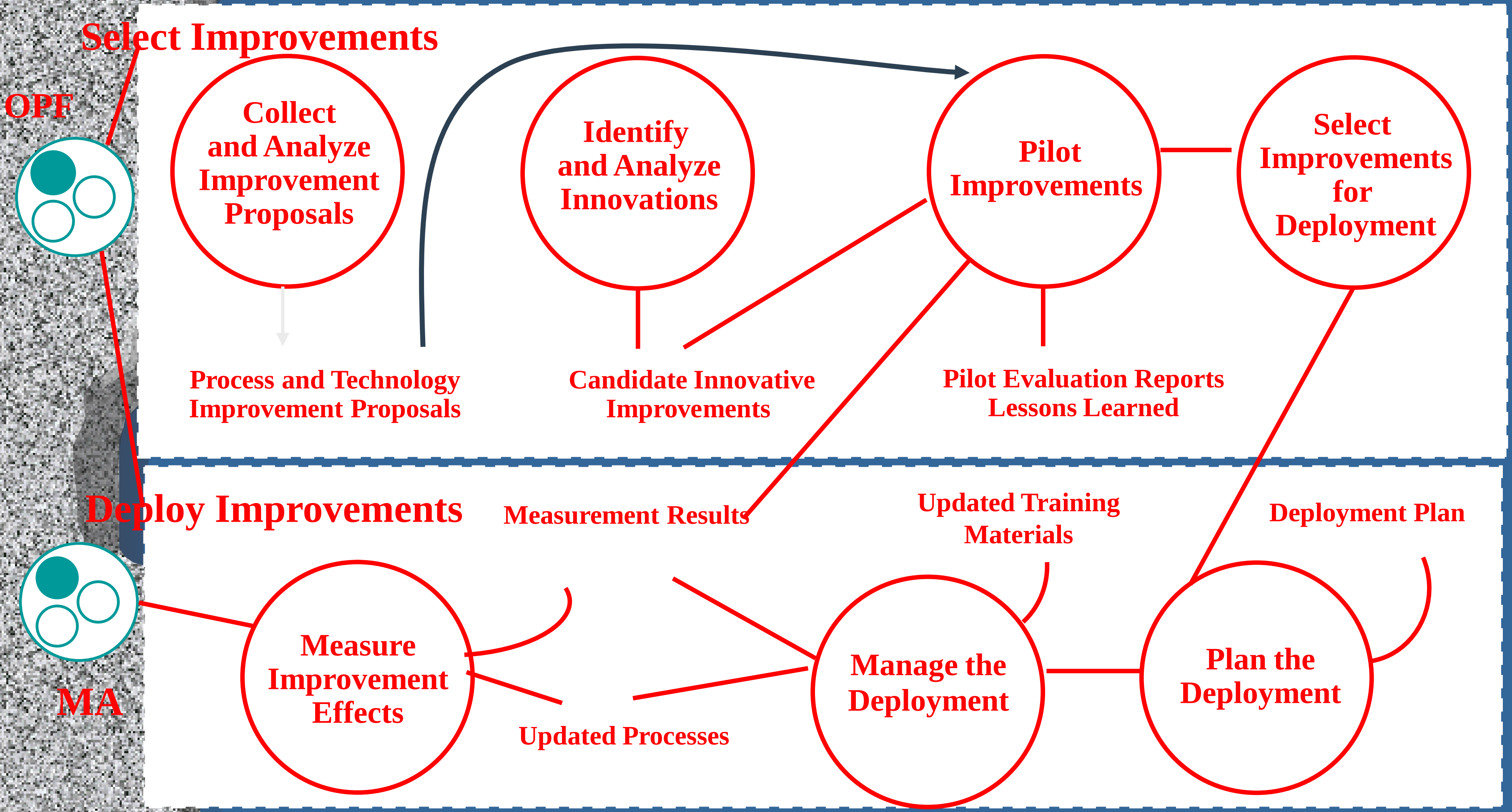
Multi Disciplines Surrounding (MDS)

Organizational Innovation and Deployment Context



Select Improvements

OPF

Collect and Analyze Improvement Proposals

Identify and Analyze Innovations

Pilot Improvements

Select Improvements for Deployment

Process and Technology Improvement Proposals

Candidate Innovative Improvements

Pilot Evaluation Reports Lessons Learned

Deploy Improvements

Measurement Results

Updated Training Materials

Deployment Plan

MA

Measure Improvement Effects

Manage the Deployment

Plan the Deployment

Updated Processes

OID Summary

- OID uses the quantitative information developed at ML4 to identify, analyze, and select incremental and innovative improvements to the organization’s processes and technologies.
- OID involves both incremental improvement (everyone in the organization is involved) and revolutionary improvements (outward looking and opportunistic) to targeted processes.
- Improvements are introduced systematically in the organization by conducting pilots, analyzing costs and benefits, and planning and managing deployment.
- OID embodies continuous improvement that results from implementing all the PAs in the model.

Main Questions for High Maturity Process Improvement

Main Questions for High Maturity Process Improvement

- Are able to determine which processes / subprocess are suitable to be measured
  - ** consideration note - selection of one process, measure, or objective will constrain the selection of the others **
- Do we know which measures are useful for determining process performance
- Do we have quality and process-performance objectives for those processes

Main Questions for High Maturity Process Improvement

- Do we have the skills to statistically measure, analysis, communicate and act according to the numbers, what additional training we will need
- Do we have relevant historical data (at least 7~13 points) that enable us to establish baseline and trends

Main Questions for High Maturity Process Improvement

- Do we have the culture on identifying causes of defects and other problems and take action to prevent them from occurring in the future. And in what level
- Do we have the culture or the capability to plan develop and deploy incremental and innovative improvements that measurably improve the organization’s processes and technologies

Supporting the SCAMPI Process for High Maturity

- The current experience shows that organizations that strive towards process improvements that targeting high maturity, do not always understand the model expectations and requirements.
- When we add to it the abstract level of the high maturity PAs, we are creating real challenge to the quality engineers and managers capability to support the business improvements.

Supporting the SCAMPI Process for High Maturity

- Based on these observations and lessons learned and as part of these pilots we have developed a number of incremental papers and guide books with the intent to build an accumulative knowledge and capabilities to interpret and understand the model and SCAMPI^{SM} expectations from high maturity practices
- These papers and guide books also increase our support to the organization business units and programs in the different domains and to focus the use of statistical techniques and tools as appropriate for the deferent units

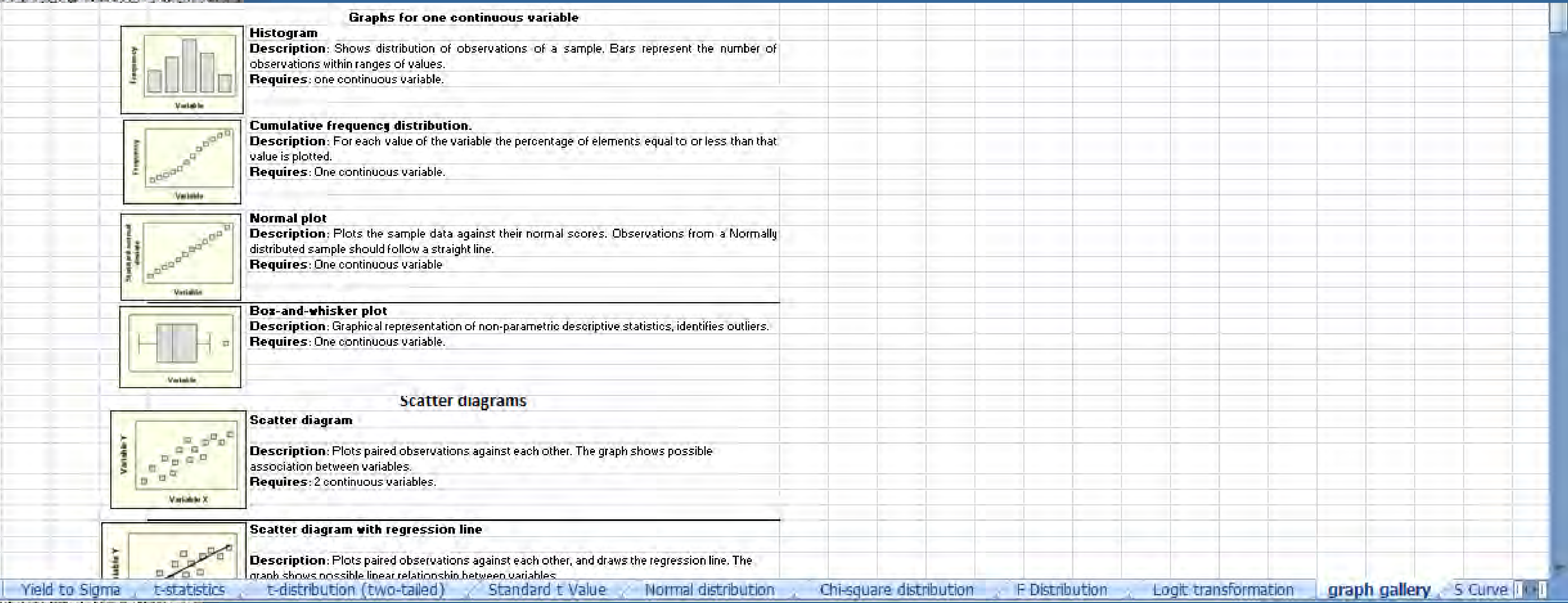
Supporting the SCAMPI Process for High Maturity

- Process performance application and appropriate usage – for the organization use
- High Level Maturity Lead Appraisal Guideline & Reference
- HLM ATM Training agenda
- High Level Maturity Appraisal Team Member Reference
- Measurements and Analysis Primer

HLM ATM Training agenda

9:00	9:10	0:10	Gathering
9:10	9:25	0:15	CMMI GP2.8 in respect of all PA's, Product Lifecycle and it's significant place in the road map to level 4&5
9:25	9:35	0:10	CMMI M&A PA in respect of all PA's, Product Lifecycle and it's significant place in the road map to level 4&5
9:35	11:05	1:30	Terms and Concepts
11:05	11:35	0:30	Process Structure and Elements
11:35	12:05	0:30	Process objectives and related measurements
12:05	13:05	1:00	The Process Performance Concept and Definition
13:05	13:50	0:45	Lunch
13:50	15:05	1:15	The Process 'X' Parameters and their role
15:05	15:50	0:45	adjusting the process model to the appraisal context
15:50	16:35	0:45	Walkthrough Case Study
16:35	16:50	0:15	rap up

High Level Maturity Appraisal Team Member References



Graphs for one continuous variable

Histogram

Description: Shows distribution of observations of a sample. Bars represent the number of observations within ranges of values.

Requires: one continuous variable.

Cumulative frequency distribution.

Description: For each value of the variable the percentage of elements equal to or less than that value is plotted.

Requires: One continuous variable.

Normal plot

Description: Plots the sample data against their normal scores. Observations from a Normally distributed sample should follow a straight line.

Requires: One continuous variable

Box-and-whisker plot

Description: Graphical representation of non-parametric descriptive statistics, identifies outliers.

Requires: One continuous variable.

Scatter diagrams

Scatter diagram

Description: Plots paired observations against each other. The graph shows possible association between variables.

Requires: 2 continuous variables.

Scatter diagram with regression line

Description: Plots paired observations against each other, and draws the regression line. The graph shows possible linear relationship between variables.

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Multi Disciplines Surrounding (MDS)

High Level Maturity Appraisal Team Member References

Statistical Methods

High Level Maturity Appraisal Team Member References

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Multi Disciplines Surrounding (MDS)

PPM-BOK

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Multi Disciplines Surrounding (MDS)

High Level Maturity Lead Appraisal Guideline

Pilot Lessoned Learned

Pilot Lessoned Learned

- Perception (right and wrong) and evaluation of level 4 – 5 in the different constellations (DEV, ACQ and SVC)
- The main lessons that led to formulating the documents
- Principles of the content structure of documents and the intent use vs. the actual use
- The training and individuals / team development process
- Appraisals (internal) preparations
- Conclusions from the pilot

Questions ?

Contact

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Getting the Most from your GP 3.2 Implementation

Natural SPI

SEI Partner

Topics

Purpose

The purpose of this presentation is to propose a way to address GP 3.2 that will benefit both projects and the organization.

What is GP 3.2?

GP 3.2 Collect Improvement Information

- Collect work products, measures, measurement results, and improvement information derived from planning and performing the process to support the future use and improvement of the organization’s processes and process assets.

Remember to read the whole practice!

Why collect improvement information?-1

GP 3.2 Collect Improvement Information

- ❑ Collect work products, measures, measurement results, and improvement information derived from planning and performing the process **to support the future use and improvement of the organization's processes and process assets.**

Satisfying GP 3.2 shouldn't be your purpose

Why collect improvement information?-2

GP 3.2 Collect Improvement Information

- ❑ Collect work products, measures, measurement results, and improvement information derived from planning and performing the process **to support the future use and improvement of the organization's processes and process assets.**

Reason #1: to support future USE of the processes

Why collect improvement information?-3

GP 3.2 Collect Improvement Information

- Collect work products, measures, measurement results, and improvement information derived from planning and performing the process **to support the future use and improvement of the organization's processes and process assets.**

Reason #2: to support future IMPROVEMENT of the processes

Where does the improvement information come from?

GP 3.2 Collect Improvement Information

- ☐ Collect work products, measures, measurement results, and improvement information **derived from planning and performing the process** to support the future use and improvement of the organization’s processes and process assets.

Improvement information is based on the actual USE of the process, not just what the Process Group dreamed up!

Isn’t Lessons Learned enough?

Certainly Lessons Learned can support future use and improvement of processes, but only if they are properly indexed and translated into process improvement proposals.

Otherwise, teams get tired of poring over endless lists of irrelevant lessons learned and abandon them altogether.

It’s unreasonable to think every project will have a lessons learned for every process area.

What else do we need?

GP3.2 Collect Improvement Information

- ❑ Collect **work products, measures, measurement results**, and improvement information derived from planning and performing the process to support the future use and improvement of the organization's processes and process assets.

The practice says we should collect these things too!

Why collect work products?

- ☐ Use them as “examples” to speed up creation of similar work products on future projects
- ☐ Illustrate special cases – again to reuse them on future projects
- ☐ Create templates from new or unique work products to make the work easier for everyone
- ☐ Analyze for potential process trends or changes

Support future USE and IMPROVEMENT of processes

What kind of work products might we collect?-1

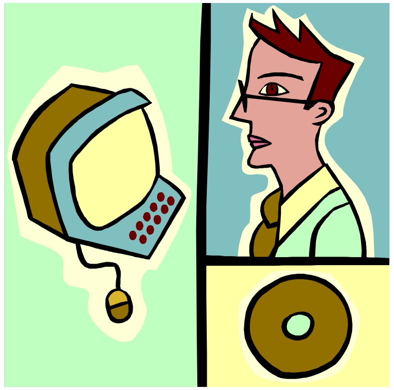
Project Management work products:

- **Project Plans** (for reuse on similar projects, to improve planning templates)
- **Risk registers** (to identify new risk sources, categories, response approaches, recurring risks)
- **Estimates** (to identify new or better work product or task attributes)
- **Milestone and Progress Briefs** (for reuse on similar projects, to identify recurring issues)

What kind of work products might we collect?-2

Engineering work products:

- ☐ **Requirements specifications** / **operational concepts** (for reuse on similar projects or products)
- ☐ **Design specifications**
- ☐ **Code**, **drawings**, **data**
- ☐ **Integration plans**
- ☐ **Installation procedures**
- ☐ **Test plans**, **procedures** and **data**

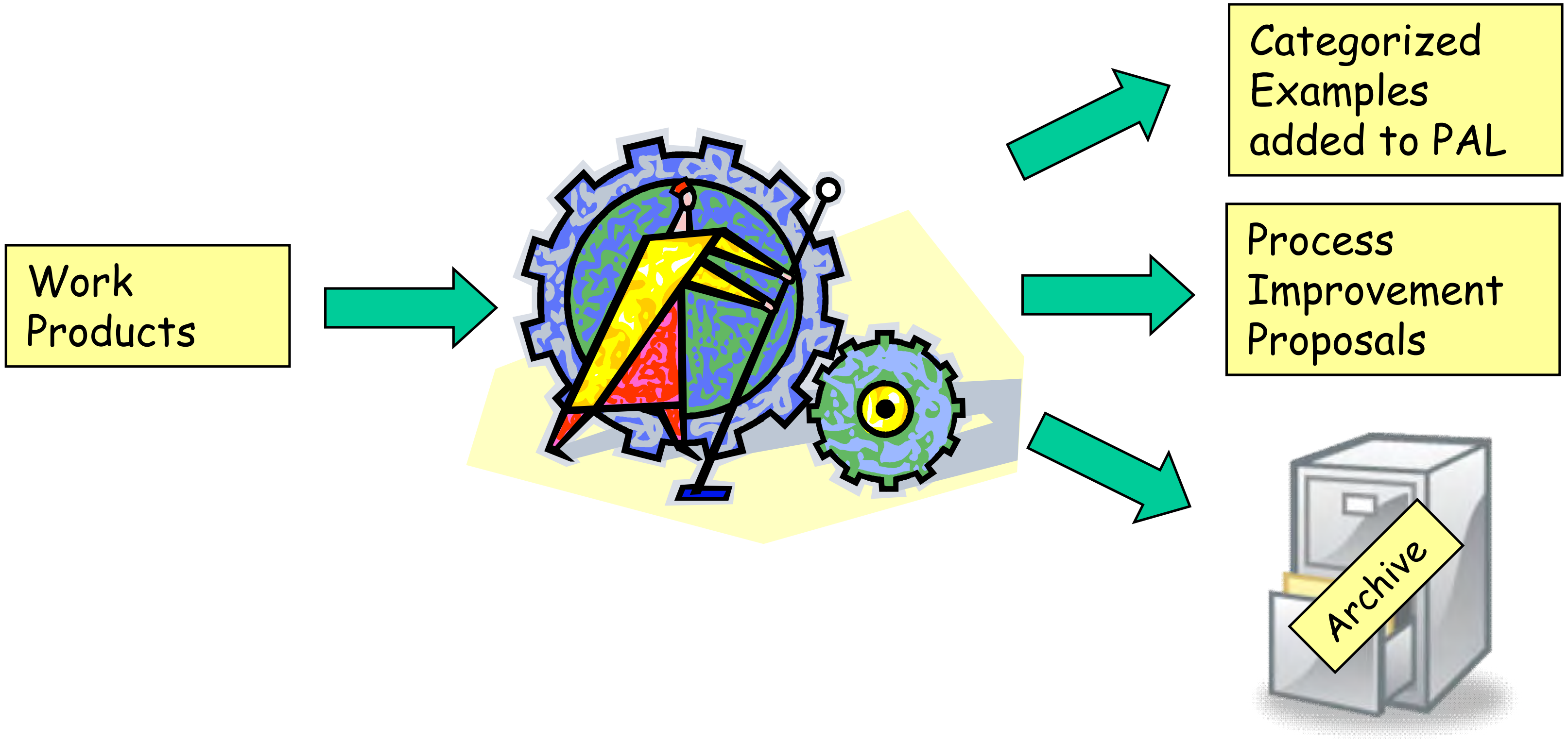


What kind of work products might we collect?-3

Other work products:

- ☐ **Contract examples and evaluation criteria** (for reuse on future contracting efforts; to improve the quality and effectiveness of contracts)
- ☐ **PPQA non-compliance data** (to identify recurring process issues)
- ☐ **Decision records** (to improve the decision making process or decision criteria, for making similar decisions in the future)
- ☐ **Project tailoring records** (to identify new tailoring criteria, new life cycles, tailoring trends, work environment adaptations)

What happens to the work products we collect?



Support future USE and IMPROVEMENT of processes

Measures versus Measurement Results

Why distinguish between the two?

- ☐ Measures are data (a data point or chart)
- ☐ Measurement results are information (includes analysis and actions taken)

Why collect measures and measurement results?

What are we going to do with them?

- ❑ Use for estimating for similar project types
- ❑ Improve measurement analysis and reporting procedures
- ❑ Improve decision process / criteria and provide quantifiable data on which decisions can be based
- ❑ Predict process performance in future (establish process performance baselines and models)

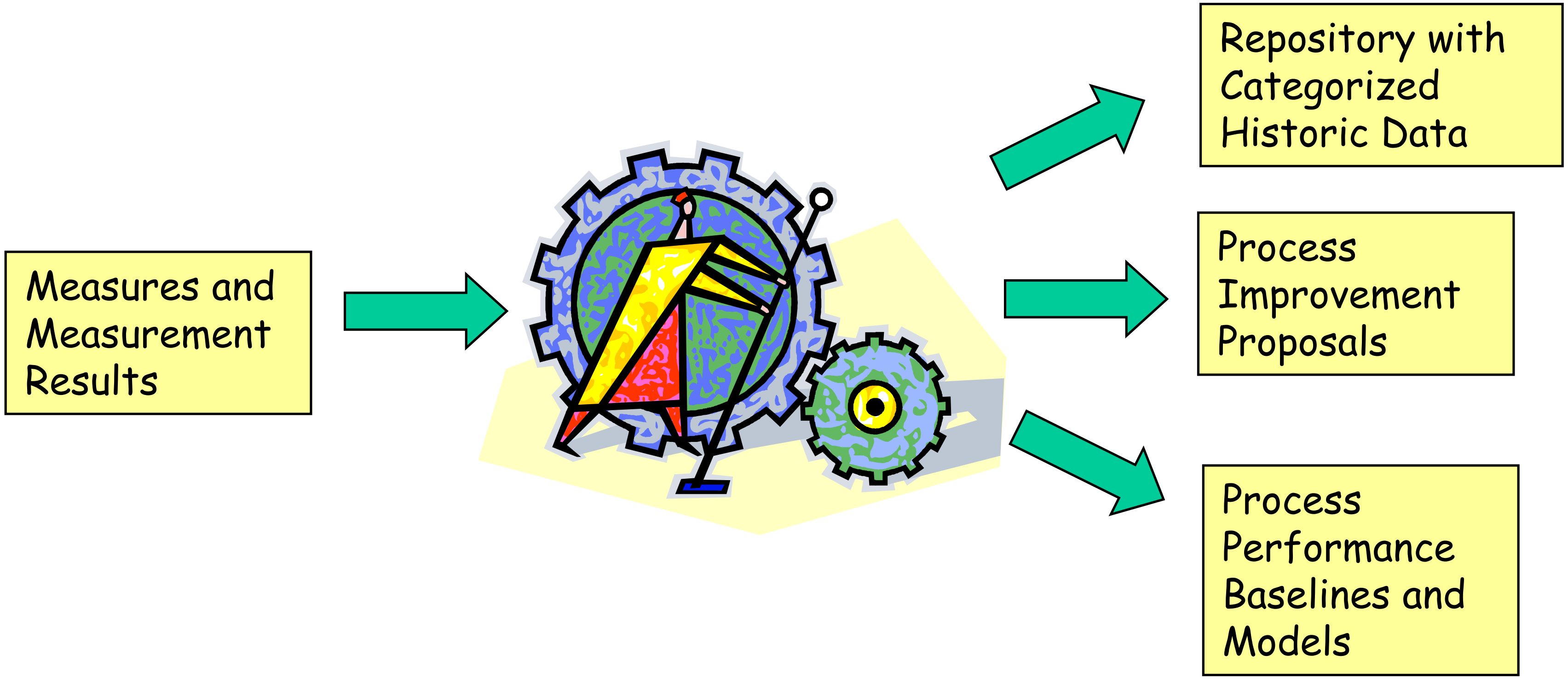
Support future USE and IMPROVEMENT of processes

What kind of measures might we collect?

- ☐ Estimates (for reuse on comparable efforts)
- ☐ Actual performance (to improve estimating and establish performance baselines)
- ☐ Unique project-specific measures with potential for reuse
- ☐ Planning data (from GP 2.2)
- ☐ Monitoring data and results (from GP 2.8)

Support future USE and IMPROVEMENT of processes

What happens to the measures we collect?



Measures and Measurement Results

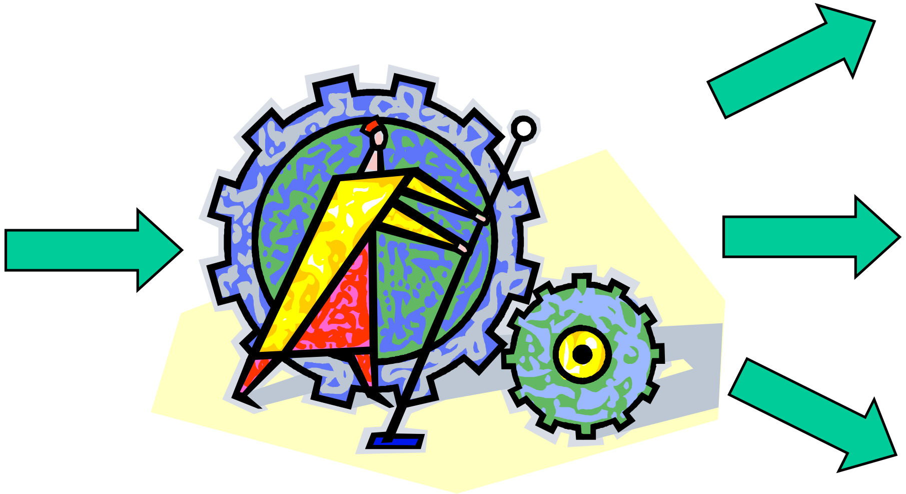
Repository with Categorized Historic Data

Process Improvement Proposals

Process Performance Baselines and Models

Support future USE and IMPROVEMENT of processes

Why is there a person in the picture?



Subject matter experts need to periodically review, analyze and categorize the work products and measures submitted in their areas of expertise

Why not collect everything?

Although the CMMI does NOT require you to identify the specific work products, measures, measurement results and improvement information that you will collect, doing so can have benefits:

- ☐ Teams know what to collect
- ☐ Teams know where to find and how to use what others have collected

Back to Lessons Learned-1

Lessons Learned are an essential aspect of GP3.2, but the results need to be indexed so teams can find relevant lessons learned quickly. Consider indexing by:

- ☐ Product or Product Type
- ☐ Customer or Customer Type
- ☐ Project or Project Type (Life Cycle, Fixed Price or T&M)
- ☐ Process during which the lessons learned was encountered
- ☐ Life Cycle phase in which the lessons learned was encountered
- ☐ Life Cycle phase in which the lessons learned should be implemented
- ☐ Date Lessons Learned was encountered
- ☐ Whether others have found the Lesson Learned useful

Back to Lessons Learned-2

Focus on incorporating lessons learned back into your processes. Once a lessons learned has been incorporated into a process, it can be archived from the lessons learned database.

This allows you to further expedite lessons learned database searches and promotes its use.

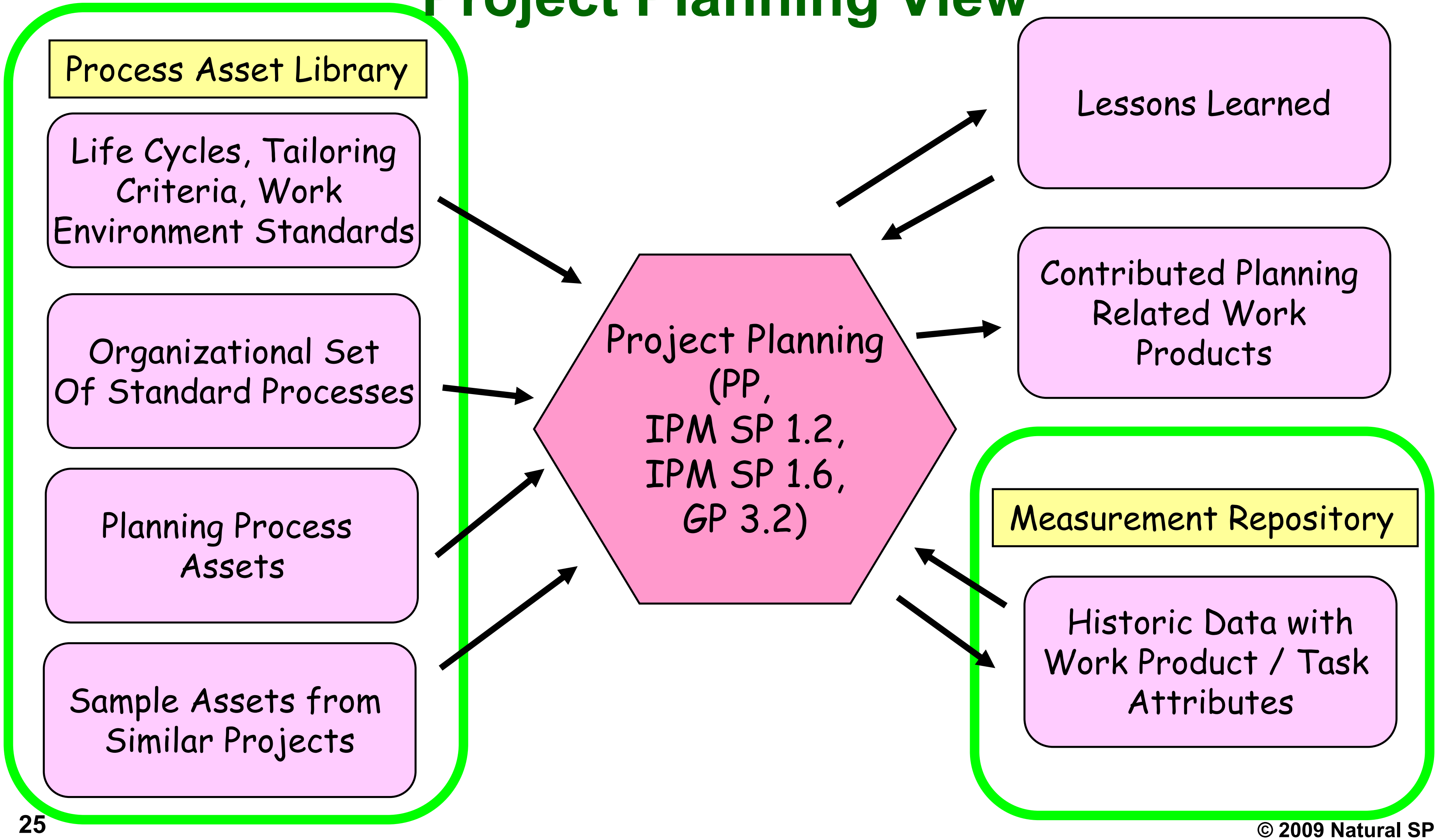
Lessons Learned can also identify training needs

Three Views of GP 3.2

Let’s look at GP 3.2 from 3 perspectives:

- ☐ Project Planning View
- ☐ Project Execution View
- ☐ Process Management View

Project Planning View



Process Asset Library

Life Cycles, Tailoring Criteria, Work Environment Standards

Organizational Set Of Standard Processes

Planning Process Assets

Sample Assets from Similar Projects

Project Planning (PP, IPM SP 1.2, IPM SP 1.6, GP 3.2)

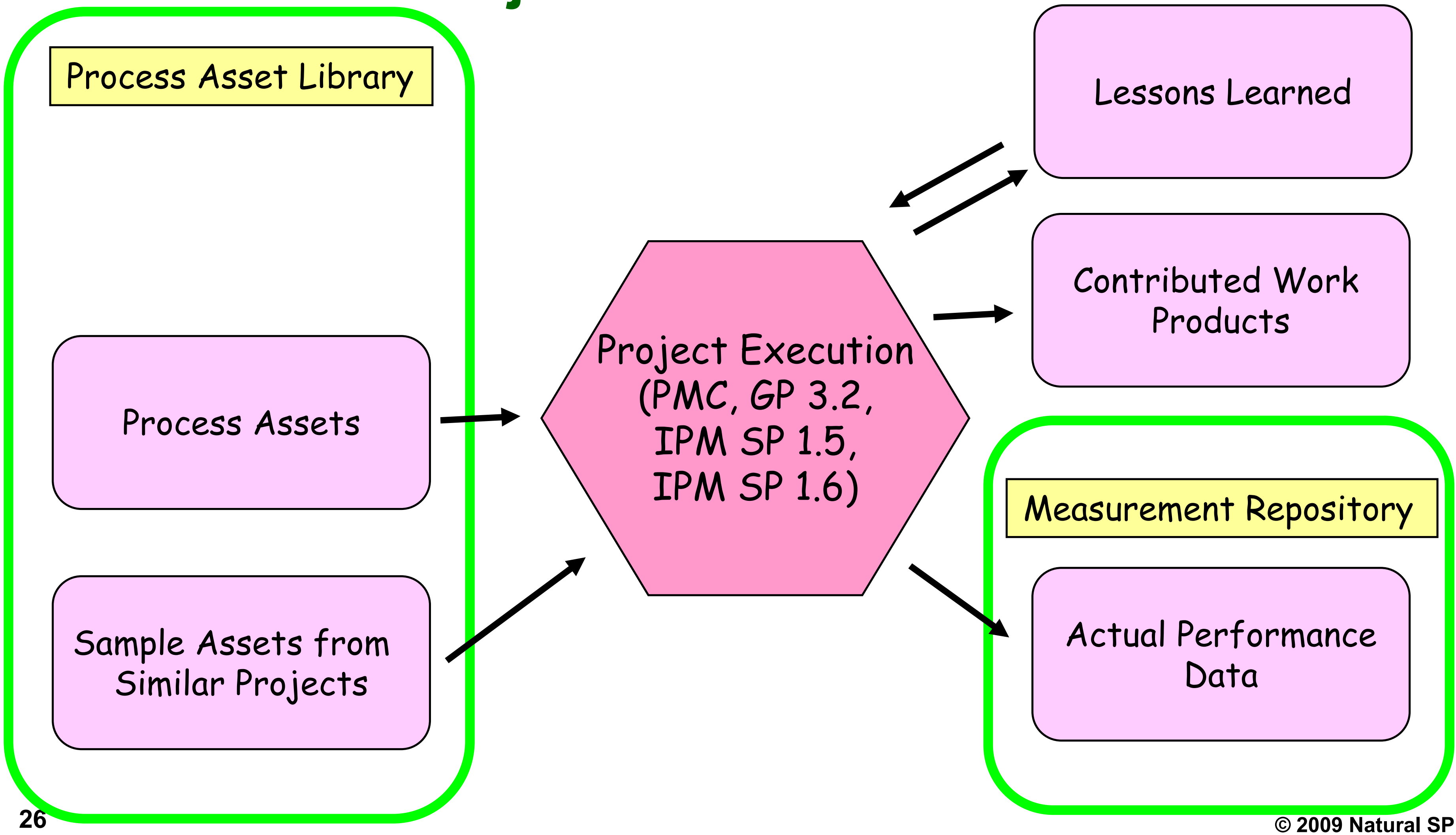
Lessons Learned

Contributed Planning Related Work Products

Measurement Repository

Historic Data with Work Product / Task Attributes

Project Execution View



Process Asset Library

Process Assets

Sample Assets from Similar Projects

Project Execution (PMC, GP 3.2, IPM SP 1.5, IPM SP 1.6)

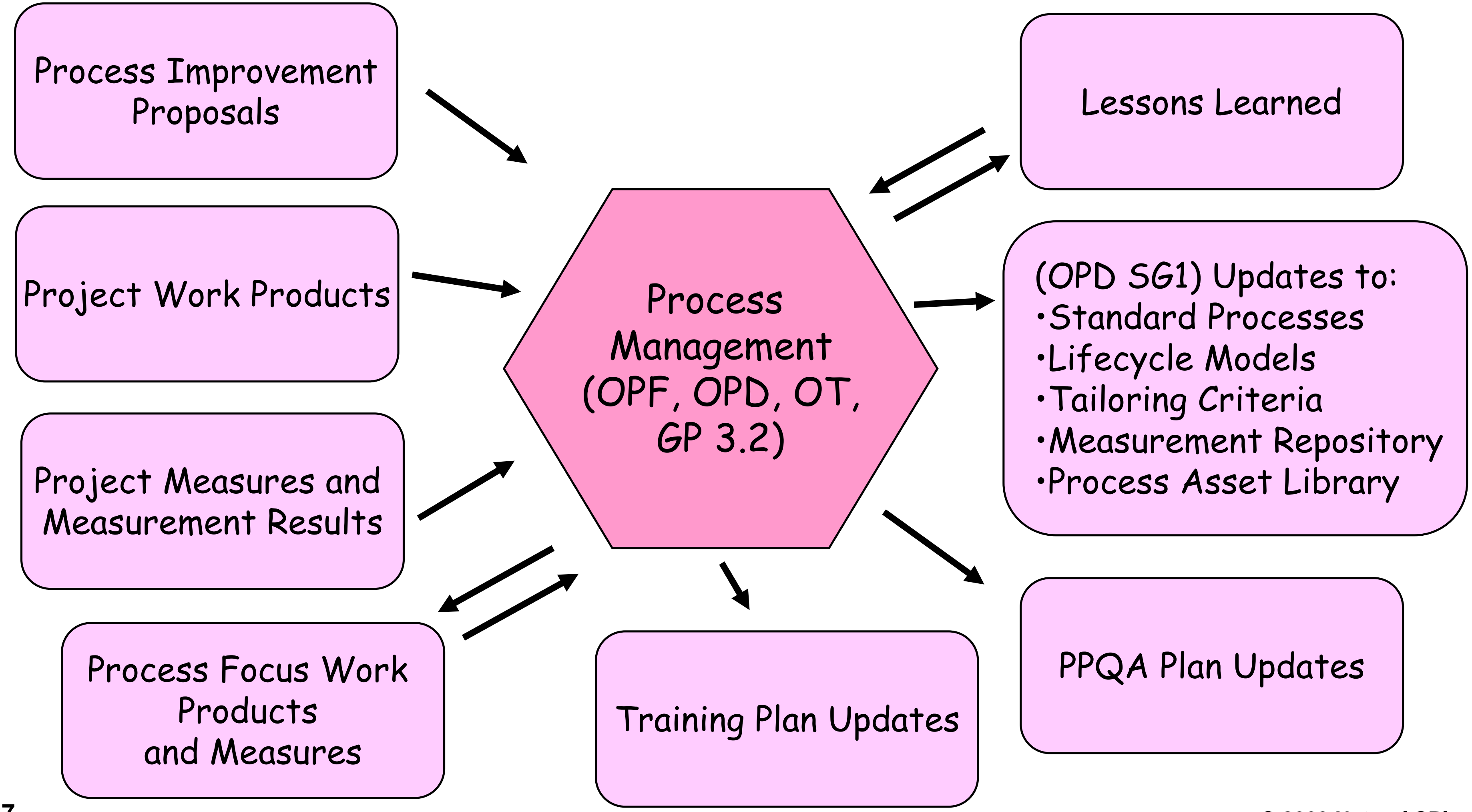
Lessons Learned

Contributed Work Products

Measurement Repository

Actual Performance Data

Process Management View



Process Improvement Proposals

Project Work Products

Project Measures and Measurement Results

Process Focus Work Products and Measures

Process Management (OPF, OPD, OT, GP 3.2)

Lessons Learned

(OPD SG1) Updates to:
- Standard Processes
- Lifecycle Models
- Tailoring Criteria
- Measurement Repository
- Process Asset Library

PPQA Plan Updates

Training Plan Updates

What about Organizational GP 3.2s?

Remember to implement GP 3.2 for process management:

- ❑ Collect work products such as training material examples, process action plans, appraisal plans and results, process deployment plans, process pilot feedback
- ❑ Collect measures such as process adoption measures, planned and actual effort spent on process improvement activities, training survey results
- ❑ Collect lessons learned at defined times in the process improvement life cycle

How can I make the most of GP 3.2?

- Select work products, measures and measurement results to archive and document what they will be used for
- Define categorization scheme for work products, measures and lessons learned (see next page)
- Identify GP 3.2 activities as steps in your processes
  - Collection / contribution points
  - Analysis and categorization points
  - Use of GP 3.2 outputs
- Define the collection or storage location for contributed work products and measures
- Measure the effectiveness of your GP 3.2 program - are people using the work products, measures and lessons learned?

Categorizing work products and measures

Using categories similar to those discussed with lessons learned, define:

- Product or Product Type
- Customer or Customer Type
- Project or Project Type
- Work Product or Measure Type
- Process during which work product or measure is used
- Tailoring Criteria or work product / task attribute which suggests use of this work product or measure
- Unique circumstances under which use of the work product or measure is recommended

Summary

Take a thoughtful approach to GP 3.2 to ensure long term benefits to projects and the organization

Benefits to the organization:

- ☐ Continuous improvement through regular incorporation of best practices into the OSSP
- ☐ Improved productivity through reuse

Benefits to the project:

- ☐ Clear definition of what needs to be archived
- ☐ Quick access to lessons learned and relevant examples

Questions

Contacts and More Information

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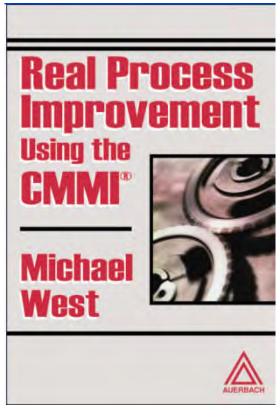
- Natural SPI's web site: www.naturalspi.com



Real Process Improvement Using the CMMI®

Michael West

AUERBACH

Raytheon

Customer Success Is Our Mission

Goal Question Model

Michael Campo

Neal Mackertich

NDIA CMMI® Technology
Conference and User Group

November 17, 2009

® CMMI is registered in the US Patent and Trademark Office by Carnegie Mellon University

Agenda

- Overview
- Process Performance Models
- Goal Question Metric Approach
- Goal Question Model
- Raytheon IDS Example: SLAM
- Summary
- References

“All models are wrong but some are useful.”

George E.P. Box

Overview

- Process Performance Models are an expected component of CMMI® high maturity
  - OPP SP 1.5: Establish and maintain the process-performance models for the organization's set of standard processes. [1]
- The concepts of process performance models are often misunderstood
  - What is and what is not a model?
  - How are models developed?
  - When are models used?
- Adapting the traditional Goal Question Metric (GQM) approach to Goal Question Model can lead to the development of effective, value-added process performance models in an organization.
- Example from Raytheon Integrated Defense Systems (IDS)

Process Performance Models

- Process Performance Model Definition from CMMI
  - A description of the relationships among attributes of a process and its work products that are developed from historical process-performance data and calibrated using collected process and product measures from the project and that are used to predict results to be achieved by following a process. [1]
- CMMI V1.2 Maturity Level 4 and 5 appraisals are expected to show evidence of using process performance models
  - During project planning/tailoring to compose the project's defined process
  - Throughout project lifecycle to determine if project will achieve its quality and process performance objectives
  - May be used to support Organizational Innovation and Deployment (OID) and Causal Analysis and Resolution (CAR) activities

Process Performance Models

(continued)

- Healthy Ingredients of CMMI Process Performance Models [2]
  - Statistical, probabilistic or simulation in nature
  - Predict interim and/or final project outcomes
  - Use controllable factors tied to sub-processes to conduct the prediction
  - Model the variation of factors and understand the predicted range or variation of the outcomes
  - Enable “what-if” analysis for project planning, dynamic re-planning and problem resolution during project execution
  - Connect “upstream” activity with “downstream” activity
  - Enable projects to achieve mid-course corrections to ensure project success

Goal Question Metric Approach

- Developed by Dr. Victor Basili working with NASA [3]
  - – Develop a set of business goals and associated measurement goals
  - – Generate questions that define those goals quantitatively
  - – Specify metrics to be collected to answer those questions

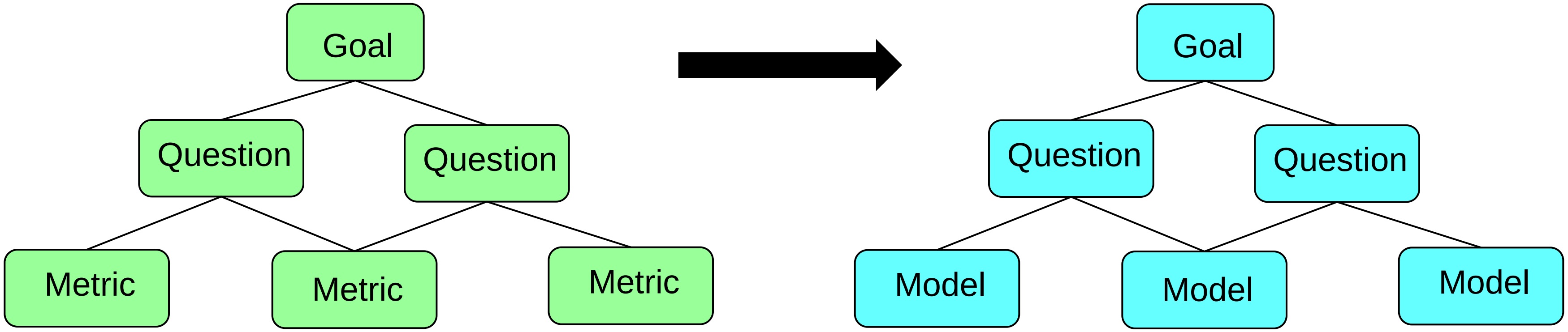
- Key is the trace from business goal to metric
  - – Focus on what is most meaningful to the business
- Example:
  - – Goal: Improve the timeliness of change request processing from the project manager’s viewpoint
  - – Question: what is the current change request processing speed?
  - – Metrics: Average cycle time, standard deviation, % cases outside of the upper limit
  - – Question: Is the performance improving?
  - – Metric: (current average cycle time/Baseline average cycle time) * 100

Goal Question Model Approach

- Goal
  - Business goals
    - Often not quantitative in nature
    - Example: Improve customer satisfaction
  - Quality and process performance objectives
    - Quantitative characterizations decomposed (if necessary) from business goals[4]
    - Often relate to cost, schedule, quality, technical performance
    - Example: Reduce defects in work products delivered to customer by 10% (without additional cost to customer).
- Questions
  - What factors influence the achievement of the goal?
    - Example: defect detection capability during development and test
  - What controllable sub-processes relate to those factors?
    - Example: peer reviews, test development and execution

Goal Question Model Approach
(continued)

- Model
  - – Identify associated measures
    - Example: defect containment, peer review measures (preparation, conduct, size, etc.), tools usage (code static analyzers, simulations)
  - – Collect data
  - – Analyze data for statistical correlations
  - – Develop a model relating factors to results



Now Models are connected to business goals.

Raytheon IDS Example: SLAM*

- Goal: Raytheon Integrated Defense Systems (IDS) has business / project cost and schedule performance goals of CPI, SPI

- Question: What are the factors influencing IDS projects' ability to meet these goals?
  - Aggressive program schedules have increased the overlap between life cycle phases
    - Design begins at risk before requirements are complete
  - Requirements Volatility
    - Changing requirements causes rework for software and hardware development
  - *Projects have been unable to quantify the risks associated with these factors.*

- Question: What controllable sub-processes relate to those factors?
  - Requirements management, requirements development, technical solution

* Patent pending

Raytheon IDS Example: SLAM

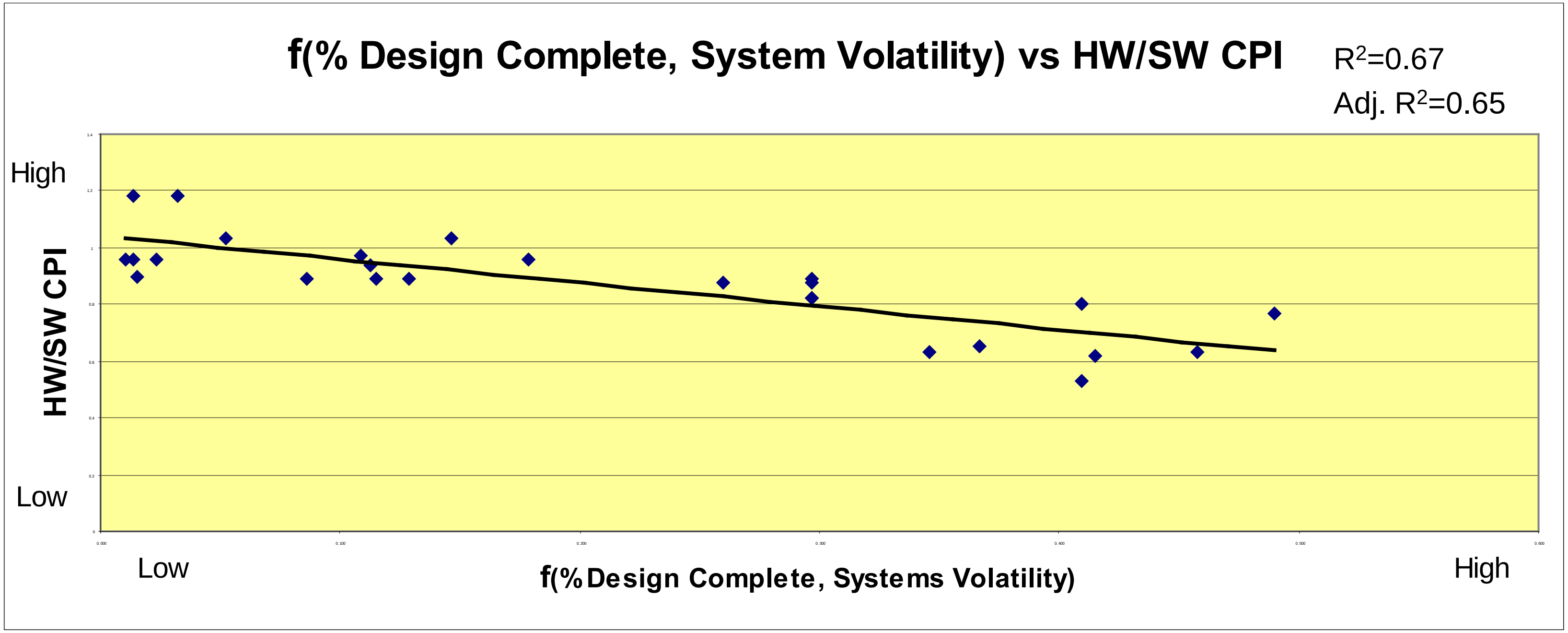
(continued)

- Model
  - Identify associated measures
    - CPI, SPI and Requirements Volatility are required measurements collected and reported by every development project across Raytheon Company.
    - Requirements/design overlap
      - A non-standard project measurement collected and analyzed during the SLAM development piloting & deployment.
      - SLAM piloting effort worked closely with a cross-section sampling of our IDS development projects in defining an objective measurement that is easily collected and readily available.
      - Up-front collection defining dialogue with SLAM pilot project teams provided highly valuable analytical and deployment insight.

Raytheon IDS Example: SLAM

(continued)

- Model (continued)
  - – Collect and analyze data
    - A mathematical function of the input factors was reasonably well correlated with the output responses using linear regression techniques (with an adjusted r-squared value = 0.65, p= .000). Additionally collected project data from SLAM piloting and deployment further confirmed the strength of this underlying statistical relationship.



Raytheon IDS Example: SLAM

(continued)

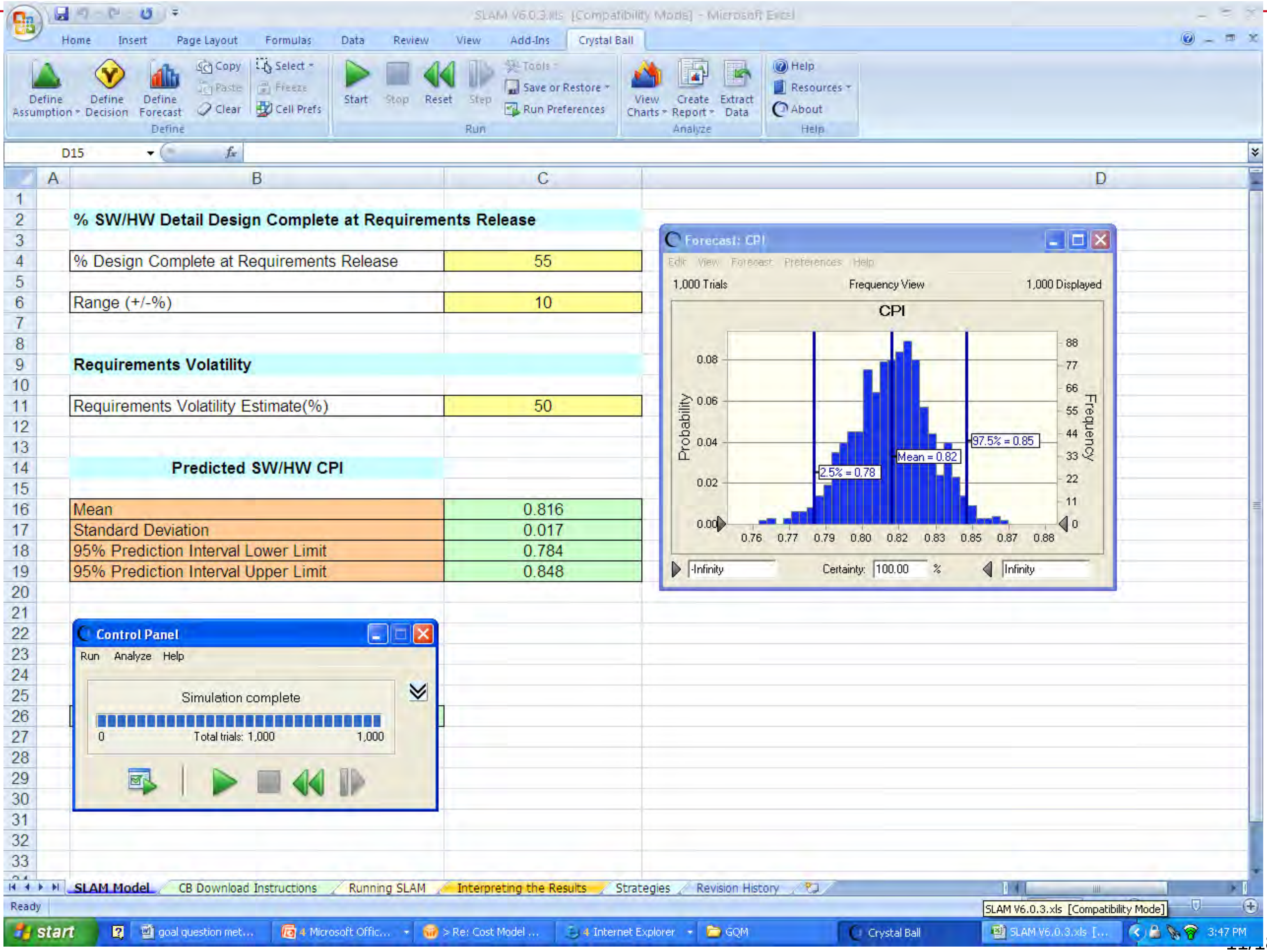
- Model (continued)
  - Crystal Ball was selected as the statistical modeling tool of choice both because of its availability to all (Raytheon has a Corporate license) and because of its general ease of use for project teams.
  - Using the correlated regression equation and estimates of mean and variance for each of the factors (from the collected data), a Monte Carlo simulation model was developed with an Excel-based User interface.
  - The SLAM Model User Interface also includes:
    - Crystal Ball download instructions
    - Step-by-Step Guidance for Projects on “Running SLAM”
    - Guidance on how “Interpreting the Results”
    - A Listing of Potential Mitigation Strategies

Raytheon IDS Example: SLAM

(continued)

- Model (continued)
  - SLAM Model Inputs
    - Estimated % Design Complete at Requirements Release
      - Confidence Range (+/- 5, 10, or 15%)
    - Requirements Volatility Estimate
      - Enter in best estimate based on historical baseline for product line, process tailoring, etc.
      - Variance estimates built into model based on historical actuals
  - SLAM Model Output
    - Projected Software / Hardware Cost Performance (CPI)
      - Mean, Standard Deviation
      - 95% Upper & Lower Prediction Interval Limits

Raytheon IDS Example: SLAM
(Example 1)



SLAM V6.0.3.xls [Compatibility Mode] - Microsoft Excel

% SW/HW Detail Design Complete at Requirements Release

% Design Complete at Requirements Release	55
Range (+/-%)	10

Requirements Volatility

Requirements Volatility Estimate(%)	50

Predicted SW/HW CPI

Mean	0.816
Standard Deviation	0.017
95% Prediction Interval Lower Limit	0.784
95% Prediction Interval Upper Limit	0.848

Forecast: CPI

1,000 Trials Frequency View 1,000 Displayed

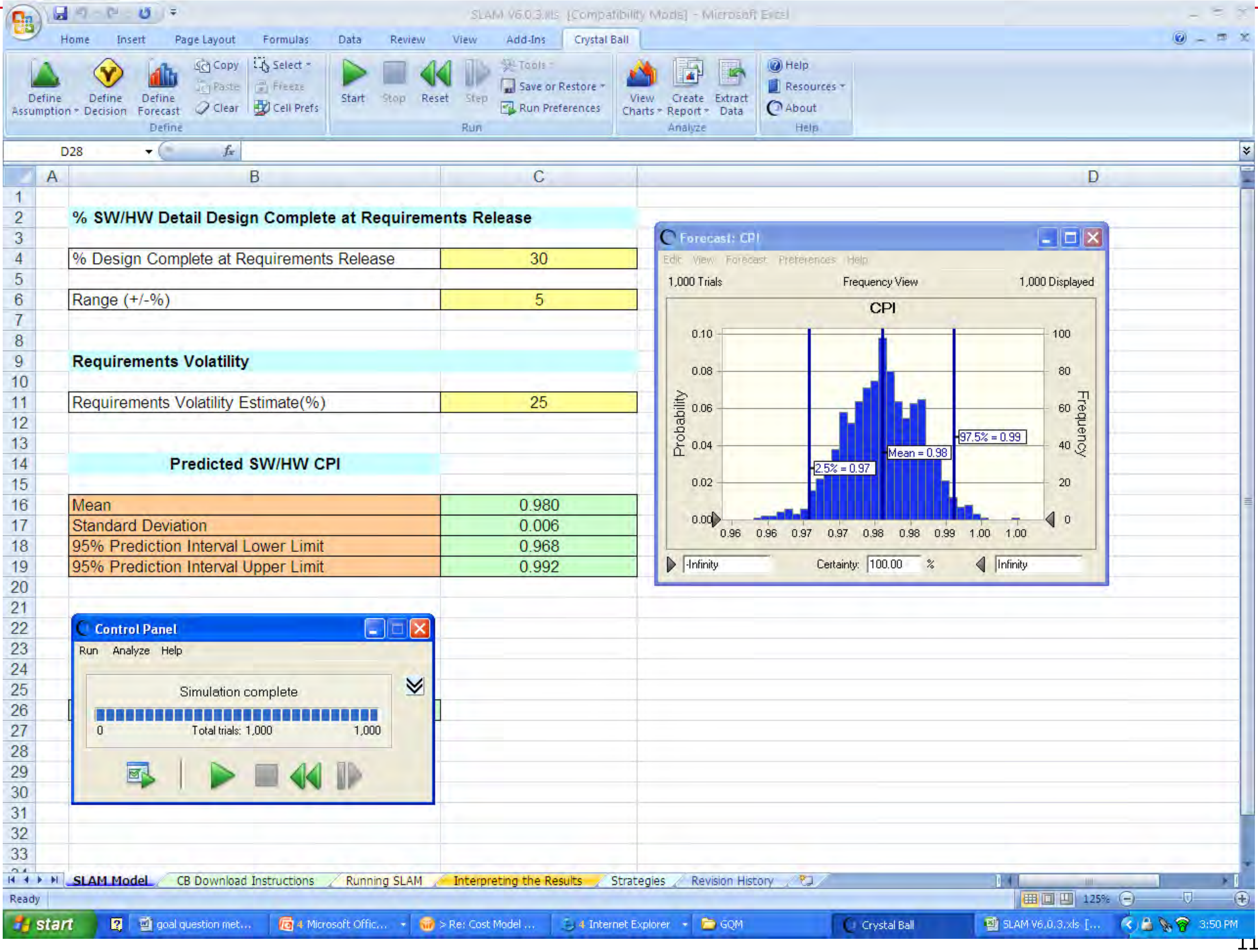
-Infinity Certainty: 100.00 % Infinity

Control Panel

Simulation complete

0 Total trials: 1,000 1,000

Raytheon IDS Example: SLAM
(Example 2)



% SW/HW Detail Design Complete at Requirements Release

% Design Complete at Requirements Release	30
Range (+/-%)	5

Requirements Volatility

Requirements Volatility Estimate(%)	25

Predicted SW/HW CPI

Mean	0.980
Standard Deviation	0.006
95% Prediction Interval Lower Limit	0.968
95% Prediction Interval Upper Limit	0.992

Simulation complete

0 Total trials: 1,000 1,000

Raytheon IDS Example: SLAM

(continued)

- The System Lifecycle Analysis Model (SLAM) was developed and deployed at Raytheon Integrated Defense Systems in order to quantitatively assess the cost performance risk associated with requirements volatility and requirements / design lifecycle overlap.
- SLAM has been used to identify risks during early planning as part of proposal activity
- SLAM is used by integrated project teams made up of Systems, Software, Hardware and Quality Engineering during project planning and execution
  - Quantifies risk
  - Enables composition of project’s defined process
  - Manages against quality and process performance objectives
- The Engineering Process Group has used SLAM to estimate benefits of process improvement proposals and to measure changes in performance due to process improvements.

IDS Process Performance Modeling Lessons Learned

- SLAM was built to aid IDS programs in their ability to achieve objectives. The users of the model felt it recognized their issues, validated their program concerns, and would help them support resolution of these issues.
- Keeping the model simple and fast to use was seen as a plus by users. No training beyond a short demo was required.
- Reviewing data with project people revealed insights that led model to be developed in a different manner than planned and contributed to buy-in from users. The iteration back to the data providers was invaluable to the developers.
- Demonstrating the model with Engineering managment helped them understand the tool, provided commitment to pilot and deploy.
- Let the data lead you to a solution. Original SLAM concept was different than what was actually created.
- Start small, get buy-in, and build from there. Expectation is for SLAM to expand with more granularity across the lifecycle.

Summary

- The Goal Question Metric approach emphasizes defining measurements in a top down fashion
  - Measure what is most meaningful to the business or a project
  - This is consistent with the CMMI expectations
    - Measurement objectives are derived from information needs (MA)
    - Establish quality and process performance objectives (OPP, QPM)
- Using the same top down approach with process performance modeling produces value-added, effective results
  - Model what is most meaningful to the business or project focuses resources where the value is greatest
  - Leads to acceptance and use of the models at various levels of the organization
  - Helps the business or project achieve its objectives

Questions

References

1. CMMI® Models and Reports, http://www.sei.cmu.edu/cmmi/models/
2. Zubrow, Schaff, Stoddard, Young, *"A Practical Approach for Building Process Performance Models"*, SEPG North America 2009.
3. Basili, Victor R.; Caldiera, Gianluigi; Rombach, H. Dieter, *"The Goal Question Metric Approach",* 1994, http://wwwagse.informatik.uni-kl.de/pubs/repository/basili94b/encyclo.gqm.pdf
4. Stoddard, Robert; Goethert, Wolf, *"Guidance on Business and Project Goal Formulation in CMMI High Maturity Settings*", SEPG North America 2009.

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DYNAMIC PROGRAM SCHEDULE, COST AND RETURNS ANALYSIS

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CMMI® Technology Conference
November 17th, 2009
Denver, CO

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WHAT WE ARE GOING TO DO AND WHY

We are going to evaluate a program in terms of the schedule, costs, fee structure and estimated returns.

We want to know if we are going to make money.

ACKNOWLEDGEMENT: The approach within this presentation has been inspired by the teachings of Dr. Sam Savage and my demonstration will use Risk Solver^{TM} software available through Frontline Systems; other useful software is @Risk from Palisade Corporation and Oracle Crystal Ball.

HOW WE ARE GOING TO DO IT AND WHY

First, using a deterministic approach for estimating factors, using expected or desired point value assumptions.

Second, using a stochastic approach for estimating factors, using a variety of stochastic assumptions.

We want to know if we are going to make money; AND how sensitive our outcome may be based on our assumptions and the unknown uncertainties.

OVERVIEW OF THE PROGRAM

The Program: ***Requirements***

Provide a recommendation with supporting analysis regarding whether or not a proposed organizational change should be implemented.

We have three interim deliverables due at 150, 180, 210 days respectively with a final deliverable due in 360 days.

OVERVIEW OF THE PROGRAM CONTINUED

The Program: ***Fee Determination***

The first deliverable is due in 150 days and is worth $100K

The second deliverable is due in 180 days and is worth $150K

The third deliverable is due in 210 days and is worth $200K

The final deliverable is due in 360 days and is worth $550K

Each interim deliverable is subject to a 10% bonus if more than 20 days early and a 10% penalty if more than 10 days late.

The final deliverable is subject to a 10% bonus if more than 60 days early; a 5% bonus if more than 30 days early; a 10% penalty if more than 20 days late; and a 25% penalty if more than 40 days late.

SOME QUESTIONS…

How long will it take?

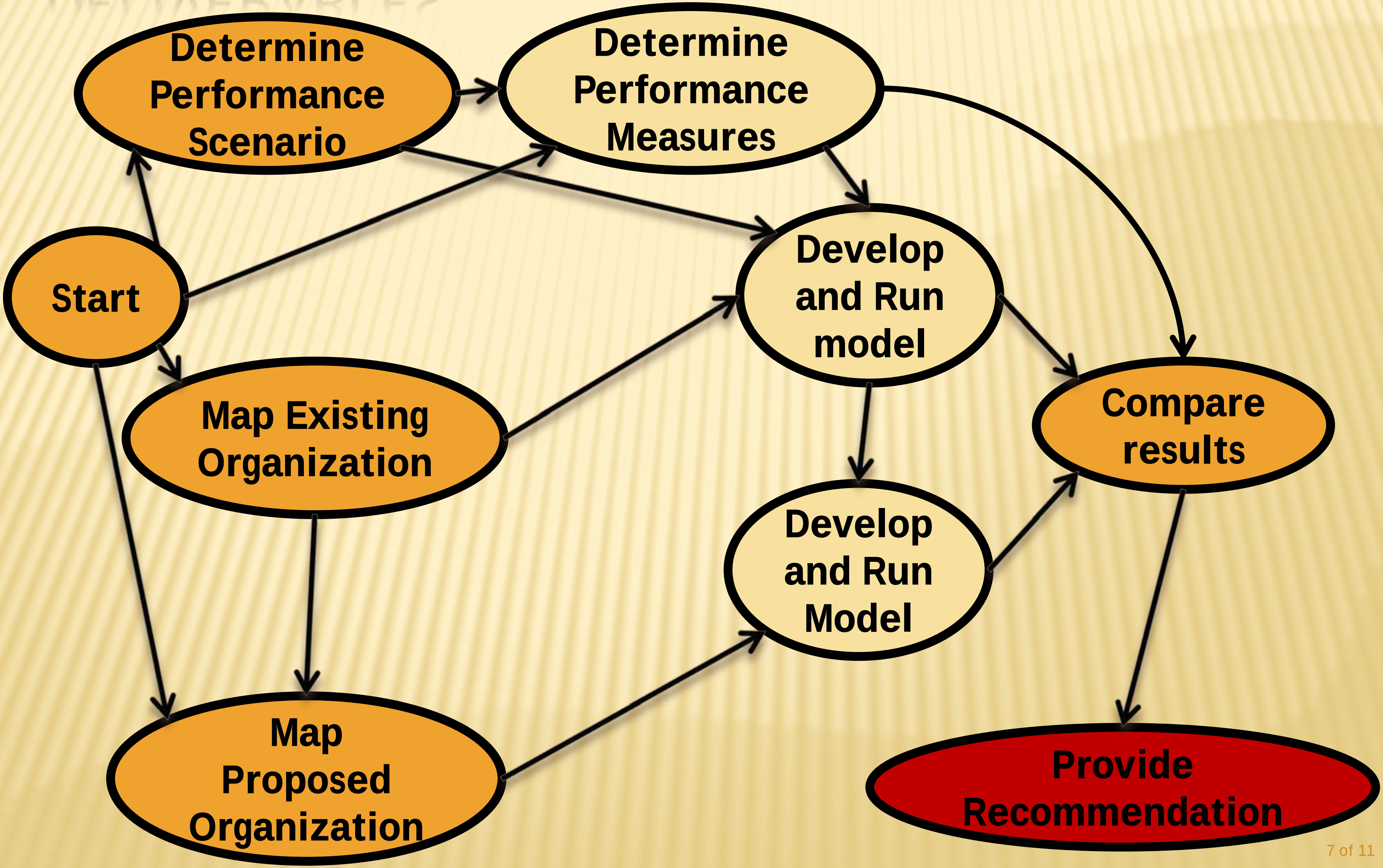
How much of the potential fee will we earn?

How much will it cost?

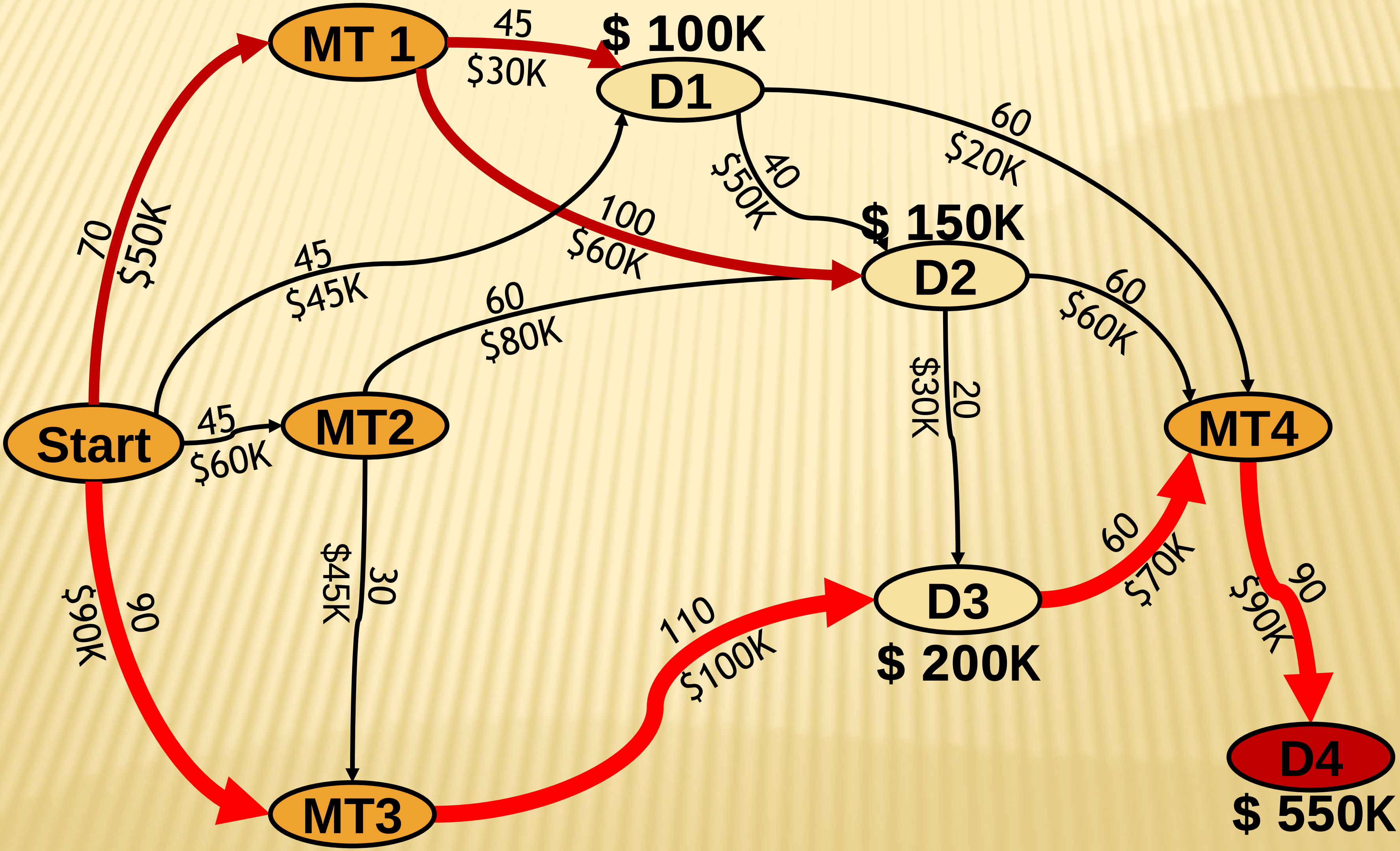
Ultimately – How much money will we make?

And…are you sure?

HERE ARE THE MAIN TASKS AND DELIVERABLES…



Here they are again, identified as Main Tasks (MT) and Deliverables (D) with estimates for times and costs; base fee amounts for each deliverable as well as the critical path identified for each deliverable and overall…



DETERMINISTIC EVALUATION…

The expected time and anticipated fee for each deliverable and expected overall program cost are therefore…

D1 – 115 Days = $100K (No bonus or penalty)

D2 – 170 Days = $150K (No bonus or penalty)

D3 – 200 Days = $200K (No bonus or penalty)

D4 – 350 Days = $550K (No bonus or penalty)

Total Fee = $1M (No bonus or penalty)

Total cost = sum of costs for all tasks and deliverables = $880K

CONCLUSION…

We will finish on time for each deliverable and overall, we will earn no bonuses but incur no penalties and we will make $120,000 (approx. 13.6% return)

We mapped all process steps and documented all assumptions

What could go wrong?

Shift to Demonstration

Lessons Learned Piloting the CMMI for Services

CMMI Technology Conference
November 16-19, 2009

Diane Mizukami-Williams
Northrop Grumman Corporation

Northrop Grumman Information Systems (IS) Sector

IS Sector

- $10 billion in sales in 2008
- 7,000 contracts
- 33,000 employees

Products and Services

- Mission support
- Cybersecurity
- Command, control, and communications
- Enterprise applications
- IT & network infrastructure
- Management & engineering services
- Intelligence, surveillance, & reconnaissance

IS as a CMMI for Services Early Adopter

- IS has a history of successful CMMI adoption
  - One of the first large organization adopters
  - Over 80 organizations (over 250 projects) appraised at Level 3 or higher
- IS was very interested in applying our successes to services
- Strong IS involvement in developing the CMMI for Services model
  - Hal Wilson – CMMI Steering Group advocate for developing the model
  - Craig Hollenbach – Model Project Manager
  - Brandon Buteau – Model Architect
  - Roy Porter – One of the model authors
- Made sense for IS to be an early adopter
- IS completed a successful Level 3 SCAMPI A in October 2009
  - Led by Pat O'Toole and 3 lead appraisers (John Clouet, Ron Ulrich, Ravi Khetan)

SCAMPI A Projects

- Started with 4 pilot projects
- Positives
  - All previously appraised at CMMI Level 3 or 5
  - 3 projects were service-only, 1 was software/hardware/service
  - Felt adopting the model would improve their processes
- Negatives
  - Projects were apprehensive about the newness of CMMI-SVC
  - Wanted assurance that IS experts would assist them in understanding the model and helping with improvements and artifacts
- Business reasons eventually reduced the appraisal to 1 project
  - IS and the project could still benefit

7 CMMI for Services Unique Process Areas

L2 **Service Delivery**
Deliver services per service agreements

L3 **Capacity and Availability Management**
Effective performance and resources are used effectively

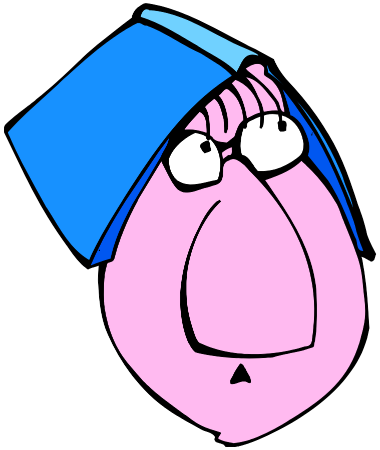
L3 **Incident Resolution and Prevention**
Resolution and prevention of service incidents.

L3 **Service Continuity**
Continuity of services during and following significant disruptions

L3 **Service System Development**
OPTIONAL
Design, develop, integrate, verify, etc. the service system.

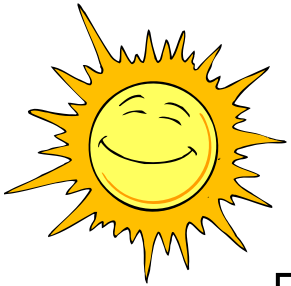
L3 **Service System Transition**
Deploy a new or changed service system

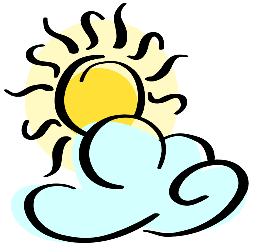
L3 **Strategic Service Management**
Standard services per strategic needs and plans

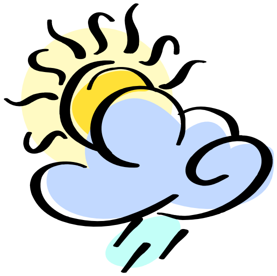


Note: Also 1 new practice in OPD and PP.

Easy to More Painful Process Areas







Service Delivery

Incident Resolution & Prevention

Service System Transition

Service System Development

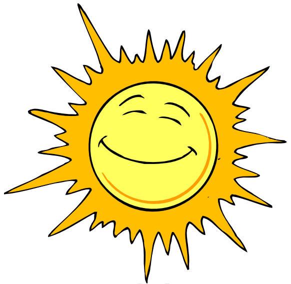
Capacity & Availability Management

Service Continuity

Strategic Service Management

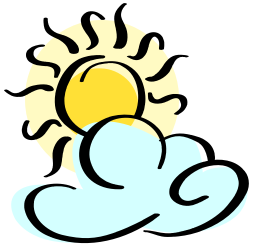
Presentation will cover what we learned from the easiest (Service Delivery) through the most painful (Strategic Service Management) process areas

1 Service Delivery



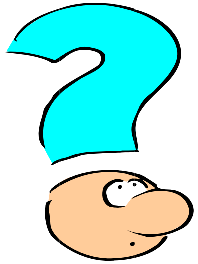
Positives

- Projects naturally implemented service delivery
  - Projects had service agreements
  - Projects prepared for service delivery
  - Projects delivered services



Slight Difficulty

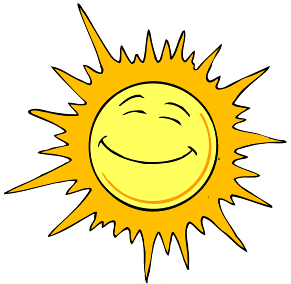
- Analyzing existing agreements and service data (SP 1.1)
  - Projects may or may not do this, and even if they did, it may not be documented



Confusion

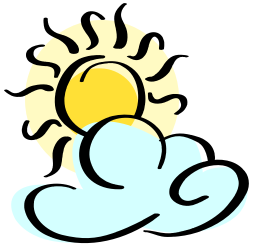
- None

2 Incident Resolution and Prevention



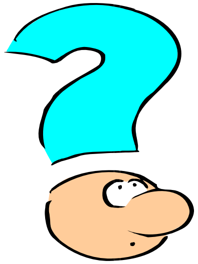
Positives

- Model improves trouble tickets
  - Projects added more fields to capture more data for trending
  - Encouraged capturing information, i.e., write it down



Slight Difficulty

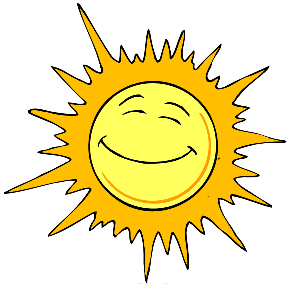
- Workarounds (SP 2.3)
  - Workaround repository is not required, but the model mentions it, and projects generally do not have one
  - Workaround used is not always documented



Confusion

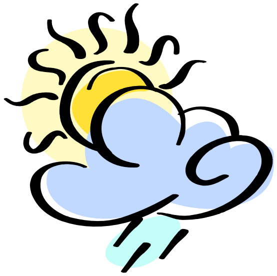
- Incidents (Goal 2) versus problems (Goal 3) not clear
  - Not all “incidents” are a “problem”. Someone might report an incident, “The computer is broken”. Your response, “You didn’t turn it on”. It’s not a “problem” unless it happens a lot.
  - Model team is correcting the confusion in V1.3

3 Service System Transition



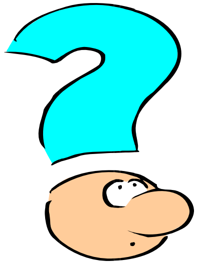
Positives

- Model adds more discipline for transitions
  - Encourages better planning for transitions
  - Ensures impacts are known and impacts are monitored
  - Ensures people are prepared for changes
  - Stops dump and run attitude, “Here you go,... good luck”



Difficult

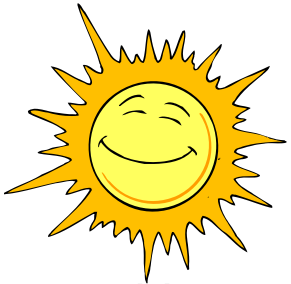
- Transition tends to be informal
  - Transition plans may or may not exist
  - Monitoring impacts tends to be informal, “Hey, how’s it going?”
  - More difficult to gather evidence



Confusion

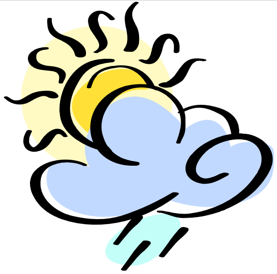
- None

4 Service System Development



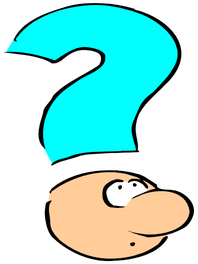
Positives

- Ensures all life-cycle activities are addressed
- Projects are very happy to use a model that fits their work (CMMI for Development more painful)
- Optional (should use for complex service systems)



Difficult

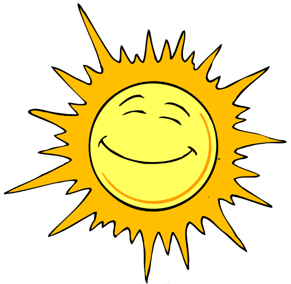
- Software/hardware/service projects miss services
  - Have plenty of evidence, but very little for services
  - For example, GP 2.8 status reports only address the software / hardware product, but not the service system
  - Service-only projects are much easier to work with



Confusion

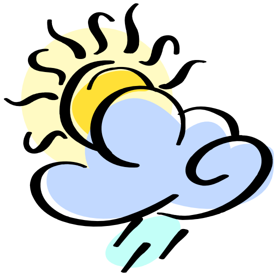
- Include the optional process area or not ???
- In V1.3, SSD will likely NOT be an option. Projects must provide rationale why it is N/A like SAM.

5 Capacity and Availability Management



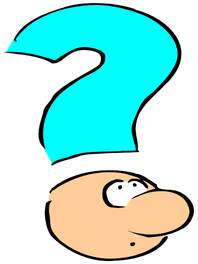
Positives

- Ensures projects monitor these critical items
- Helps formalize both capacity and availability
- Ensures measures are collected and analyzed, which is good



Difficult

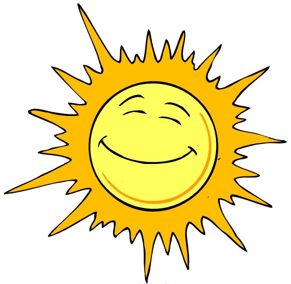
- Availability and/or capacity not done
- If done, not done formally
- Only done well if a contract requirement



Confusion

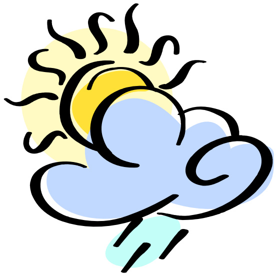
- Should be at the service system level, not component level, although key components should do it
- Service system representation (SP 1.3) does not have to be graphical, but must provide useful information (Buteau)

6 Service Continuity



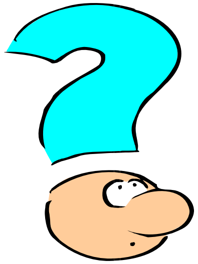
Positives

- Projects generally do not think of continuity until a major disruption occurs
- Puts things in place BEFORE a major disruption occurs
- Brings structure to planning and implementation



Difficult

- Lack of Service Continuity Plans (SP 2.1)
  - Assume they will not have sufficient plans
  - Created a detailed 53 page Service Continuity Plan Template
  - Template helped projects tremendously



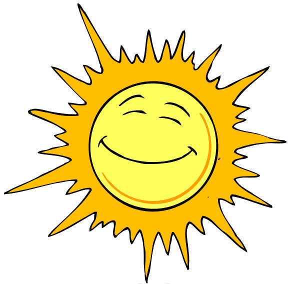
Confusion

- Verify and validate the Service Continuity Plan (SP 3.2)
  - People are not used to testing and validating a “plan”
  - Educated the project using the template
  - Key services and essential functions and resources in the plan should be verified and validated (Buteau)

7 Strategic Service Management

Last but not least,...
Strategic Service Management

7 Strategic Service Management (1 of 2)



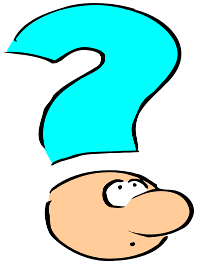
Positives

- Ensures the long term health of the service
- Evolves the service per market and customer needs so service does not stagnate over time
- Makes it very clear what services are provided

Very Difficult

- Properties of standard services and service levels (SP 2.1)
  - Model fits cell phone companies with similar services
  - Much more difficult with companies as diverse as Northrop Grumman (Red Cross blood bank project, anti-terrorist FBI project, Internal Revenue System (IRS) project, etc.)
  - Pick the level in the organization where things become more common
  - Used project evidence. Project had a “Chinese Menu” where you order this for your site, and that for your site, etc.

7 Strategic Service Management (2 of 2)



Confusion

- STSM is project or organization?
  - Immediate reaction was STSM was a project-level process area
  - STSM is not in the Process Management category like OPD, OPF, etc.
  - According to the authors, it was intended to be organizational, similar to OPD, OPF, etc.
- STSM is not like OPD, OPF, etc.
  - OPD, OPF, etc. evidence works whether there is 1, 2, or 100 projects
  - In STSM, switching to 1 project changes the evidence
  - Populated PIID with Sector, Division, Department, and project evidence
  - Appraisal team called a 1 hour telecon for STSM
  - Debated on who should do this, Sector? Division? Business Unit? Department? Project?
  - Model authors stated practices could be done at one or more levels, ... it depends

Miscellaneous

- What is a service project
  - A “project” covers the scope of one service agreement, which may contain several services (Buteau)
  - One appraisal team member felt each service within a project could be treated as a separate “project” and should do every practice
- Enhance training
  - Expand appraisal team member training
  - Appraisal team appraised development projects for so long, they may not be able to shift their thinking to services
- Typical “gap analysis” approach won’t work
  - Address the 7 new service-specific PAs and the 1 additional practice in PP and OPD and I’m done,... WRONG
  - Half way through, realized OPD, OPF, etc. only contained evidence for systems/hardware/software but nothing for services. Reworked OPD, OPF, etc. to add service-specific evidence.

Summary

- Don’t assume if you address the 7 new service-specific Process Areas (and 1 PP and OPD practice), you’re done
- Beware of Strategic Service Management
- Overall, transitioning to the new CMMI for Services model was a great idea
- Recommend using the model, ... I like it!

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Work *ON* Your Engineering Business, Not *IN* It!

NDIA CMMI Technology Conference

November 17th, 2009

Rolf W. Reitzig

cognence inc

Improving Software Economics

What Is Your Competitive Advantage?

- Technology?
- People?
- Quality?
- Cost?

HOW you develop your products strongly determines *WHAT* competitive advantages you are able to obtain and maintain

How Is Your Company Run?

- Day-to-Day?
- Quarter-to-Quarter?
- Year-to-Year?
- Multi-Year?

What activities does management engage in that overlay the activities overwhelming employees on a day-to-day basis? *Or, is management consumed by the day-to-day as well?*

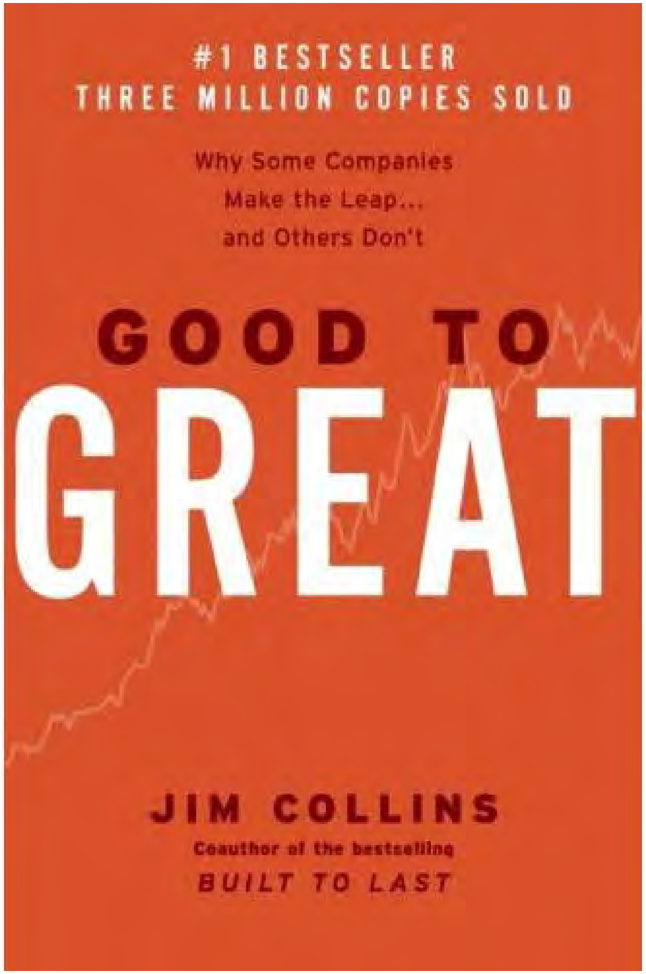
What insight does management have into the ***business model*** that's being employed, and how to improve and refine it?

Successful Businesses...

- Run operations as if they were a franchise
  - Every business process is standardized
  - Average employees can easily be successful by following the processes as outlined
  - Well executed processes are scaled and leveraged across the organization
- For software organizations, “franchising” processes can result in a 50% or more increase in productivity

Jim Collins' *Good to Great*

- Good-to-great companies focus equally on *what* to do, *what not* to do, and *what to stop* doing
- Technology-driven change had virtually nothing to do with igniting a transformation. *Technology can help accelerate, but doesn't cause change*. Technology influences typically come last, not first.



Key Concept From *Good to Great*

"Good-to-great companies built a ***consistent system*** with clear constraints, but they also gave people the freedom and responsibility within the framework of that system. They hired self-disciplined people who didn't need to be managed, and then ***managed the system***, not the people."

Other *Good to Great* Thoughts

- "What are the brutal facts? We've got to get a grip on the facts, what are the trends, what are the trendlines, how bad is it? Get a grip on the facts.“
- "How does a culture of mediocrity take hold? The signature of mediocrity is chronic inconsistency”
- "What you can measure you can target. And what you can target you can accomplish.”
- "Don't look for silver bullets. Pick a lead bullet and polish it so it becomes silver"

Key Franchising Concepts

- Great businesses are not built by extraordinary people, but by ordinary people doing extraordinary things
- To achieve this, a system is absolutely essential – it becomes the tools people use to increase productivity, to get the job done in a way that differentiates
- A franchise is simply *your unique way of doing business – your system*
- If you haven't orchestrated your business, you don't own it!

Source: *The e-Myth Revisited,* Michael E. Gerber, HarperCollins Publishers, 1995

Management's Role

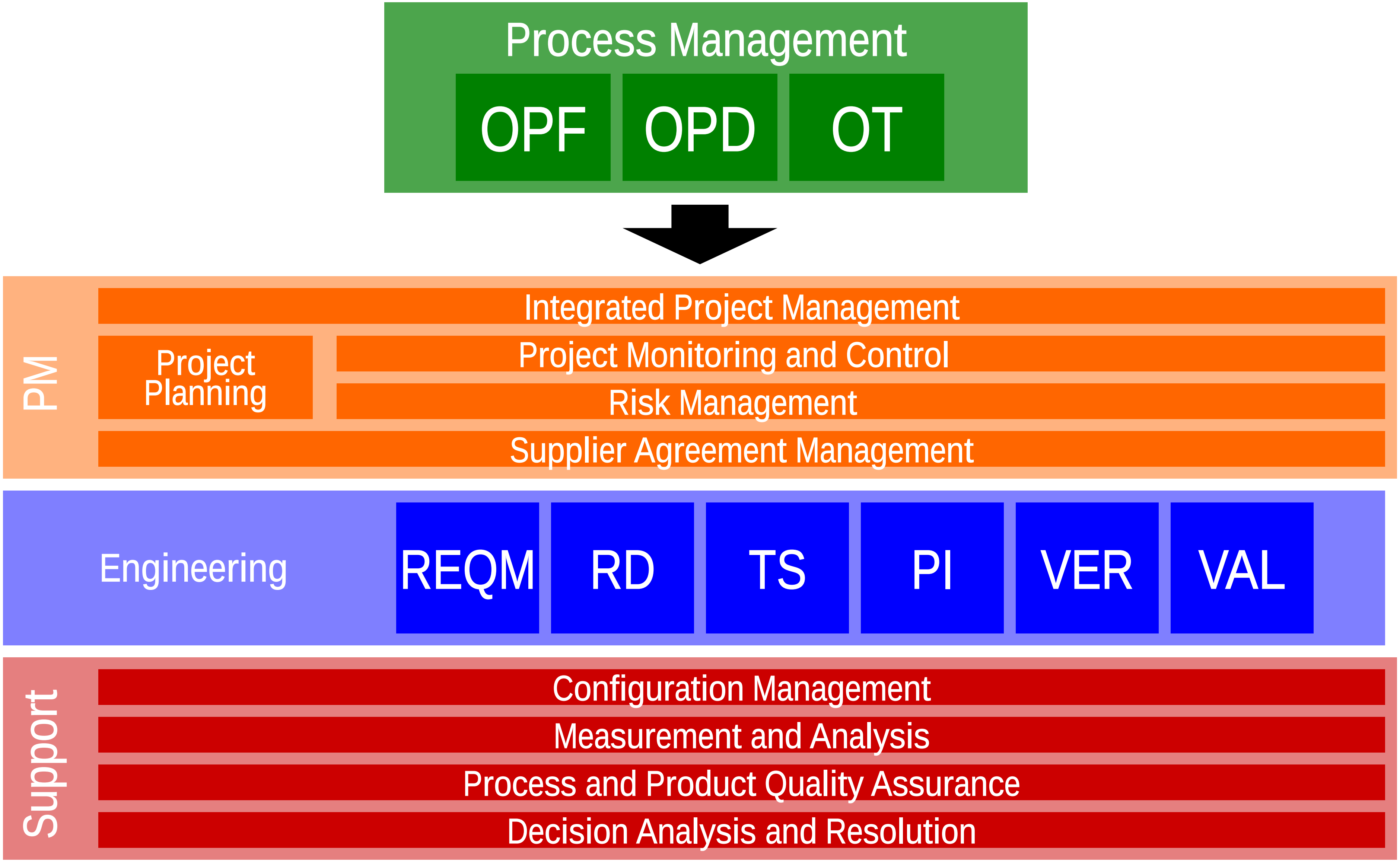
- It's management's job to develop systems and tools and teach employees how to use them
- Its the employee's job to use the systems and tools and to recommend improvements based on their experience with them
- Management makes sure employees understand the idea behind the work they are being asked to do
- Avoid "Management by Abdication"!

Source: *The e-Myth Revisited,* Michael E. Gerber, HarperCollins Publishers, 1995

The Capability Maturity Model Integration

- The CMMI is a framework that describes the key elements of an effective systems and software process, and provides for an evolutionary improvement path from an ad hoc, immature process to a mature, disciplined one.
- The CMMI guides engineering organizations that want to gain control of their processes for developing and maintaining systems and software and to evolve toward a culture of software engineering and management excellence.
- The intent of the CMMI is to install a process infrastructure that supports standardization, scalability, continuous re-evaluation, and improvement – *in other words, an engineering system*

CMMI Engineering Business Model Philosophy



Process Management

OPF OPD OT

PM

Integrated Project Management

Project Planning

Project Monitoring and Control

Risk Management

Supplier Agreement Management

Engineering

REQM RD TS PI VER VAL

Support

Configuration Management

Measurement and Analysis

Process and Product Quality Assurance

Decision Analysis and Resolution

Generic Practices

2.1 Establish an Organizational Policy
2.2 Plan the Process
2.3 Provide Resources
2.4 Assign Responsibility
2.5 Train People
2.6 Manage Configurations
2.7 Identify and Involve Relevant Stakeholders
2.8 Monitor and Control the Process
2.9 Objectively Evaluate Adherence
2.10 Review Status with Higher Level Management

3.1 Establish a Defined Process
3.2 Collect Improvement Information

Examples of Working IN versus ON Your Business - 1

IN

Reacting to project problems after they occur

Becoming good at ***responding to customer complaints***, instead of eliminating them

ON

Instituting a ***cross-project measurement and periodic review program*** that illuminates and addresses potential issues ***before*** they occur

Reviewing ***how*** projects are accomplishing their work, and that they are following the organization's expectations

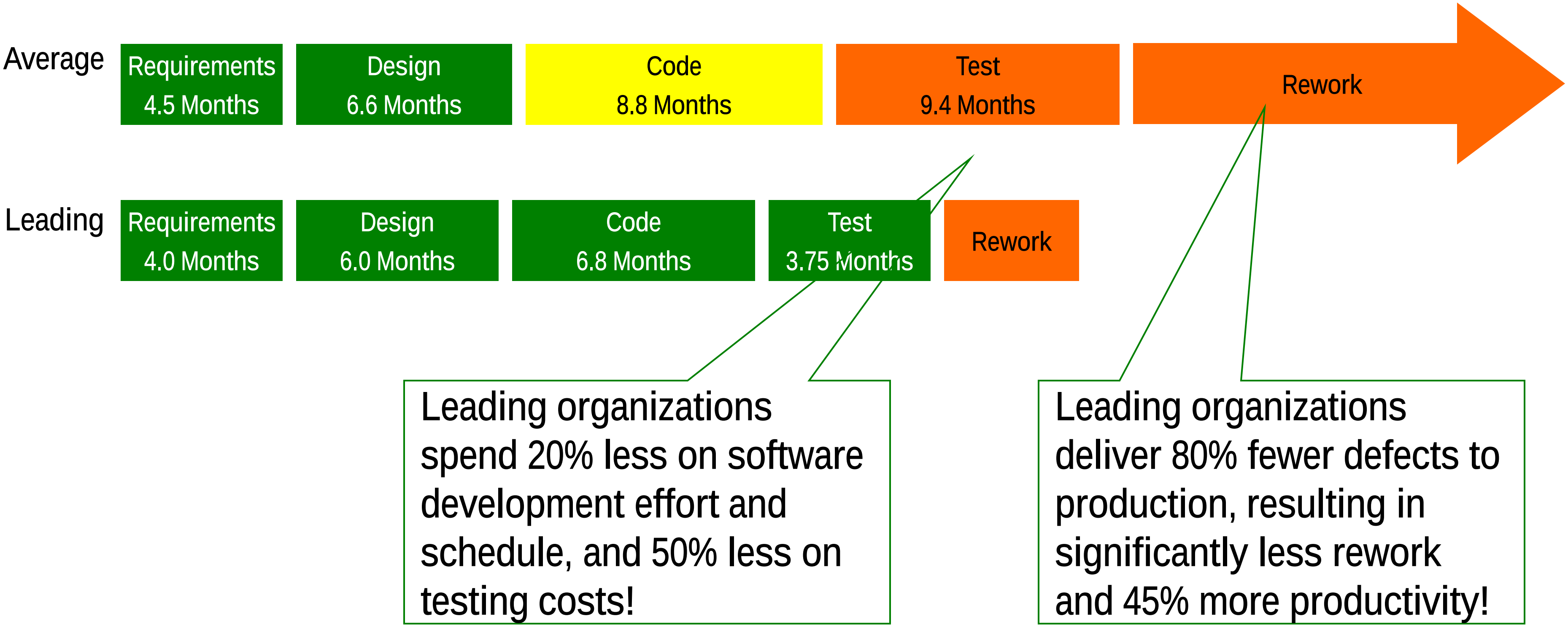
Examples of Working IN versus ON Your Business - 2

IN	ON
Letting teams approach projects however they’d like, and bringing in whatever tools they want	Instituting a ***consistent engineering process***, and constantly measuring and refining it based on facts ***Quantitatively evaluating and implementing*** new technologies/tools in a disciplined fashion

Examples of Working IN versus ON Your Business - 3

IN	ON
Allowing key project decisions to be made by the political/ influential power of certain project team members	Requiring DAR to be used in a light-weight, but quantitative fashion to remove individual and political influence out of the process

Example: 65% More Productivity



Leading organizations spend 20% less on software development effort and schedule, and 50% less on testing costs!

Leading organizations deliver 80% fewer defects to production, resulting in significantly less rework and 45% more productivity!

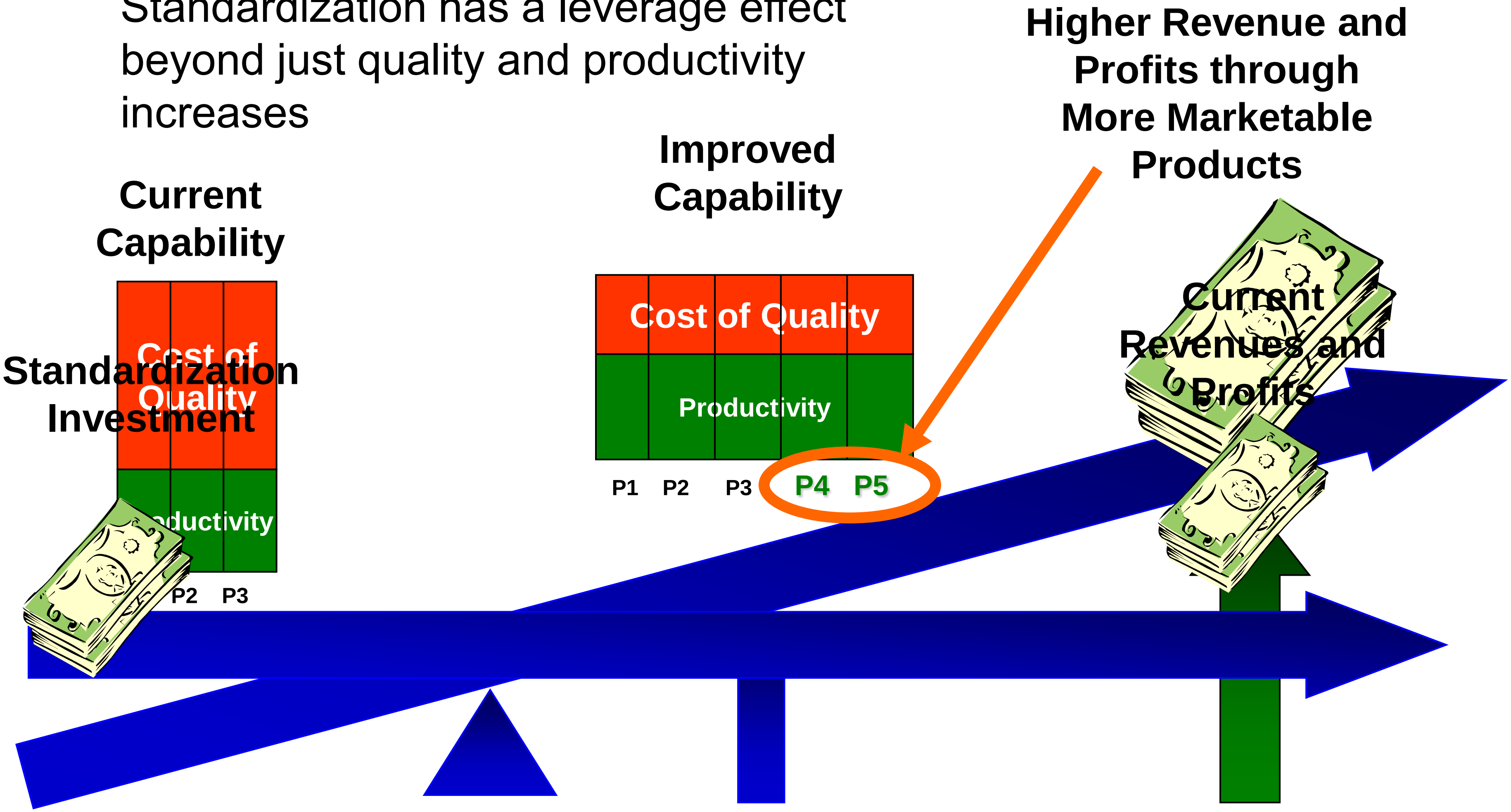
20%

45%

COMPARE: Trailing organizations spend 30% of project resources on testing, leading organizations spend 15%

Leverage

Standardization has a leverage effect beyond just quality and productivity increases



Thank You!

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cognence inc
Improving Software Economics

The Economics of CMMI®

NDIA CMMI® Working Group
NDIA Systems Engineering Division

CMMI Technology Conference

November 17, 2009

The Economics of CMMI

CMMI is an investment

- Are you obtaining the returns you should?
- Is performance improving?
- Do benefits outweigh the costs?
- Or just an added cost of doing business?

Value often stems from business choices

- Organizational objectives
- Performance goals
- Implementation strategies

These choices are under an organization's control

- Utilize effective strategies and mechanisms to achieve improved business performance and cost efficiencies

The Effective Use of CMMI®

- NDIA Position Paper

Summary of NDIA industry position statements for obtaining best value from CMMI investments:

1. **Good processes increase the likelihood of achieving successful project performance**
2. **CMMI is a model, not a standard – adapt CMMI to your business environment, resources, and objectives**
3. **Focus on business improvement objectives – a primary emphasis on achieving levels may not achieve significant benefits and may increase rather than decrease costs**
4. **High maturity is a business case – justify the investment; many organizations find business value in improving processes even at lower CMMI maturity levels**
5. **Maturity level ratings are not alone a predictor of project performance – many other factors can be significant contributors**
6. **Don't specify maturity levels in acquisitions – use CMMI to probe supplier capability and process execution risks**
7. **Greatest benefits of appraisals are from improvements, not evidence or ratings - disproportionate effort on appraisal preparation risk can diminish business returns**

- "The Effective Use of CMMI®", NDIA Systems Engineering Division, June 2009. http://www.ndia.org/Divisions/Divisions/SystemsEngineering/Documents/CMMI%20Working%20Group/CMMI%20NDIA%20position%20statement_final_.pdf

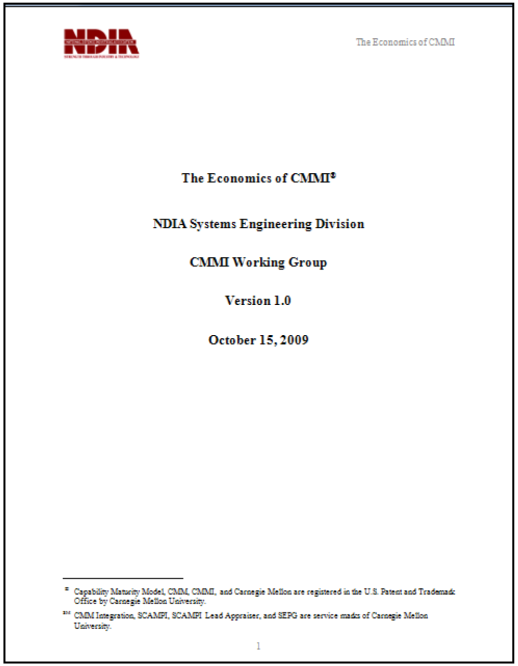
The Economics of CMMI

Overview:

- Developed by NDIA CMMI Working Group
- Guidance by industry, and for industry, on achieving business value through CMMI
- Suggested CMMI strategies and mechanisms, intended to be tailored much like the model itself

Content:

1. Guidance on achieving business performance improvement through economical use of CMMI
2. Guidance on effective CMMI implementations to address common business issues



The Economics of CMMI

The Economics of CMMI®

NDIA Systems Engineering Division

CMMI Working Group

Version 1.0

October 15, 2009

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SM CMM Integration, SCAMPI, SCAMPI Lead Appraiser, and SEPG are service marks of Carnegie Mellon University.

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Objectives:

- Provoke thoughtful dialog on the effective use of CMMI
- Influence the mindset of CMMI business value – focus on improvement
- Help raise expectations across industry for results achieved through CMMI

The Economics of CMMI –
Targeting CMMI Decision-Makers

Section	Topics
Economical Business Application of CMMI *(Executives)*	• Support of Business Goals and Strategy • Organizational Leadership • Improvement Velocity • Making Performance Improvement Intrinsic to the Job
Economical Implementation of CMMI *(Implementers)*	• Use CMMI as an Integrating Framework • Develop and Deploy Processes Effectively • Tailor CMMI Implementation Appropriately • Implement CMMI in a Practical Way • Make an Informed Decision on High Maturity • Conduct Appraisals Economically

Economical Business Application of CMMI (Part 1)

CMMI business value depends on a foundation of underlying principles:

First Principles of CMMI Adoption	Potential Impact When Not Adopted
CMMI-based improvement efforts must align with and support defined business goals.	CMMI investments do not affect business performance; process improvements which are not really improvements have detrimental effects.
Organizational leadership must be actively involved and visibly committed to the improvement effort.	Improvements are not substantial or lasting, due to lack of organizational commitment and resources. Missed opportunities to improve the business.
Manage process improvement velocity. The rate at which processes are improved must respond to the needs of the business.	Massive simultaneous change overwhelms an organization and results in loss of focus on high priority improvement targets. Improvements are not realized in a reasonable time frame, which reduces the return on investment.
Continuous performance improvement must be an intrinsic part of the job - not secondary to it.	Workforce not engaged in improvement initiatives. Waste due to inefficiencies and organizational resistance to change. Premature abandonment based upon failures leaving a worsened condition in the aftermath.

Support of Business Goals and Strategy

CMMI is for improvement with a purpose

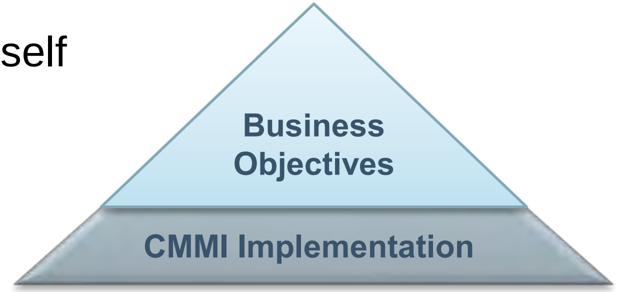
- Fit CMMI to the business objectives, not vice versa
  - Improving cycle time, productivity, quality, cost efficiency, customer satisfaction, etc.
- CMMI is a means to an end – not the objective itself

Prioritize improvements where business performance needs are greatest

- What business issues are being faced?
- How can CMMI help address them?

Pursue business value and improved performance

- Disproportionate emphasis on maturity levels can lead to a compliance-focused approach with burdensome processes at increased cost



Economical Business Application
➢ Support Business Goals/Strategy
Organizational Leadership
Improvement Velocity
Make Improvement Intrinsic to the Job
Economical Implementation of CMMI
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Organizational Leadership

Prominent executive sponsorship of CMMI

- Management commitment is crucial
- Set and communicate the strategic vision
- Provide adequate resources (staff, funding, tools)
- Model and reinforce desired behaviors

Hold people accountable for improvement progress

- Set objectives
- Get the organization involved
- Recognize and reward achievements

Understand and communicate CMMI commitment

- Set the tone on why CMMI is important
- The workforce will follow cues from management

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Improvement Velocity

Manage process changes at the rate needed to support the business

- What changes are needed, in what timeframe?

Plan for change at the organizational level

- Factors influencing the ability to absorb change
  - Relationships of processes with performance
  - Current state of processes and leadership
  - Project profiles (size, complexity, domain, etc.)
  - Improvement strategies and methods
- Prioritize improvements where most needed

Manage process improvement like a project

- Apply the same rigor as for any key project
- Led by a capable project manager
- Org charts, with defined roles and responsibilities
- Budget, schedule milestones, project reviews
- Engage the appropriate stakeholders

Making Performance Improvement Intrinsic to the Job

Process improvement is everyone's responsibility

- "Quality is not an act, it is a habit" (Deming)
- Set expectations for organization-wide involvement
  - Managers at all levels
  - Process groups
  - Practitioners and support groups
- Establish mechanisms for a learning organization
  - Improvement suggestions, lessons learned, process assets

Engage practitioners

- The most useful processes are often developed by those doing the work – not "ivory tower" process groups
- Ensure connection to the real issues faced by projects

Involve respected experts and opinion leaders

- Ensure process relevance, ownership, buy-in

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Economical Implementation of CMMI (Part 2)

Section	Topics
Economical Implementation of CMMI *(Implementers)*	• Use CMMI as an Integrating Framework • Develop and Deploy Processes Effectively • Tailor CMMI Implementation Appropriately • Implement CMMI in a Practical Way • Make an Informed Decision on High Maturity • Conduct Appraisals Economically

Practical guidance for implementing CMMI economically

- Helps ensure investments yield returns in business performance
- Recommendations for effective implementations to avoid common pitfalls
- Non-exhaustive, perhaps subject to debate - intended to be interpreted, tailored and applied in business context

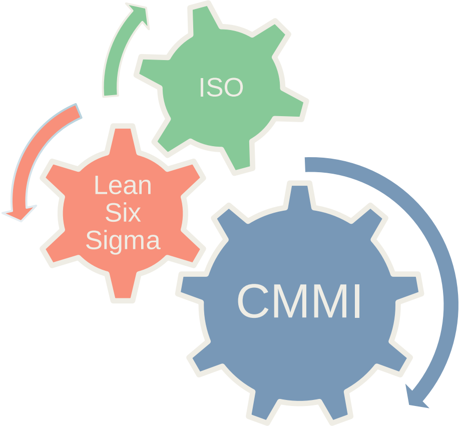
Intent is to help maintain CMMI emphasis where it belongs

- Improvement in business results and project performance, achieved economically

Use CMMI as an Integrating Framework

Common Issues	Recommendations
• Multiple parallel improvement strategies (e.g., CMMI, ISO, Lean, Six Sigma) not well coordinated at the organizational level. • Not all functions engage in integrated process improvement, resulting in sub-optimized processes or disjoint initiatives.	• Create one set of organizational process standards supporting multiple improvement strategies. Use CMMI to create a process architecture and framework supporting multiple process guidance sources. • Integrate stakeholders and cross-functional processes using CMMI to identify issues early in the product life cycle.

CMMI can be used to integrate processes, stakeholders and improvement initiatives



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Develop and Deploy Processes Effectively

Common Issues	Recommendations
• Processes too closely aligned with CMMI model don't fit the organization • Processes developed in isolation from projects aren't realistic or accepted • Too much change at once overwhelms the organization • Process descriptions are too verbose, disorganized, or overly dependent on manual effort to be useful to projects	• Integrate CMMI with current practices. Design processes around work actually performed. • Involve practitioners to help develop and deploy processes that are practical and useful. • Manage the improvement initiatives. Consider improvement lifecycles. Pilot for effectiveness. • Maintain perspective - remember who processes are for, and why. Keep end users in mind as the primary target for useful, concise process descriptions ready to be followed

Design processes so they are effective and most useful to those that must follow them

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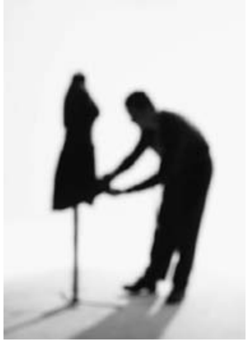
Tailor the CMMI Implementation Appropriately

Common Issues	Recommendations
• Organizations adapting to CMMI, instead of adapting CMMI to their business • Forcing a "one size fits all" CMMI implementation on the diverse projects in the organization	• Tailor CMMI model implementation to the business context. Adapt CMMI implementations to meet the needs of the business. • Recognize the needs of different types of projects. Allow and encourage project tailoring of the organization's process.

CMMI is a model, not a process – adapt it to fit the characteristics and constraints of the business context



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Implement the CMMI in a Practical Way

Common Issues	Recommendations
• Size of the CMMI model can be overwhelming for newcomers.	• Start simply and bite off manageable chunks. Identify areas where needs are greatest. Understand model dependencies.
• Confusion about generic practices causes process rework.	• Interpret and apply CMMI generic practices with good judgment. Find practical solutions for implementation/appraisal that support the work.
• Inability to estimate process improvement effort causes cost and schedule problems.	• Learn from experience. Collect measures for improvement cost and effort. Use training and other resources to minimize misunderstandings that can cause rework.

Use good judgment on CMMI implementation strategies to manage complexity and maximize business leverage

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Make an Informed Decision on High Maturity

Common Issues	Recommendations
Misunderstanding high maturity leads to folklore on burdensome processes.	Separate fact from fiction. Take training to understand high maturity and find opportunities.
Focus on high maturity level ratings over actual improvement value.	Focus on process improvement, not maturity levels.
Concern that high maturity requires excessive rework of processes.	Anticipate process evolution. Plan for natural progression of improvement, at any level.
Un-measurable quality and process performance objectives.	Derive measurable quality and process performance objectives from business needs.
Settling for ML3, losing opportunities for greater business leverage.	Make an informed decision on high maturity. Seek first to understand , then determine where it makes sense for the business.

Greatest business benefit can be obtained by implementing the appropriate level of process maturity based on business objectives

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Conduct Appraisals Economically

Common Issues	Recommendations
• Behaviors based on fear of failing ratings drives disproportionate effort on appraisal preparation and dry runs. • Focusing on appraisal ratings and not acting upon improvements. • Expensive appraisals, preparation and evidence collection can burden CMMI adoption. • Appraisals of supplier processes can be cost-prohibitive in acquisition.	• Utilize the entire family of appraisal methods (Class A, B, C) appropriately – right tool for the right purpose. Design an appraisal strategy. • Use appraisals as process improvement opportunities and as a measure of progress. • Conduct efficient appraisals. Minimize creation of evidence repositories and artifacts intended just for appraisals. • Use targeted appraisals to determine supplier processes risks most relevant to a planned acquisition. Look beyond ratings for suitability.

Establish cost-effective strategies for appraisals that align with business needs and measure improvement progress

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Summary –
The Economics of CMMI

Business returns on CMMI investments are dependent largely on underlying principles

- **Objectives** – *alignment with business goals*
- **Sponsorship** – *leadership, commitment, resources*
- **Action** – *improvement velocity for business needs*
- **Engagement** – *participation, project focused*
- **Value** – *performance results to justify investments*
- **Motivation** – *performance improvement vs. ratings*

These factors are under an organization's control

- The Economics of CMMI is a balance sheet for obtaining best value from CMMI
- Implementation strategies govern whether CMMI investments translate into improved business performance, or simply added costs of doing business

Focus on business value to provoke thoughtful dialog and raised expectations for the effective use of CMMI

For More Information….

NDIA CMMI Working Group

http://www.ndia.org/Divisions/Divisions/SystemsEngineering/Pages/CMMI_Working_Group.aspx

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CMMI® for Executives

NDIA Systems Engineering Division

in partnership with:
Software Engineering Institute
Carnegie Mellon University

October 2009

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Topics

- ***Do You Need CMMI?***
- What Is CMMI?
- How Can CMMI Benefit You?
- Who Is Using CMMI?
- How Can You Get Best Value from CMMI?

Do You Need CMMI?

Recognize these symptoms?

- **Missed commitments**
  - Late delivery
  - Last minute crunches
  - Spiraling costs
- **Inadequate management visibility**
  - Too many surprises
- **Quality problems**
  - Too much rework
  - Functions not working correctly
  - Customer complaints
- **Poor morale**
  - Crisis atmosphere
  - High turnover
  - Low productivity

Does the following occur?

- **Poor planning**
  - Plans not realistic or followed
  - Work is not tracked against the plan; plans are not adjusted.
- **Baselines not controlled**
  - Inconsistent requirements
  - Changes not managed
- **Ineffective organizational structure**
  - Functions not well integrated
  - Designs not producible
- **Unable to repeat successes**
  - Staff skills and knowledge not available when needed
  - Dependent on heroic individuals

CMMI Features Help Address Common Issues

CMMI Feature	Description and Examples
Results Oriented	• Industry best practices for project planning and execution • Performance-driven measures for consistent outcomes
Priorities Based on Business Value	• Investments and maturity prioritized to align with business goals • Appraisals relative to model to set direction (“map and compass”)
Customer Focus	• Validation of customer needs across the project life cycle • Manage product/service quality (verification, validation, reviews)
Proactive Management	• Forward-looking measurement, monitoring, risks, corrective action • Management decisions based on plans, data, alternatives
Flexibility	• Adaptable to a variety of businesses (domain, size, products) • Non-prescriptive (required, expected, informative components)
Business Process Integration	• Cross-functional stakeholder involvement • Coordinate various improvement strategies and methods (Lean, Six Sigma, ISO, Agile, etc.)
Continuous Learning	• Standardized assets tailored for project characteristics • Leverage experience and history across projects

Why Focus on Process?

The quality of a system is highly influenced by the quality of the process used to acquire, develop, and maintain it.

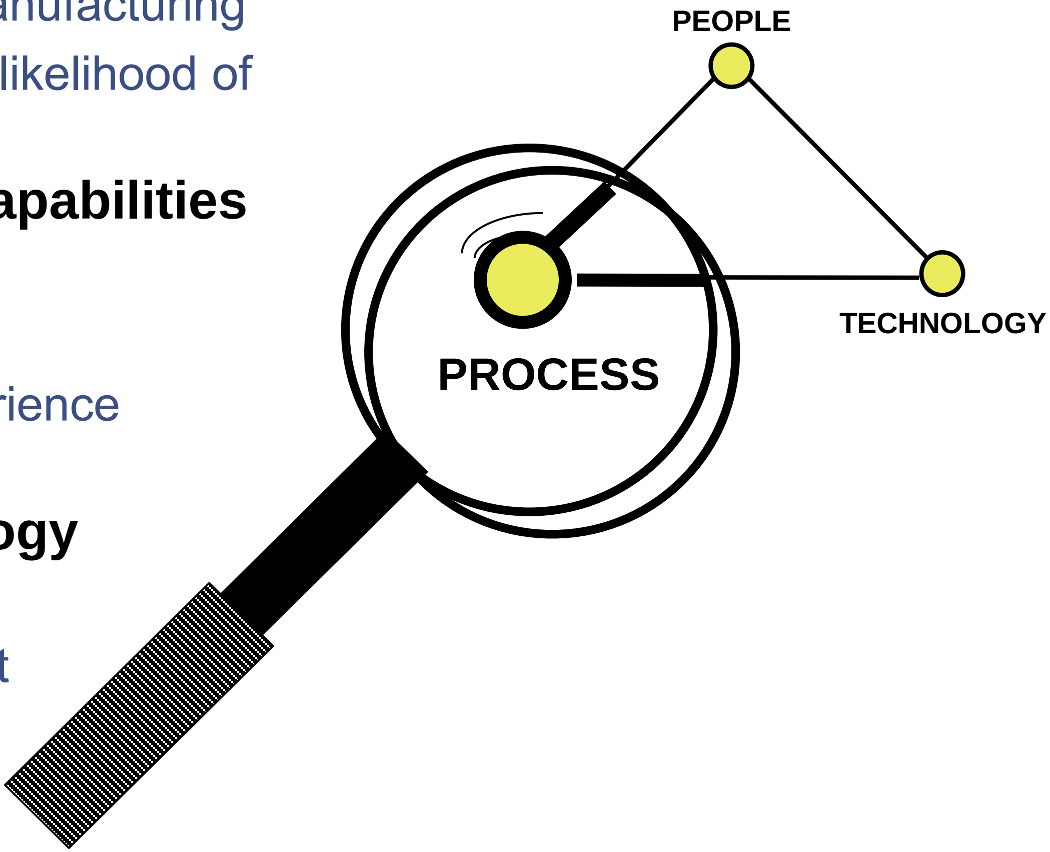
- A long-standing premise in manufacturing
- Good processes increase the likelihood of successful projects

Process can enhance the capabilities of your workforce

- Work smarter, not just harder
- Leverage organizational experience and best practices

Process integrates technology with resources

- Technology, by itself, will most likely not be used effectively



Topics

Do You Need CMMI?

What Is CMMI?

How Can CMMI Benefit You?

Who Is Using CMMI?

How Can You Get Best Value from CMMI?

What Is CMMI?

CMMI is a model representing a collection of best practices proven effective in industry

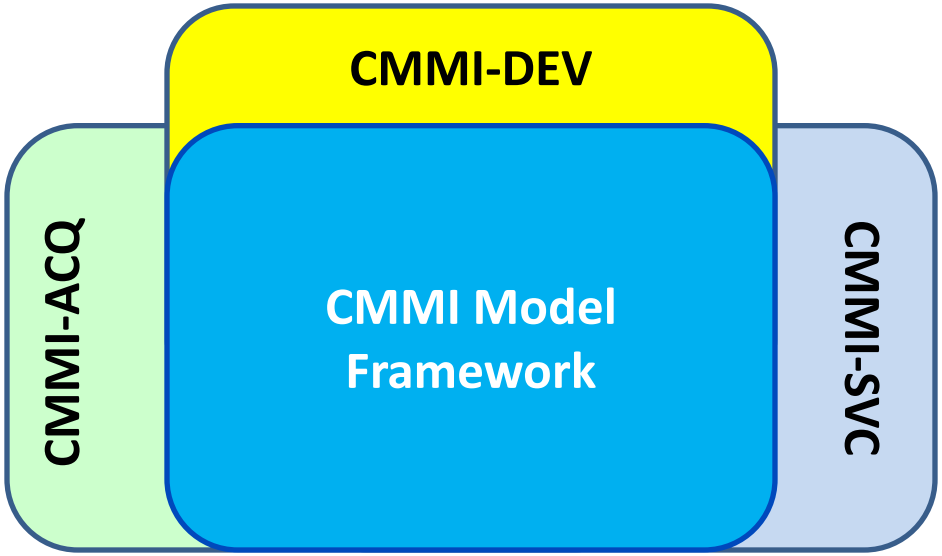
- A framework for developing, improving, and sustaining business performance
- Provides a process focus on work activities
- Developed by industry (commercial and defense), government, academia

CMMI targets three primary environments:

- Development -
  Engineering a product or service
- Services –
  Providing services
- Acquisition –
  Acquiring products and services

The CMMI product suite consists of:

- Models and primers
- Appraisal methods
- Training courses



Capability Maturity Model Integration (CMMI®)

What CMMI Can Add to Your Organization

- Integration of business processes across functions based on industry best practices
- Visible project and organizational measures aligned with achievement of business objectives
- Commonly accepted process framework for inter-company coordination and competitor benchmarking
- Repeat project successes through standardization, tailoring, and capture of organizational process assets
- Avoid project performance issues through process discipline, proactive management, and early stakeholder engagement
- Predictable project performance, with fewer surprises

CMMI Model Overview

Process Areas	**Clusters of related practices, in several categories** •**Project Management** – planning, monitoring, suppliers, risk, … •**Support** – CM, QA, measurement, decision analysis, … •**Process Management** – organizational processes, training, … •**Engineering** – requirements, development, integration, … •**Services –** development, delivery, transition, … •**Acquisition** – requirements, solicitation, agreements, …
Generic Practices	**Enable process management, deployment and improvement** •Plans, monitoring, CM, stakeholders, objective evaluation, …
Goals	**Describes characteristics for implemented processes**
Capability Levels	**Achievement of process improvement within an individual process area**
Maturity Levels	**Achievement of process improvement across a predefined set of process areas (stages)**

CMMI Appraisals

Appraisals compare organization and project processes against CMMI models to determine improvement priorities

Senior management’s role in appraisals:

- Provide sponsorship and resources
- Set appraisal scope and objectives
- Ensure follow-through on appraisal findings and prioritized improvement actions

CMMI provides a family of appraisal methods, with varying intent, confidence levels, data collection, resources needed

- Flexible focus: approach, deployment, institutionalization
- Rigorous benchmark rating method (for maturity levels)
- “Quick look” diagnosis of process weaknesses

Licensed SEI partners deliver SCAMPI^{SM} appraisal services

- http://www.sei.cmu.edu/collaborating/partners/cmmiv1.2/

Note that for internal process improvement, company-developed and other methods can be effective

Standard CMMI®
Appraisal Method for
Process Improvement
(SCAMPI^{SM}) A,
Version 1.2:
Method Definition
Document

SCAMPI Upgrade Team

August 2006

HANDBOOK
CMU/SEI-2006-HB-002

Topics

Do You Need CMMI?

What Is CMMI?

▶ **How Can CMMI Benefit You?**

Who Is Using CMMI?

How Can You Get Best Value from CMMI?

Reasons You Should Adopt CMMI

1. **Increase customer satisfaction**
   - Deliver products and services that satisfy user needs
   - Deliver products and services on time and within budget
2. **Increase probability of capturing new and repeat business**
   - Improved ability to meet commitments
   - Reduces customer-perceived risk of award to your organization
   - Can be a discriminator relative to your competition
3. **Increase profit through improved quality and less rework**
   - Better predict actual costs through repeatable processes
   - Better visibility into projects due to established measures and analysis techniques
   - Significantly reduce the probability of problem programs
   - Reduce costs by capitalizing on organizational infrastructure, processes, training, tools and early/often stakeholder involvement
4. **Increase productivity**
   - More efficiency through implementation of common processes, tools and training
   - Improved productivity by implementing process improvement that are directly aligned key organizational goals and objectives.
   - Higher employee morale and less turnover

Benefits of CMMI-Based Process Improvement

Many companies cite performance benefits from CMMI

- Published in conferences, articles, papers, studies, surveys, reports

SEI collects quantitative measures of CMMI performance improvement

- Technical reports, including:
  - “Performance Results of CMMI-Based Process Improvement” (http://www.sei.cmu.edu/pub/documents/06.reports/pdf/06tr004.pdf)

Performance Category	Median Improvement
Cost	34%
Schedule	50%
Productivity	61%
Quality	48%
Customer Satisfaction	14%
ROI	4.0 : 1

CMU/SEI-2006-TR-004.
Data from 35 organizations.

Topics

Do You Need CMMI?

What Is CMMI?

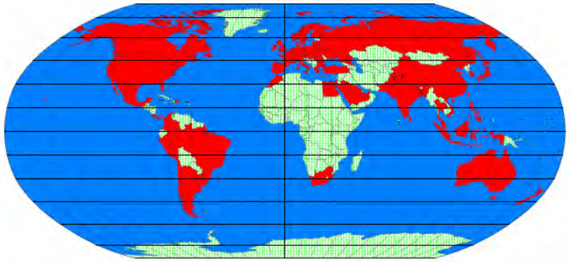
How Can CMMI Benefit You?

▶ **Who Is Using CMMI?**

How Can You Get Best Value from CMMI?

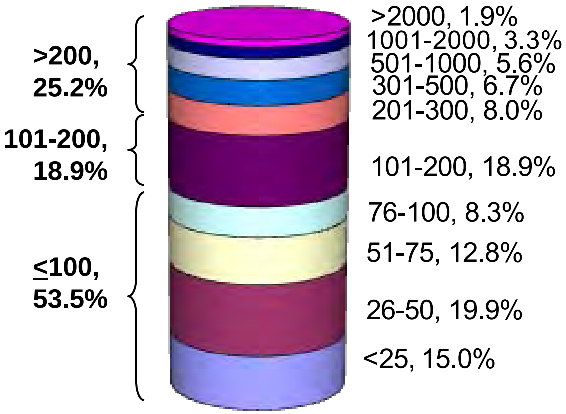
CMMI Adoption

CMMI appraisals are conducted worldwide…



	USA		Non-USA	
	Qty	%	Qty	%
Commercial In-House	354	33.6%	2566	91.3%
Contractor for Military/Government	586	55.7%	183	6.5%
Military/Government Agency	113	10.7%	63	2.2%
	1053	100.0%	2812	100.0%

…in small and large organizations and projects



Organization Size (Employees)
(3863 organizations reporting)

…in a wide range of businesses

Services (70.1%)

- Business Services
- Engineering and Management Services
- Health Services
- Other Services

Manufacturing (16.8%)

- Electronic and Electric Equipt
- Transportation Equipment
- Instruments & Related Products
- Industrial Machinery
- Other Mfg Industries

Other (13.1%)

- Finance, Insurance, Real Estate
- Public Administration/Defense
- Transportation, Communication, Utilities

Based on primary Standard Industrial Classification (SIC) codes reported in CMMI-based appraisals.

…at all levels of process maturity

	Commercial In-House	Contractor for Military/ Government	Military/ Government Agency
No Rating Given	5.7%	8.5%	22.7%
Initial (ML1)	0.8%	1.6%	1.7%
Managed (ML2)	28.0%	31.7%	44.3%
Defined (ML3)	53.6%	46.7%	26.7%
Quantitatively Managed (ML4)	3.1%	1.4%	1.1%
Optimizing (ML5)	8.7%	10.1%	3.4%
	(2920 orgs)	(769 orgs)	(176 orgs)

Source: SEI Process Maturity Profile, Sept 2009.
http://www.sei.cmu.edu/appraisal-program/profile/

Topics

Do You Need CMMI?

What Is CMMI?

How Can CMMI Benefit You?

Who Is Using CMMI?

How Can You Get Best Value from CMMI?

Getting Value from CMMI

Your Role as an Executive

Set the vision and direction for CMMI-based improvement

- Establish measurable objectives
- Be a visible sponsor – set expectations for involvement
- Manage process improvement like a project

Provide resources and support

- Funding, staffing, tools
- Choose the best people to lead - respected opinion leaders

Keep it real

- Maintain relentless focus on business value and program performance
- Involve projects and practitioners for the best ideas
- Hold people accountable
- Track and communicate progress
- Recognize and reward achievement

The Effective Use of CMMI®

Summary of NDIA industry position statements for obtaining best value from CMMI investments*:

1. **Good processes** increase the likelihood of achieving successful project performance
2. **CMMI is a model, not a standard** – adapt CMMI to your business environment, resources, and objectives
3. **Focus on business improvement objectives** – a primary emphasis on achieving levels may not achieve significant benefits and may increase rather than decrease costs
4. **High maturity is a business case** – justify the investment; many organizations find business value in improving processes even at lower CMMI maturity levels
5. **Maturity level ratings are not alone a predictor of project performance** – many other factors can be significant contributors
6. **Don't specify maturity levels in acquisitions** – use CMMI to probe supplier capability and process execution risks
7. **Greatest benefits of appraisals are from improvements, not evidence or ratings -** disproportionate effort on appraisal preparation risk can diminish business returns

"The Effective Use of CMMI®", NDIA Systems Engineering Division, June 2009.
http://www.ndia.org/Divisions/Divisions/SystemsEngineering/Pages/CMMI_Working_Group.aspx

Want to Learn More about CMMI?

SEI CMMI web pages:

- What is CMMI?
- Conferences
- FAQs
- Models
- Performance Results
- Background Information
- Adoption
- Appraisals
- Contacts

CMMI focus topics, guidance, technical reports:

- CMMI and Agile
- CMMI in Small Settings
- Earned Value Management
- CMMI and Six Sigma
- CMMI in Acquisition
- SW-Only Organizations
- Product Line Practices
- Interpretive Guidance
- Operations Organizations

Training:

- Process Improvement
- CMMI Level 2-3 for Practitioners
- Introduction to CMMI
- Understanding High Maturity
- Intermediate Concepts of CMMI
- SCAMPI Appraiser training

User Networks

- SEI Partner Network
- Consultants
- Newsgroups, Blogs, Wikis
- Conferences
- Books, Periodicals, Articles
- Asset Repositories

Questions? Comments?

Web: http://www.sei.cmu.edu/cmmi

Email: cmmi-comments@sei.cmu.edu

SEI Customer Relations: (412) 268-5800, customer-relations@sei.cmu.edu

SOFTWARE ASSURANCE FORUM
BUILDING SECURITY IN

Assurance for CMMI®: A Toolbox for Multiple Cyber Challenges

9th Annual CMMI® Technology Conference
17 November 2009

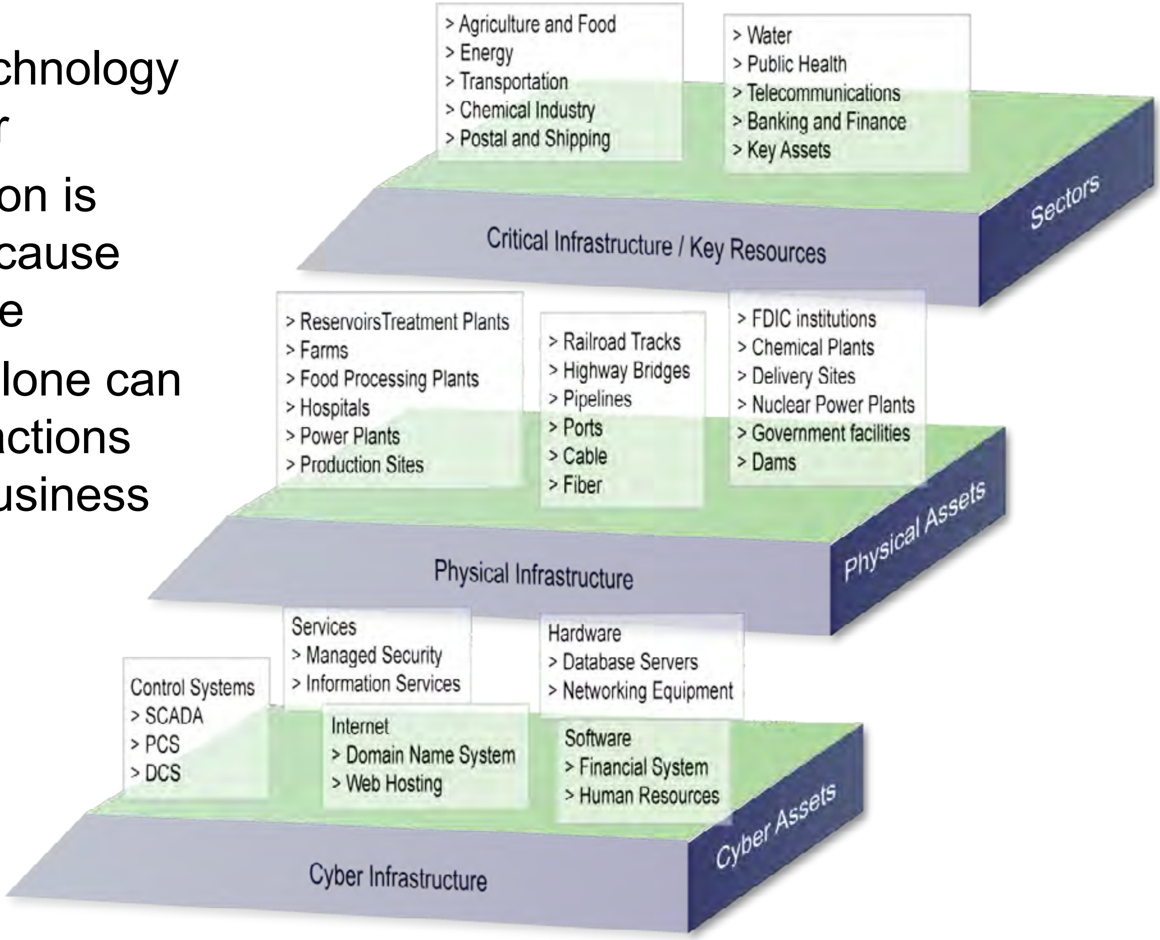
Michele Moss, Booz Allen Hamilton
Debbie McCoy, Booz Allen Hamilton

Agenda

- Setting the Stage
- Assurance for CMMI®
- Code Vulnerabilities
- Global Supply Chain
- Organizational Cyberspace
- Next Steps

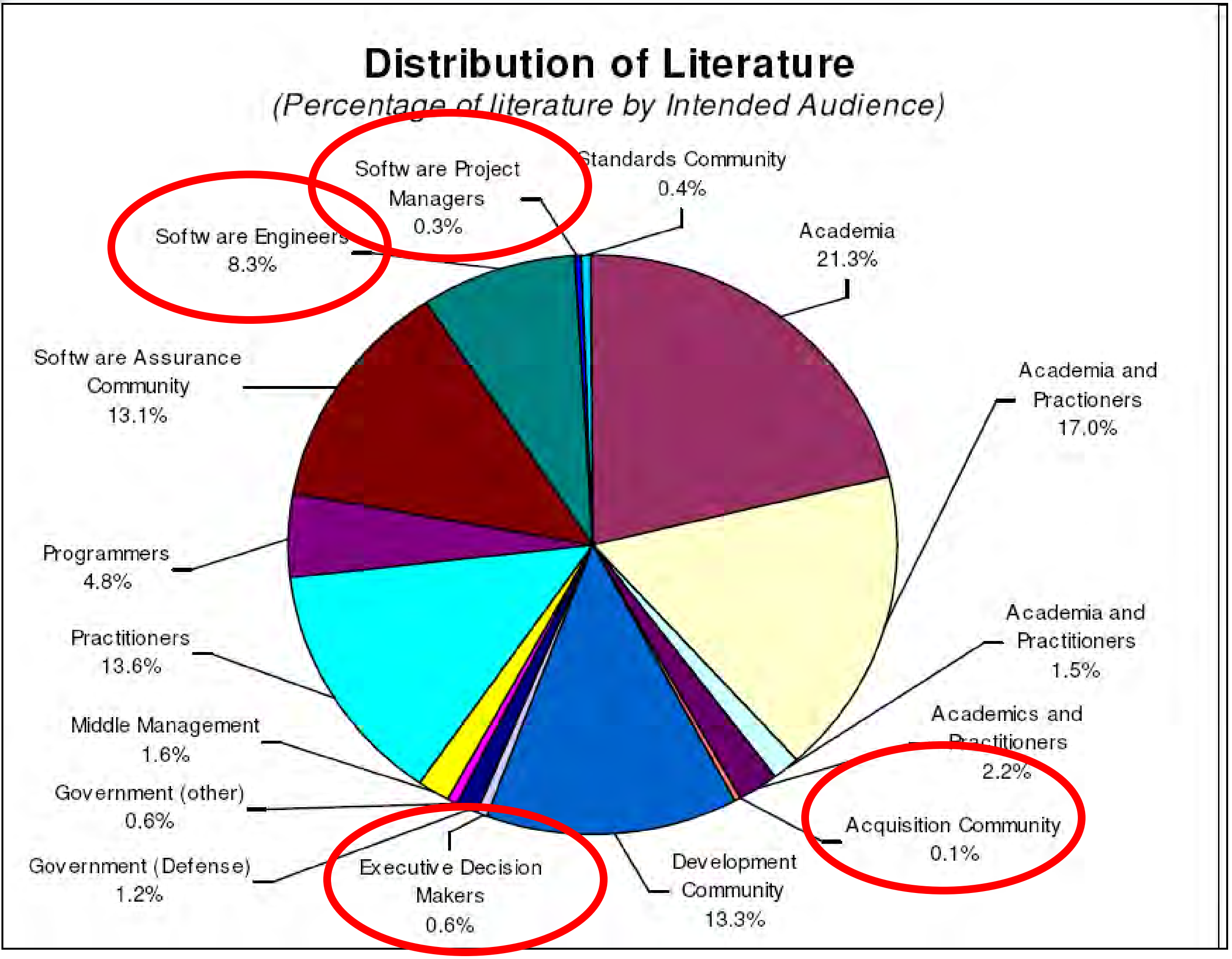
Today's Reality Requires Increased Confidence In Our IT Products and Services

- Dependencies on technology are greater then ever
- Possibility of disruption is greater than ever because software is vulnerable
- Loss of confidence alone can lead to stakeholder actions that disrupt critical business activities



Adapted from: Jarzombek, Mitigating Risks to the Enterprise through Development and Acquisition, SEPG 2009

Gaps Exist In The Intended Audience For SwA Literature

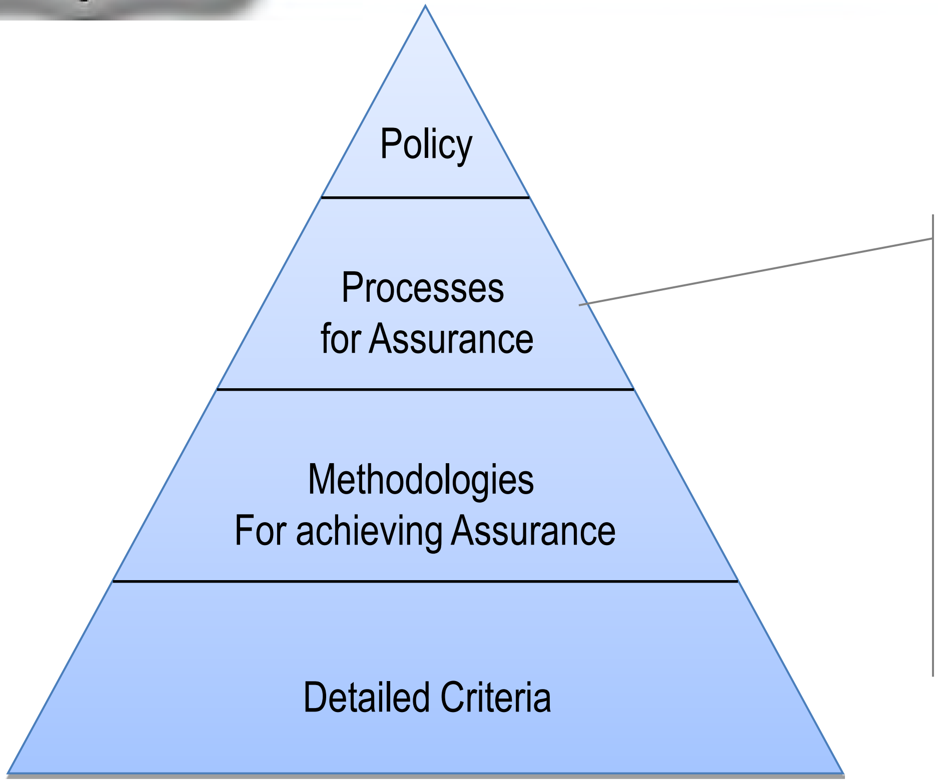


June 2009 SwA Working Group Session - Courtesy of Jeff Inglesbe

Agenda

- Setting the Stage
- Assurance for CMMI®
- Code Vulnerabilities
- Global Supply Chain
- Organizational Cyberspace
- Next Steps

Assurance for CMMI® - A Place To Start

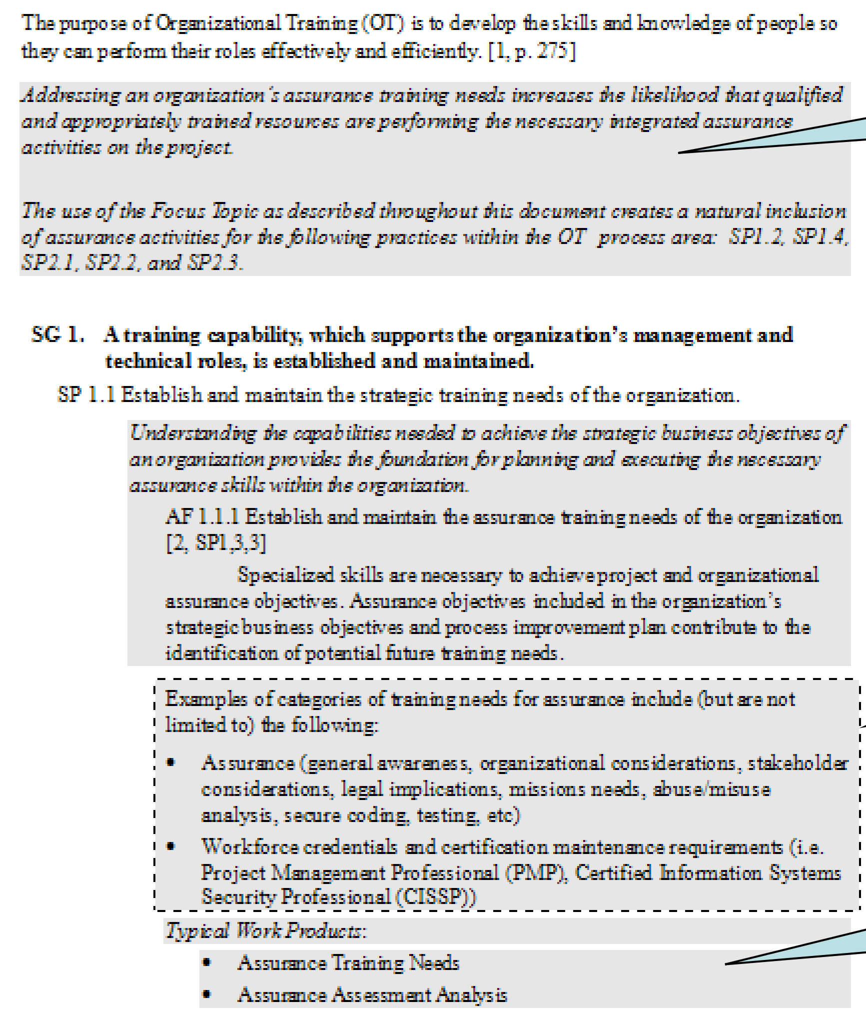


Project leadership and team members need to know where and how to contribute

Focus Topic: Assurance for CMMI® defines the Assurance Thread for Implementation and Improvement of Assurance Practices

https://buildsecurityin.us-cert.gov/swa/procresrc.html

Assurance Focus – Organizational Training



The purpose of Organizational Training (OT) is to develop the skills and knowledge of people so they can perform their roles effectively and efficiently. [1, p. 275]

Addressing an organization's assurance training needs increases the likelihood that qualified and appropriately trained resources are performing the necessary integrated assurance activities on the project.

The use of the Focus Topic as described throughout this document creates a natural inclusion of assurance activities for the following practices within the OT process area: SP1.2, SP1.4, SP2.1, SP2.2, and SP2.3.

SG 1. A training capability, which supports the organization's management and technical roles, is established and maintained.

SP 1.1 Establish and maintain the strategic training needs of the organization.

Understanding the capabilities needed to achieve the strategic business objectives of an organization provides the foundation for planning and executing the necessary assurance skills within the organization.

AF 1.1.1 Establish and maintain the assurance training needs of the organization [2, SP1.3,3]

Specialized skills are necessary to achieve project and organizational assurance objectives. Assurance objectives included in the organization's strategic business objectives and process improvement plan contribute to the identification of potential future training needs.

Examples of categories of training needs for assurance include (but are not limited to) the following:

- Assurance (general awareness, organizational considerations, stakeholder considerations, legal implications, missions needs, abuse/misuse analysis, secure coding, testing, etc)
- Workforce credentials and certification maintenance requirements (i.e. Project Management Professional (PMP), Certified Information Systems Security Professional (CISSP))

Typical Work Products:

- Assurance Training Needs
- Assurance Assessment Analysis

Context of Assurance for the PA

Assurance practice aligned with existing CMMI® Specific practice

Supporting examples, sub practices, etc that clarify the Assurance practice

Typical Work Products

Agenda

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- Code Vulnerabilities
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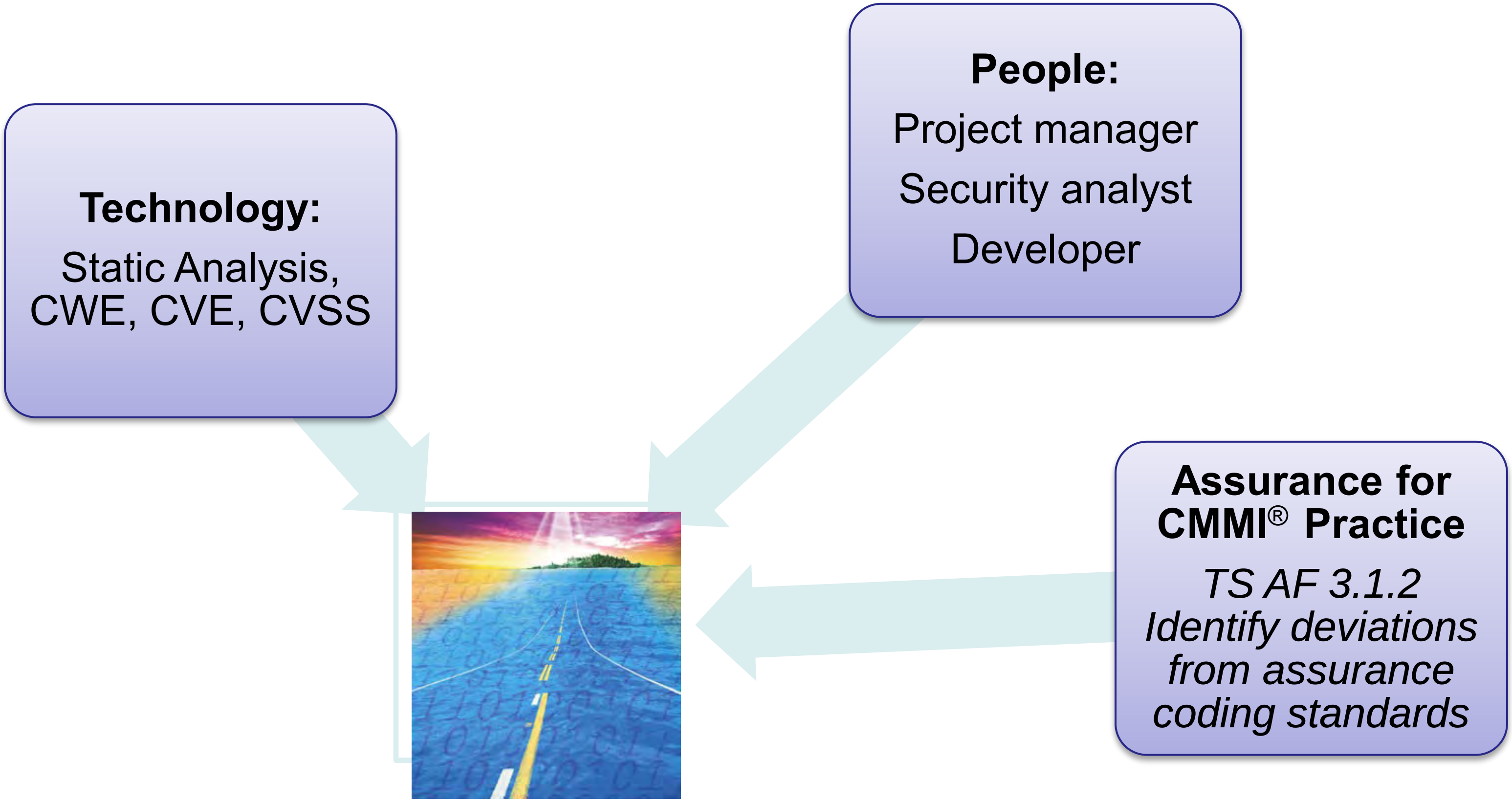
Assurance Risks and Software Quality

- 64% of the vulnerabilities in NVD in 2004 are due to programming errors*
  - 51% of those due to classic errors like buffer overflows, cross-site-scripting, injection flaws*
- Probability of serious vulnerabilities is 52.3% (Capers Jones Overview of the US software Industry, April 2008)
- 27% of development effort is devoted to defect removal, repair, and rework (Capers Jones Overview of the US software Industry, April 2008)
- 67% percent of the attacks in 2007 were "for profit" motivated, ideological hacking came second (Web Application Security Consortium Annual 2007 Report)

** courtesy of Robert Seacord*

Secure Coding Roadmap



Technology:

Static Analysis,
CWE, CVE, CVSS

People:

Project manager

Security analyst

Developer

Assurance for CMMI® Practice

TS AF 3.1.2 Identify deviations from assurance coding standards

Secure Coding Practice Implementation

SDLC Activity	Assurance for CMMI	BSIMM	TSP Secure *
Code Review Checklists	*OPD AF 1.1.1 Establish and maintain organizational processes to achieve the assurance business objectives.* *TS AF 3.1.2 Identify deviations from assurance coding standards.*	SR Level 1: Provide easily accessible security standards and (compliance-driven) requirements	CERT SCI provides language specific secure coding guidelines for C, C++, and Java. To claim compliance with a standard, software developers must be able to produce on request documentation as to which systematic and specific deviations have been permitted during development.
Static Analysis Tools	*IPM AF 1.3.1 Establish and maintain assurance of the project's work environment based on the organization's work environment standards.*	CR Level 2: Enforce standards through mandatory automated code review and centralized reporting CR Level 3: Build an automated code review factory with tailored rules	Automatable guidelines are identified by WG14/N1393. Remaining guidelines are enforced through manual inspection. The CERT Source Code Analysis Laboratory certifies conformance to standards.

** courtesy of Robert Seacord*

Agenda

- Setting the Stage
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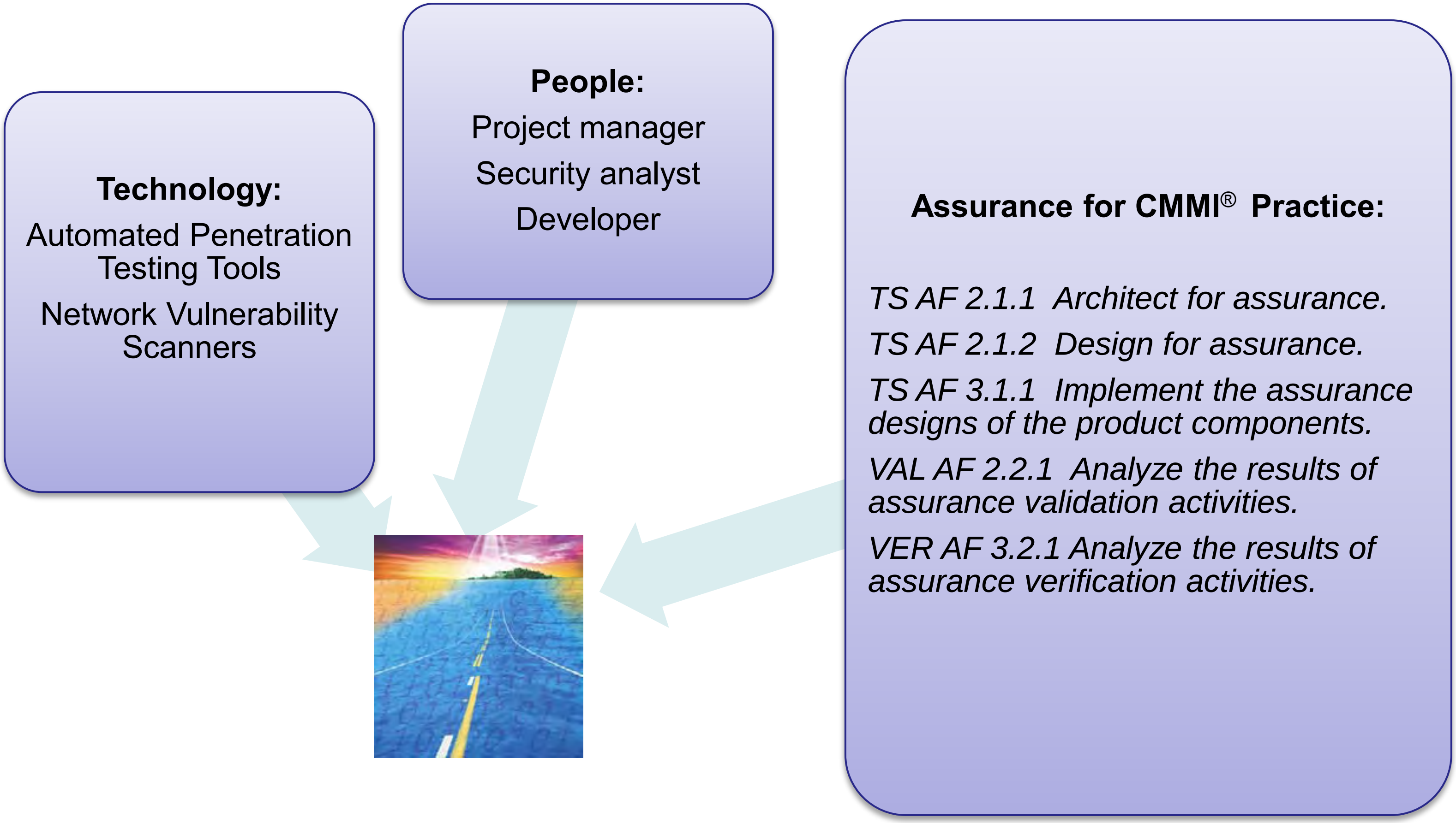
IT Risks from Supply Chain

- Deliberately embedded malicious functionality
- Theft to intellectual property
- Fake or counterfeit products
- Exploitable IT/software unintentionally produced by suppliers with poor security practices
- Lack of developer and acquirer awareness of associated risks

Increased Vigilance Is Critical To Reducing IT Risks From The Supply Chain

Adopted from Marcus H. Sachs, Verizon, "Supply Chain Risk Management: Can we Secure the IT Supply Chain in the Age of Globalization?" Software Assurance Forum, 15 Oct 2008

Supply Chain Integrity Roadmap



Technology:

Automated Penetration Testing Tools

Network Vulnerability Scanners

People:

Project manager

Security analyst

Developer

Assurance for CMMI® Practice:

TS AF 2.1.1 Architect for assurance.

TS AF 2.1.2 Design for assurance.

TS AF 3.1.1 Implement the assurance designs of the product components.

VAL AF 2.2.1 Analyze the results of assurance validation activities.

VER AF 3.2.1 Analyze the results of assurance verification activities.

Software Supply Chain Integrity

- **Established Design Principles**
  - **Chain of Custody: The confidence that** each change and handoff made during the source code’s lifetime is authorized, transparent and verifiable.
  - **Least Privilege Access: Personnel can** access critical data with only the privileges needed to do their jobs.
  - **Separation of Duties: Personnel cannot** unilaterally change data, nor unilaterally control the development process.
  - **Tamper Resistance and Evidence:** Attempts to tamper are obstructed, and when they occur they are evident and reversible.
  - **Persistent Protection: Critical data is** protected in ways that remain effective even if removed from the development location.
  - **Compliance Management: The success** of the protections can be continually and independently confirmed.
  - **Code Testing and Verification: Methods** for code inspection are applied and suspicious code is detected.

The Software Supply Chain Integrity Framework Defining Risks and Responsibilities for Securing Software in the Global Supply Chain http://www.safecode.org/publications/SAFECode_Supply_Chain0709.pdf

Agenda

- Setting the Stage
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- Global Supply Chain
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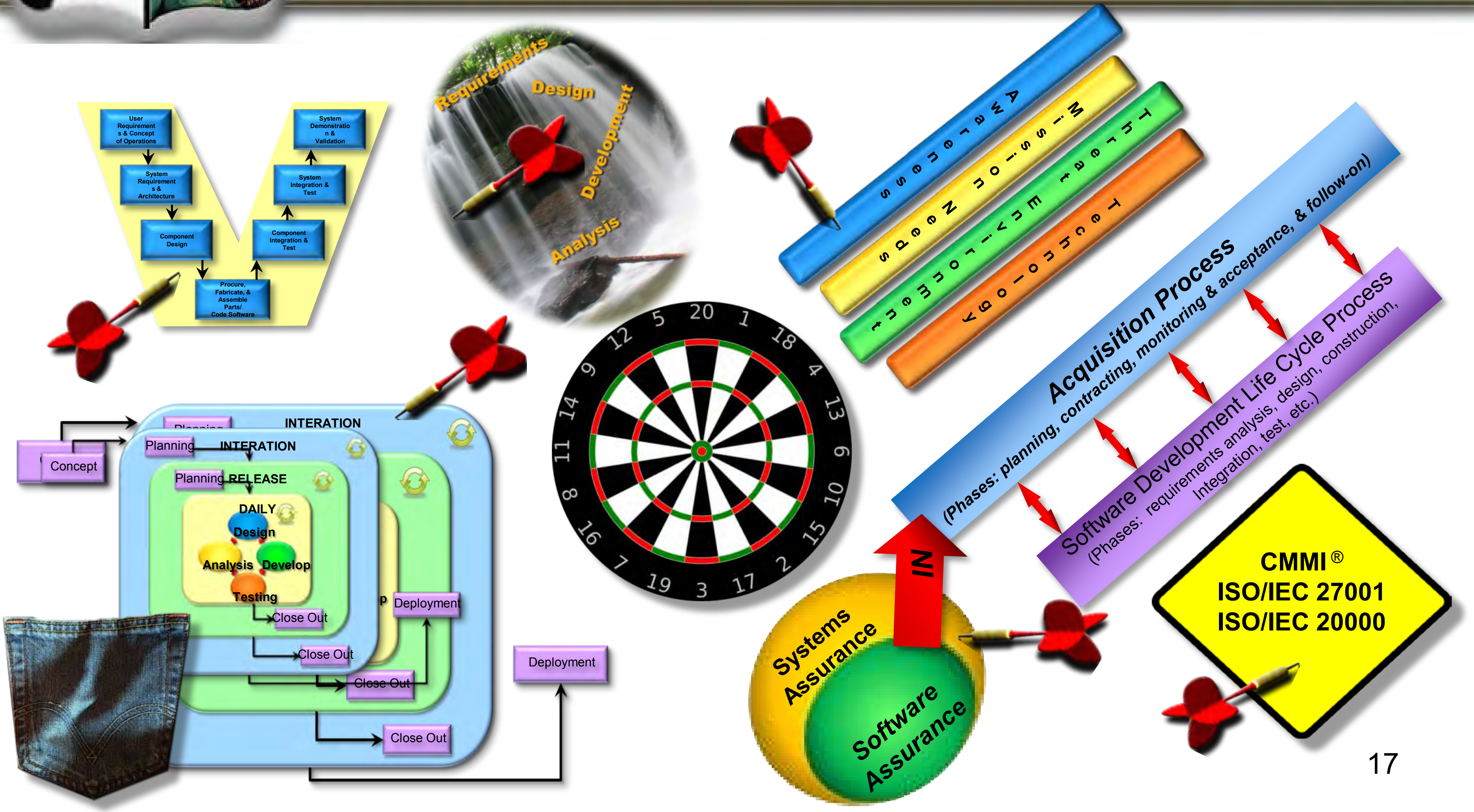
Stovepiped Assurance Efforts Miss The Dartboard



Organizational Cyberspace

Technology:

Process, Measurement, and Artifact Repositories

Social Media

People:

Executive Sponsors

Project Managers

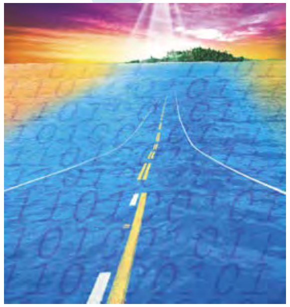
Project Teams

Assurance for CMMI® Practice

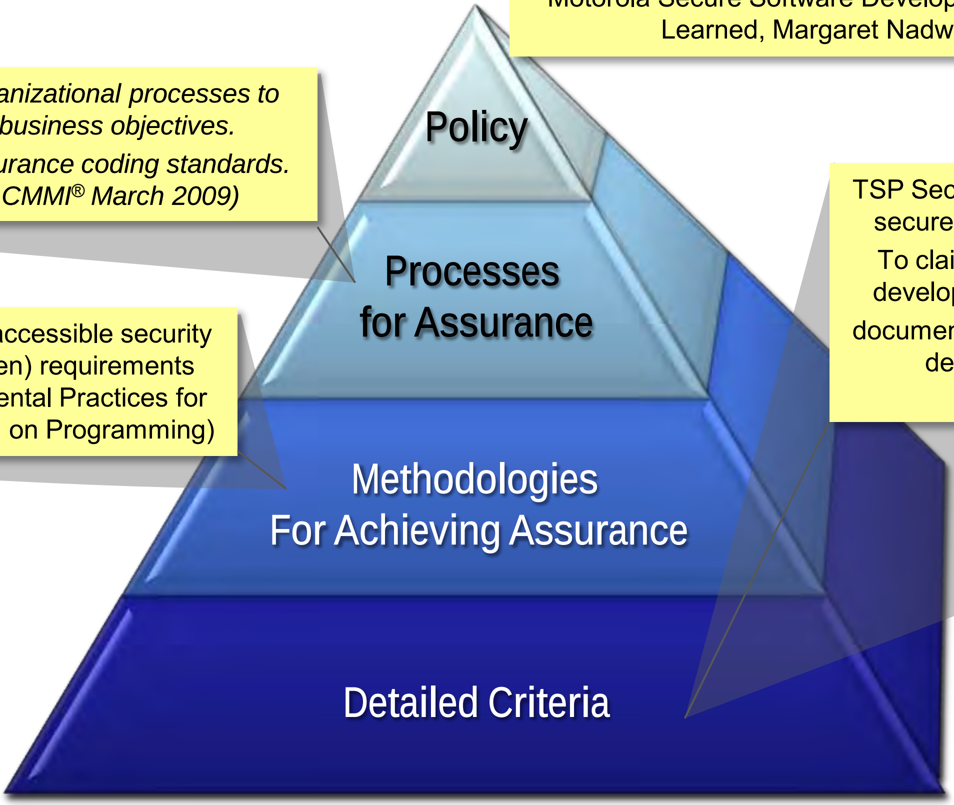
OPF AF 1.1.1 Establish and maintain the description of the assurance context and objectives for the organization.

OPD AF 1.1.1 Establish and maintain organizational processes to achieve the assurance business objectives.

OT AF 1.1.1 Establish and maintain the strategic assurance training needs of the organization



Assurance for CMMI® Provides the Framework to Connect Development Activities to Assurance Goals



"It is the policy of Motorola to offer security solutions designed to protect the confidentiality, integrity and availability of information and other assets appropriate to their value to Motorola, and to service providers (and their customers) using Motorola products." (source: Motorola Secure Software Development Model (MSSDM) Lessons Learned, Margaret Nadworny, August 10, 2007)

Establish and maintain organizational processes to achieve the assurance business objectives.

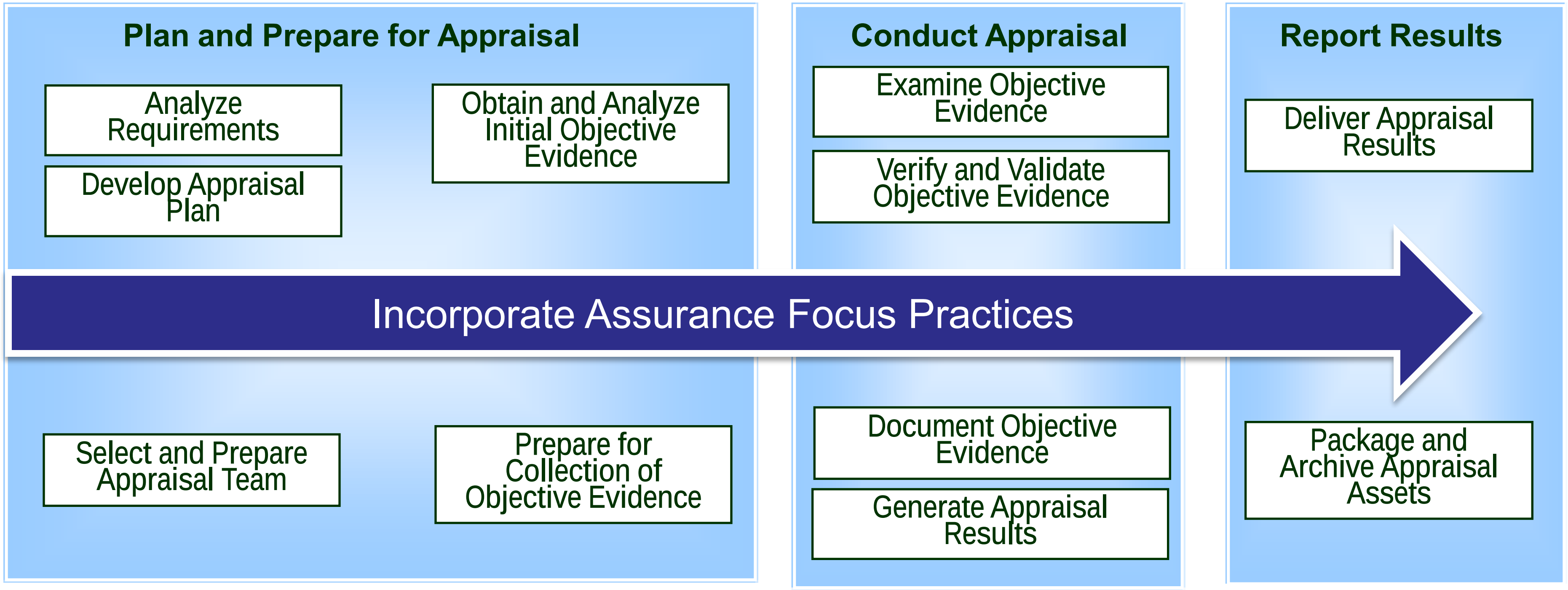
Identify deviations from assurance coding standards. (Source: Assurance for CMMI® March 2009)

TSP Secure CERT SCI provides language specific secure coding guidelines for C, C++, and Java.

To claim compliance with a standard, software developers must be able to produce on request documentation as to which systematic and specific deviations have been permitted during development.

BSIMSR Level 1: Provide easily accessible security standards and (compliance-driven) requirements Safecode Whitepaper - Fundamental Practices for Secure SW Development (section on Programming)

SCAMPI^{SM} Is A Tool To Identify Assurance Process Institutionalization Risks



Plan and Prepare for Appraisal

Analyze Requirements

Develop Appraisal Plan

Obtain and Analyze Initial Objective Evidence

Select and Prepare Appraisal Team

Prepare for Collection of Objective Evidence

Conduct Appraisal

Examine Objective Evidence

Verify and Validate Objective Evidence

Document Objective Evidence

Generate Appraisal Results

Report Results

Deliver Appraisal Results

Package and Archive Appraisal Assets

Incorporate Assurance Focus Practices

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

Agenda

- Setting the Stage
- Assurance for CMMI®
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- Next Steps

What can you do?

- *Use "Draft Practices" to identify gaps in your assurance practices* *https://buildsecurityin.us-cert.gov/swa/procresrc.html*
- Measure and improve your *assurance practices*
- *Share your lessons learned (swawg-process @ cert.org)*

References for Integrating Assurance

- DHS Software Assurance Working Groups
  - https://buildsecurityin.us-cert.gov
  - http://www.us-cert.gov/swa/
- IATAC /DACS
  - http://iac.dtic/iatac
  - https://www.thedacs.com
  - Enhancing the Development Life Cycle to Produce Secure Software
  - State of the Art Report on Software Security Assurance
- NIST
  - http://csrc.nist.gov/
- NDIA
  - Systems Engineering Division
  - System Assurance Guidebook
- SANS
  - http://www.sans.org/
- International Organization for Standardization (ISO)
  - http://www.iso.org
- Software Security Engineering
  - http://www.softwaresecurityengineering.com/
  - http://www.amazon.com/Software-Security-Engineering-Project-Managers/dp/032150917X

Contact Information

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  Co-Chair DHS SwA Processes and Practices Working Group
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- Debbie McCoy, SCAMPI^{SM} B/C Team Lead, Introduction to CMMI® Instructor
  Booz Allen Hamilton
  mccoy_debbie@bah.com

9th Annual National Defense Industrial Association
CMMI Technology Conference and User Group
November 17, 2009
Denver, Colorado, USA

Leading Edge™
PROCESS CONSULTANTS LLC

CREATIVELY APPLYING
CMMI-SVC
IN A VERY SMALL CONSULTING FIRM

Bill Smith, CEO
Leading Edge Process Consultants LLC
www.CmmiTraining.com

Objective of This Presentation

To provide a glimpse into how one very small company is, little-by-little, adopting key principles from the CMMI for Services (CMMI-SVC) to dramatically improve its bottom line.

Agenda

- Background
- Making the Decision
- Improving Our *Marketing*
- Improving Our *Training Delivery*
- The Future
- In Conclusion

Who Are We, and Why Do You Care? (Or Not.)

Background

Who Are We?

- Leading Edge Process Consultants is a well-established, world-class provider of process improvement consulting, appraisal, and training services.

A slight exaggeration

Depends on the day, really

Eventually… *Dec. 2007!* *Some day…* *BINGO!*

Award-Winning CMMI Training

About “Public” Training…

To appreciate this presentation, you need to understand why we put so much time and energy into public training

(other than the fact that I personally love it)

HIGH RISK,
HIGH REWARD

If you don’t get it right…

…you could lose
your shirt!

If you do get it right…

…you don’t have to eat *this*
every night

Net income from 1 public training class can be equivalent to 3 to 4 private classes. Alternatively, you may not break even.

Growth of Our CMMI Training Business

"Cinderella story… outta nowhere…" [Caddyshack, 1980]

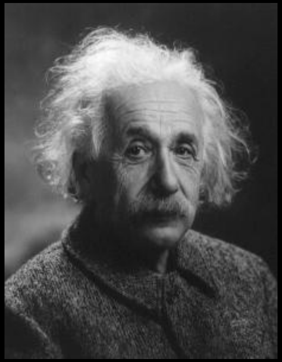
	2007	2008	2009
Google rank - "cmmi training"	NA	Fell asleep before finding	**#3** (after 2 SEI pages)
# Intro to CMMI students taught	0	89	**223** (projected) (191 thru 11/6)
Average public class attendance	NA	11.3	**25.4*** (thru 11/6)
Net income	Negative	x	**15x** (projected) (10x thru 11/6)
% of income from CMMI classes	NA	100% (CMMI-DEV)	100% (CMMI-DEV, -SVC)

* *Includes three space-constrained "sell-outs"*

But… How Are We Doing It?

A BIT

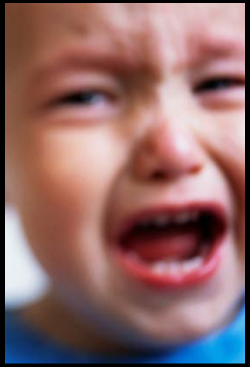
“Just try harder”?



Insanity: doing the same thing over and over again and expecting different results.
- A. Einstein

SOME

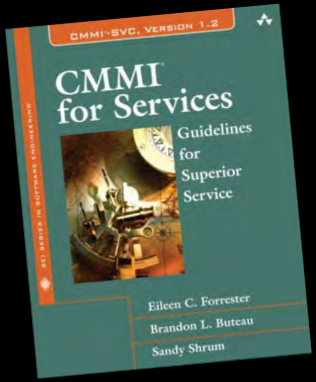
Natural business growth?



In *this* economy?

YES !

Get better?



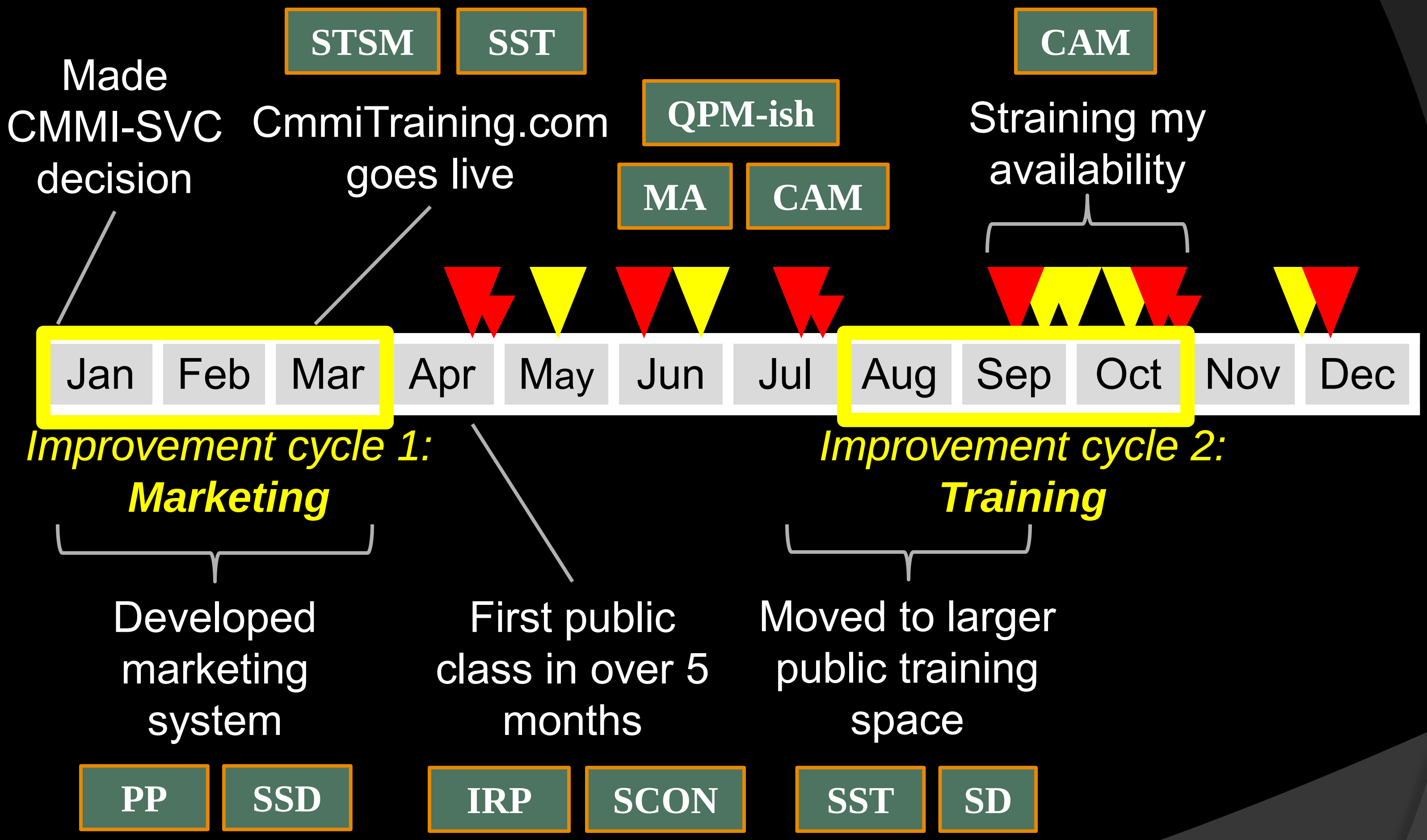
CMMI-SVC, VERSION 1.2

CMMI for Services
Guidelines for Superior Service

Eileen C. Forrester
Brandon L. Buteau
Sandy Shrum

Using the CMMI for Services as a guide.

2009: The Year in Review



Made CMMI-SVC decision

STSM **SST**

CmmiTraining.com goes live

QPM-ish

MA **CAM**

CAM

Straining my availability

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

Improvement cycle 1: ***Marketing***

Improvement cycle 2: ***Training***

Developed marketing system

PP **SSD**

First public class in over 5 months

IRP **SCON**

Moved to larger public training space

SST **SD**

CMMI-SVC Process Areas appearing on this slide are representative samples; elements of other PAs have also been addressed

▼ Private Intro to CMMI

▼ Public Intro to CMMI

▼ Public SVC Supplement

“CMMI in a One-Person Company? Are You Crazy?*”

Making the Decision

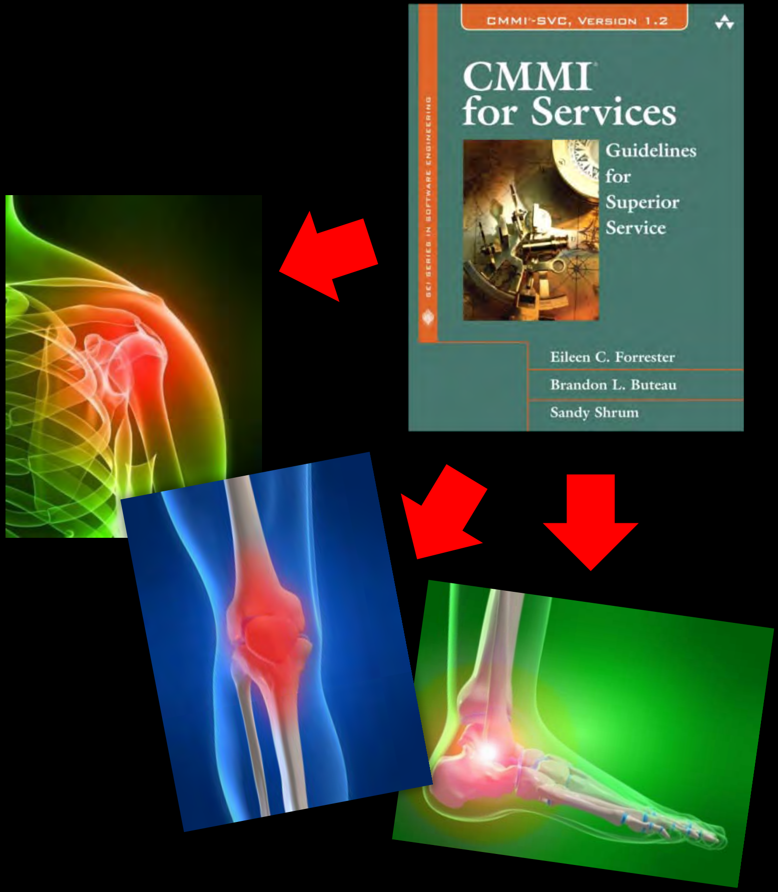
**Those who know me already know the answer.*

Making the Business Decision (1)

- Shouldn't we practice what we preach – the CMMI?
- But… we need to focus on *making money right now*
- Time/resources available to dedicate to long-term improvement: *zip, zilch, nada, none*

Our process improvement budget.

Making the Business Decision (2)



CMMI-SVC, VERSION 1.2

SEI SERIES IN SOFTWARE ENGINEERING

CMMI for Services

Guidelines for Superior Service

Eileen C. Forrester
Brandon L. Buteau
Sandy Shrum

"Tell me where it hurts…"

- No money, no problem!
  1. Pick an organizational pain point
  2. Address the pain, using guidance from CMMI-SVC as appropriate
  3. Repeat steps 1 and 2 as needed
- Focus on near-term tasks for *just-in-time process improvement*
- If it ever looks like CMMI-SVC = wrong business decision, then simply ***STOP***

MINIMAL RISK

Making the Business Decision (3)

CMMI for Services Diary

"We're adopting the CMMI for Services to become more efficient and more effective... so we can do things better, cheaper, or faster... for competitive advantage.

"Another way of saying this -- and let this sink in -- is that we're doing it for legitimate improvement, not for a 'level rating'."

[Jan. 16, 2009]

From our blog
(www.CmmiForServicesDiary.com)

Desired location of competition *(Dec 2009)*

Actual location of competition *(Jan 2009)*

Pinpointing Our Pain (1)

Training?

High levels of student satisfaction

Marketing?

Inadequate number of students to cover costs of public classes

BTW, a trip through the CMMI glossary (service, product, end user, etc.) confirms that marketing may indeed be considered a "service."

Pinpointing Our Pain (2)

- Key marketing issues:
  - Ad hoc, reactive
  - **$25,541** on Google Ads in 2008:
    money pit?
  - Web site not sufficiently…
    compelling
  - Personally, still a relative “unknown”
  - *I could go on…*

Not Hard to Do, Because Last Year It Stunk

Improving Our Marketing

Creating a *Marketing* Service System

- Researched marketing practices
- Identified components and subcomponents of my target service system
- Identified current and desired states of each
- Estimated development effort
- Drafted implementation schedule
- Began developing components

Top Level Components

1. Me
2. My Websites
3. My Blogs
4. Social Networking
5. E-Mail Marketing
6. Press Releases
7. Videocasts
8. Publications
9. Speaking/Networking
10. Directories
11. Search Advertising
12. Search Engine Optimization
13. Viral Marketing
14. Link Campaigning

SERVICE SYSTEM DEVELOPMENT (SSD)

PROJECT PLANNING (PP)

Developing CmmiTraining.com (1)

(**Marketing Service System Component 2.2**)

The goal: "Increase my conversion rate (ratio of website visitors to registered students)"
[from *Student Attraction Strategy 2009*, 1/5/2009]

Key features:

- Course catalog and schedule*
- Online student registration**
- Secure credit card transactions**
- Differentiators (why us?)*
- Search engine optimized*
- Google ad-optimized*

About Us | Courses | Schedule | Locations | Enrollment | Random

View All Classes

CMMI Diary
Practicing What We Preach

SEI INTRODUCTION TO CMMI v1.2 (CMMI-DEV)

Seats Remaining 14

Upcoming Classes

SEI Introduction to CMMI

Dec 8-10, 2009
Reston, VA

Mar 9-11, 2010
Reston, VA

see all

SEI Services Supplement for CMMI

Mar 12, 2010
Reston, VA

Welcome to Class!

"I loved the creativity, humor, instructor stories, inventive and unique activities... I will actually retain the information long-term..."
(See this entire student comment from our Sept. 15-17 class.)

Join nationally-recognized speaker Bill Smith for this engaging delivery of the SEI Introduction to CMMI at our spacious new training center near Washington, DC.

Bill has averaged a phenomenal 4.9 feedback rating while teaching this course to over 600 students, including onsite deliveries at AT&T, General

The Top 10 Reasons to Choose Us

1. **Dynamic instructor.** Bill Smith – noted speaker, devoted blogger, and award-winning trainer. Bill makes the CMMI real, with his practical observations and engaging delivery.

2. **Guaranteed low price.** Our $1190 price is up to 30% off the competition's standard tuition. Find a lower price? We'll match it. (Some restrictions apply.)

3. **We love travelers.** Over 50% of our students come from out-of-town. We make it easy on visitors, with discounted room blocks at local hotels and free shuttles to and from our training center.

4. **Our training center rocks!** Literally. Starting with the foot-stompin' music you hear as you walk into class. We'll keep you energized with food, fun, and more.

** new or improved versus prior website*

*** by Amplify Software, www.amplifyllc.com*

Developing CmmiTraining.com (2)

Old, money-sucking website

Spiffy new money-making website

Classroom of eager CMMI students

Feb	Mar	Apr

2/7/09

3/9/09

4/23-4/25/09

30-day web development "sprint"

6 weeks promo time

Developing CmmiTraining.com (3)

PROJECT PLANNING

SP 1.2 Establish Estimates of Work Product and Task Attributes

SP 1.3 Define Project Lifecycle

SP 3.2 Reconcile Work and Resource Levels

Critical Success Factors

- Stop “working” so much!
  - Suspended class deliveries to focus on this
- Agile development methodology
- Accurate effort estimate, based on
  - Size (# web pages)
  - Complexity (of each page)
  - Reuse (existing website)
- A Validation Team!
  - 3 former students, 2 business associates

SERVICE SYSTEM DEVELOPMENT

SP 1.1 Develop Stakeholder Requirements

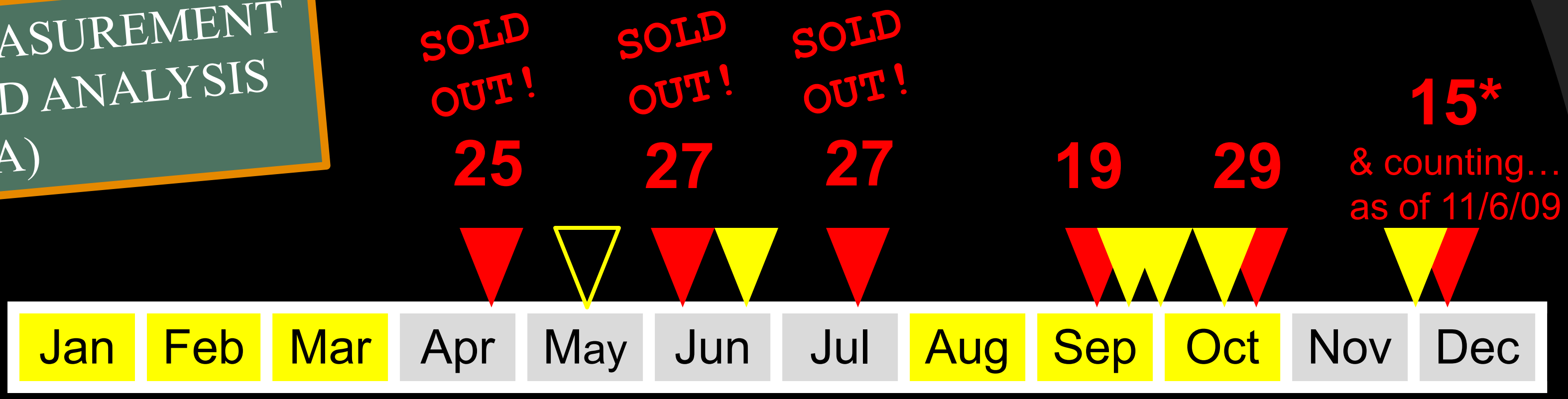
SP 2.2 Develop the Design

SP 3.4 Validate the Service System

They rocked!

Measuring Our Marketing Results

MEASUREMENT AND ANALYSIS (MA)



2009 vs. 2008

Google Ad Dollars	-26%
Click-thru Rate	+260%
Avg Time on Website	+44%
Public Class Size	+61%

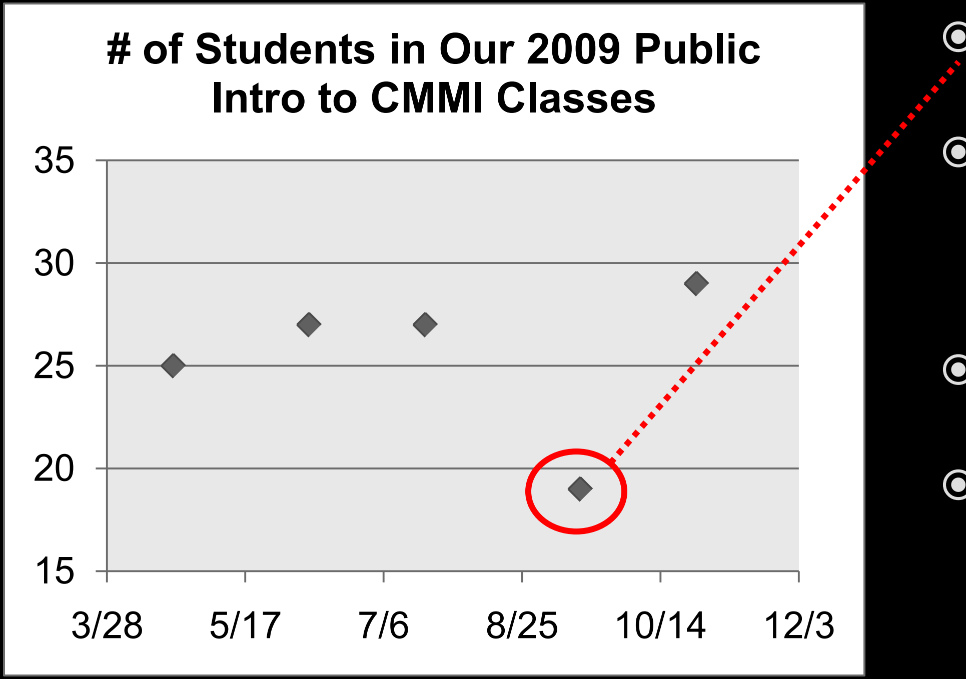
Given our corporate vision, this may have been the difference between staying in business… and not.

Comparison of 4 weeks prior to 10/27-10/29/09 and 11/11-11/13/08 classes. Unable to compare all of 2008 vs. all of 2009 because not all of this data was captured in 2008.

Sorry, percentages only! The actual data is proprietary.

▼ Private Intro to CMMI, 2009 Mktg
▼ Public Intro to CMMI
▽ Other Private Intro to CMMI

Moving Toward Quantitative Management



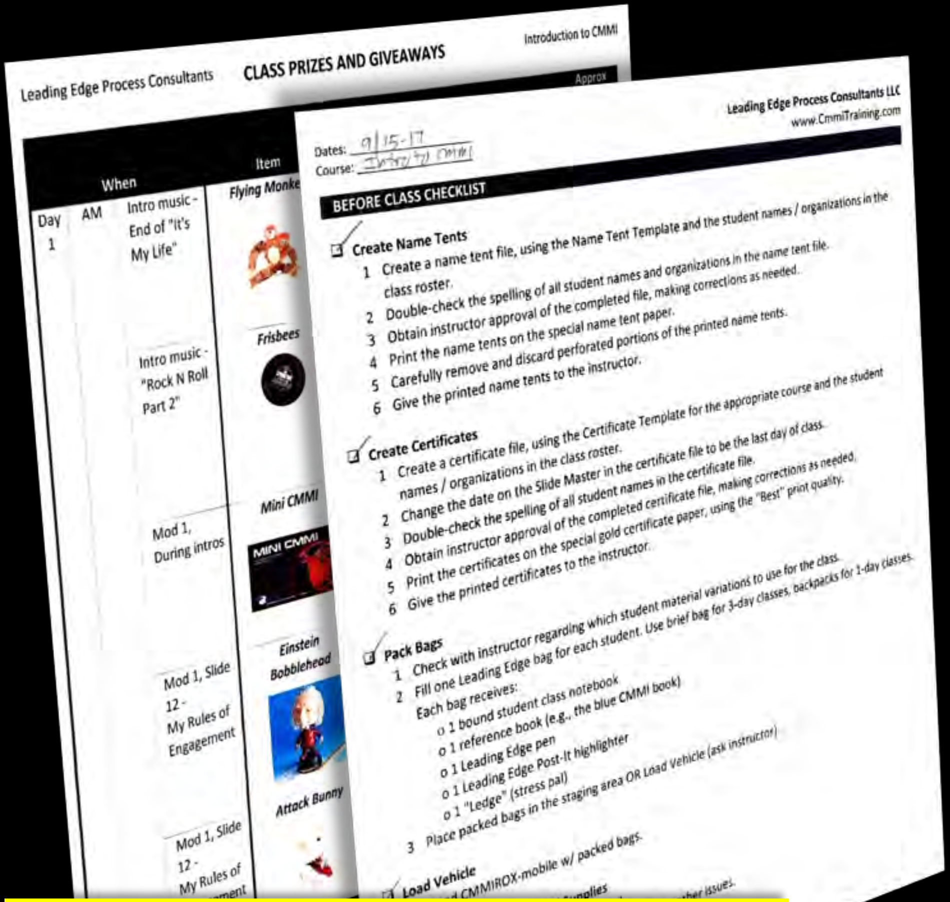
- Random variation, or “special cause”?
- If special cause, eliminating it could be worth tens of thousands of dollars
- I have a hunch, but lack the correct data to verify
- Collecting that data now, but may not know for another year!

QUANTITATIVE PROJECT MANAGEMENT (ish)

We Now Have Flying Monkeys… and More!

Improving Our Training Delivery

Documented Procedures Help Us to Grow (1)



Leading Edge Process Consultants

CLASS PRIZES AND GIVEAWAYS

Introduction to CMMI

When			Item	Approx
Day 1	AM	Intro music - End of "It's My Life"	Flying Monke	
		Intro music - "Rock N Roll Part 2"	Frisbees	
		Mod 1, During intros	Mini CMMI	
		Mod 1, Slide 12 - My Rules of Engagement	Einstein Bobblehead	
		Mod 1, Slide 12 - My Rules of	Attack Bunny	

Leading Edge Process Consultants LLC
www.CmmiTraining.com

Dates: 9/15-17
Course: Intro to CMMI

BEFORE CLASS CHECKLIST

☑ **Create Name Tents**

1 Create a name tent file, using the Name Tent Template and the student names / organizations in the class roster.
2 Double-check the spelling of all student names and organizations in the name tent file.
3 Obtain instructor approval of the completed file, making corrections as needed.
4 Print the name tents on the special name tent paper.
5 Carefully remove and discard perforated portions of the printed name tents.
6 Give the printed name tents to the instructor.

☑ **Create Certificates**

1 Create a certificate file, using the Certificate Template for the appropriate course and the student names / organizations in the class roster.
2 Change the date on the Slide Master in the certificate file to be the last day of class.
3 Double-check the spelling of all student names in the certificate file.
4 Obtain instructor approval of the completed certificate file, making corrections as needed.
5 Print the certificates on the special gold certificate paper, using the "Best" print quality.
6 Give the printed certificates to the instructor.

☑ **Pack Bags**

1 Check with instructor regarding which student material variations to use for the class.
2 Fill one Leading Edge bag for each student. Use brief bag for 3-day classes, backpacks for 1-day classes.
Each bag receives:
   - 1 bound student class notebook
   - 1 reference book (e.g., the blue CMMI book)
   - 1 Leading Edge pen
   - 1 Leading Edge Post-It highlighter
   - 1 "Ledge" (stress pal)
3 Place packed bags in the staging area OR Load Vehicle (ask instructor)

☑ **Load Vehicle**

CMMIROX-mobile w/ packed bags.

- August, 2009. A frighteningly busy Sept/Oct was looming:
  - 5 Intro to CMMI classes in a 7-week period
  - 2 of these public, requiring *tons* of work; the other 3 out-of-town
- How to stay organized?
  - Created procedures and checklists *just-in-time*, because I *really needed them*
  - Better solution than constantly re-creating to-do lists!

Why "just-in-time"?
I rarely say to myself "I'm looking for something to do right now, so I think I'll write a procedure." Just-in-time works for me.

CmmiTraining.com

Documented Procedures Help Us to Grow (2)

SERVICE DELIVERY
GP 3.1 Establish a Defined Process

- Thanks to procedures, checklists, & mentoring, somebody else now:
  - Creates/prints certificates
  - Creates/prints name tents
  - Enters data from SEI evaluations into spreadsheets
  - Assembles handout packets
  - Packs student bags (CMMI, student notebook, freebies)
  - Restocks inventory
- He's 12

Connor Smith

Manager, Special Projects

Leading Edge Process Consultants

Getting Better, Constantly (1)

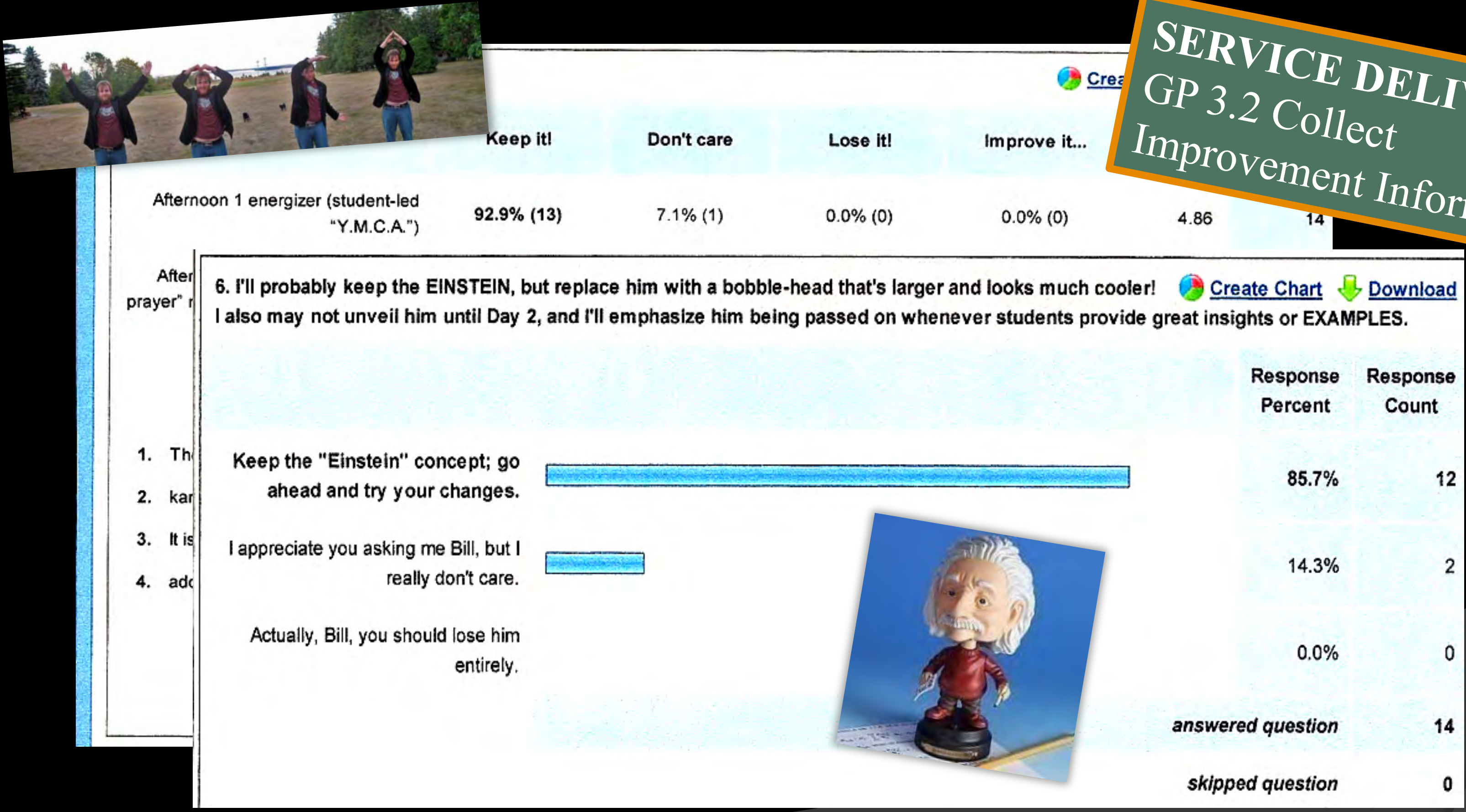
We introduced an explosion of new classroom ideas this fall…

How are these used in class? Give us $1190 and three days of your time, and you can find out!

Getting Better, Constantly (2)

…which we piloted in class before becoming part of our standard process

SERVICE DELIVERY
GP 3.2 Collect Improvement Information



Crea

	Keep it!	Don't care	Lose it!	Improve it...		
Afternoon 1 energizer (student-led "Y.M.C.A.")	92.9% (13)	7.1% (1)	0.0% (0)	0.0% (0)	4.86	14

After
prayer" r

1. Th
2. kar
3. It is
4. adc

6. I'll probably keep the EINSTEIN, but replace him with a bobble-head that's larger and looks much cooler! I also may not unveil him until Day 2, and I'll emphasize him being passed on whenever students provide great insights or EXAMPLES.

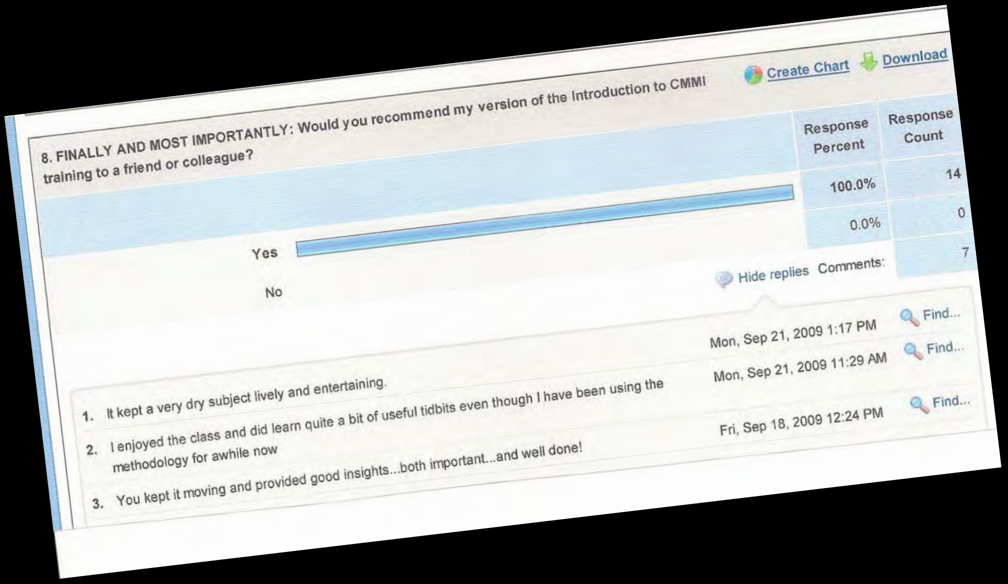
Create Chart Download

	Response Percent	Response Count
Keep the "Einstein" concept; go ahead and try your changes.	85.7%	12
I appreciate you asking me Bill, but I really don't care.	14.3%	2
Actually, Bill, you should lose him entirely.	0.0%	0
answered question		14
skipped question		0

Measuring Our Training Delivery Results (1)

WHAT WE LOOK AT

- Standard SEI Class Evaluations, aggregated for each class
- Our own, more customized web survey *(using Survey Monkey)*



8. FINALLY AND MOST IMPORTANTLY: Would you recommend my version of the Introduction to CMMI training to a friend or colleague?

	Response Percent	Response Count
Yes	100.0%	14
No	0.0%	0
Comments:		7

1. It kept a very dry subject lively and entertaining. Mon, Sep 21, 2009 1:17 PM
2. I enjoyed the class and did learn quite a bit of useful tidbits even though I have been using the methodology for awhile now Mon, Sep 21, 2009 11:29 AM
3. You kept it moving and provided good insights...both important...and well done! Fri, Sep 18, 2009 12:24 PM

MOST IMPORTANT QUESTION

Would you recommend our version of the Introduction to CMMI *training to a friend or colleague?*

INITIAL RESULTS

Since doing this for 3 classes, everybody has replied “yes.”

"Got to admit, it's getting better" [Lennon, McCartney]

The Future

2010 and Beyond

- Use our 2009 gains as a foothold for continued improvement
- Keep a watchful eye on the competition
- Add more structure to our process improvement program
  - Still grounded in business value
  - More proactive, a bit less "just-in-time"

Planning Our Improvements

- Another planned improvement cycle in early 2010
- How to find the time?
  - “Skipping” a public class on our calendar
- Harsh business reality:
  - Sometimes you need to make *less money now* so you can make *more money later*

12 week gap

(typically 6 weeks)

Date	Course	Location
Dec 8-10, 2009	Introduction to CMMI v1.2 (CMMI-DEV)	Reston, VA
Mar 9-11, 2010	Introduction to CMMI v1.2 (CMMI-DEV)	Reston, VA
Mar 12, 2010	Services Supplement for CMMI v1.2	Reston, VA
April 13-15, 2010	Introduction to CMMI v1.2 (CMMI-DEV)	Reston, VA

A Sampling of Future Improvements (1)

Issue	Improvement	Business Reason
Received several requests for private training in Aug-Oct that we lacked the availability to handle. Some consulting/ appraisal requests also. But how many? What's the business value of opportunities missed?	Formally track requests for services *other than* public training.	If indicated by demand (e.g., missed opportunities), increase income by expanding or simply raising prices. Perhaps reduce expenses by decreasing marketing budget. Consider new services, if we don't offer what several people are asking for.

CAPACITY AND AVAILABILITY MANAGEMENT (CAM)

SERVICE DELIVERY (SD)

STRATEGIC SERVICE MANAGEMENT (STSM)

A Sampling of Future Improvements (2)

Issue	Improvement	Business Reason
What if our instructor gets sick and can't deliver a public class for which 30 students are enrolled, half of whom have flown into town to just for the occasion?	Preemptively take mega-doses of Vitamin C. More realistically, have a back-up instructor.	A public training class is a $30K+ revenue event – tons of money for a small company like ours. Refunding this money could be crippling – and the customer dissatisfaction hit could be severe.

INCIDENT RESOLUTION AND PREVENTION (IRP)

SERVICE CONTINUITY (SCON)

IRP vs. SCON: Which One?
Though some might say this issue is about IRP, it's so potentially serious that we believe ***we'll benefit more from applying the principles of SCON*** *to it. Hey, whatever works!*

Leading Edge™
PROCESS CONSULTANTS LLC

Parting Words of ~~Wisdom~~ Experience

In Conclusion

Conclusions

- We've begun applying the CMMI for Services to our Marketing and Training Delivery processes.
- Our process improvement initiative is solely about business value. We have no current plans to attain a Maturity Level rating.
- We've achieved a significant net income gain in the past year. We unquestionably attribute much of that gain to our adoption of key CMMI-SVC principles.
- Given our success, we'll continue adopting the CMMI for Services through 2010.

Recommendations

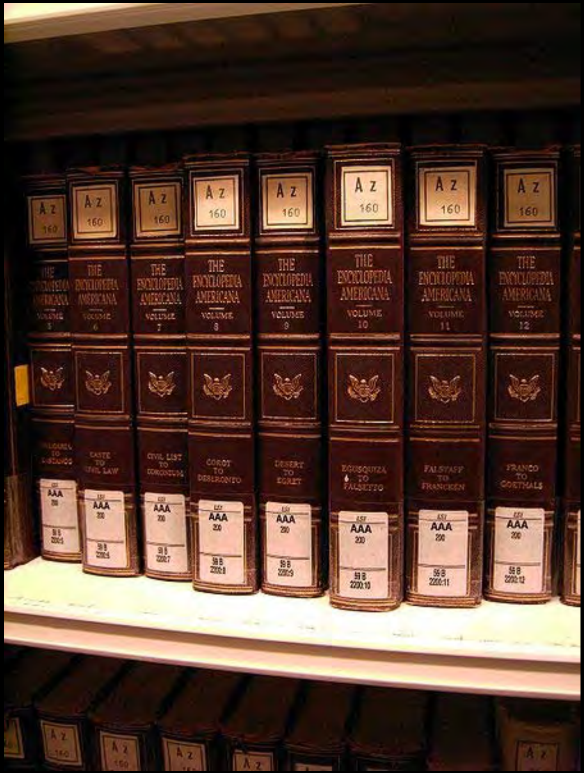
for the Ultra Small Organization (1)

1. Don’t Panic!

Yes, we realize the CMMI can seem overwhelming. *It doesn’t have to be that way, though.* Relax and take a deep breath before you proceed…

Recommendations

for the Ultra Small Organization (2)



2. View the CMMI as an Encyclopedia of Good Stuff

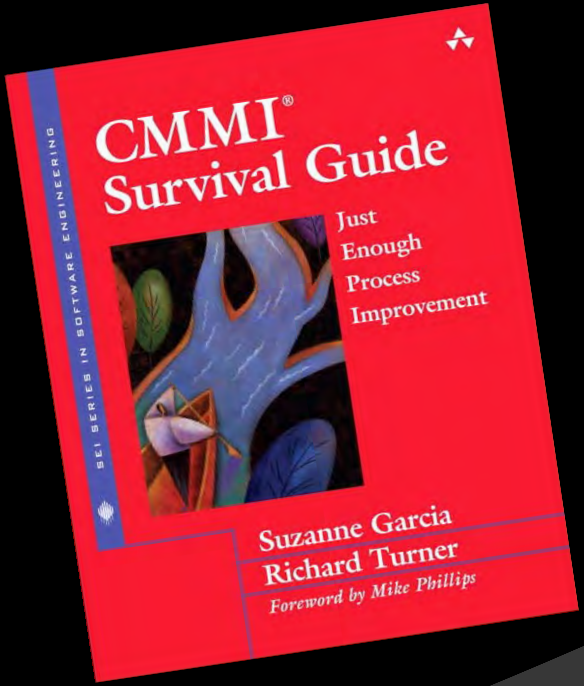
It’s chock full of good ideas. Probably *too* many for you. Some of them will *quickly* benefit your organization. The others? Ignore them for now.

Recommendations

for the Ultra Small Organization (3)

3. Focus on Your Pain

Show immediate benefit by using an iterative -- or "agile" -- process improvement approach. (Need a detailed example? Check out the *CMMI Survival Guide*.)



Recommendations

for the Ultra Small Organization (4)

4. Abandon Your "Compliance" Mindset

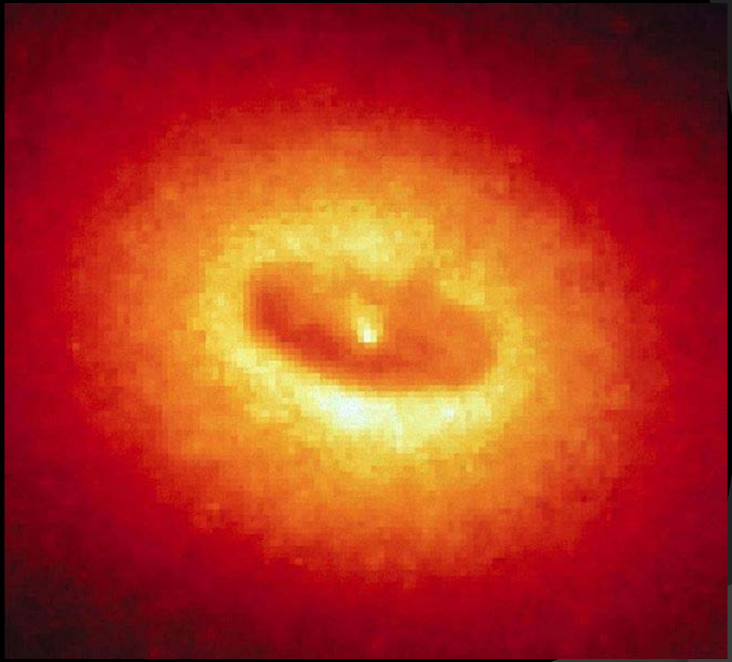
It's nice to be compliant but it's way nicer to make money. Focus on using pieces of the CMMI to achieve your business goals. Measure your success with dollars, not a Maturity Level.

Recommendations

for the Ultra Small Organization (5)

5. Avoid the “Big Bang” Approach at All Costs!

Seriously, do you want to spend the next two years documenting processes? And then gathering evidence? And then shelling out tens of thousands of dollars for an appraisal? And still not know whether you truly got better? Um, neither do I.



Recommendations

for the Ultra Small Organization (6)

6. Use a Just-in-Time Approach to Process Documentation Whenever Possible

You'll end up with process descriptions more rooted in reality, and more immediately useful.

Recommendations

for the Ultra Small Organization (7)

7. At Some Point You May Need to Reconsider the First 6 Recommendations

Someday you may no longer be "ultra small." Your informal communication channels may break down, and the written word will become more important. You can't always generate process documents "just-in-time." You may need to demonstrate compliance to external customers, or even yourself.

Still, you may never want to abandon Recommendation 1.

My Other Presentations This Week

- An Overview of CMMI-SVC for CMMI-DEV Enthusiasts
  - Wednesday 11/18
  - 8:45-9:15 a.m.
  - Wind Star Room

- CMMI in the Social Media (for the Social Media-Challenged!)
  - Wednesday 11/18
  - 10:45-11:30 a.m.
  - Grand Mesa F

Any Questions?

?

Website: www.CmmiTraining.com
Blog: www.CmmiForServicesDiary.com
Twitter: CmmiRox
LinkedIn: www.linkedin.com/in/billsmithleadingedge

Upcoming Public Classes In Reston, VA (DC Metro Area)

SEI Introduction to CMMI

- Dec 8-10, 2009
- Mar 9-11, 2010
- Apr 13-15, 2010

SEI Services Supplement for CMMI (CMMI-SVC)

- Mar 12, 2010

Private Classes?

- Bill@CmmiTraining.com

Raytheon
Customer Success Is Our Mission

Directive Documents and ITAR Made Easy

Ken Weinberg
El Segundo, CA
kiweinberg@raytheon.com

November 17, 2009

Overview

- What Prompted a Review of This Process?
- What is ITAR?
- What other Export Regulations Apply?
- How is sensitive data protected?
- What was the Initial Review Process?
- What types of Directive Documents contain restricted data?
- Analyzing the Sensitive Documents
- New Review Process
- Benefits
- Lessons Learned

What Prompted a Review of This Process?

- The ITAR Review of Documents Occurs Once the Content is Finalized, Prior to Release
- The Quantity of Documents varies by monthly release
- Reviewers
  - Specific training
  - Core Team each Month
  - Extra Reviewers During Peak Periods supplement the core team
- One of the Outside reviewers found the process tedious and explored methods of improvement

What is ITAR?

- **International Traffic in Arms Regulations (ITAR)**
  - Government regulations that control the export and import of defense-related articles and services on the United States Munitions List
  - Implements the provisions of the Arms Export Control Act
- Information required for the development, manufacturing, operation, etc., of defense articles

Goal is to safeguard US national security and further US foreign policy objectives

What other Export Regulations Apply?

- Export Administration Regulations (EAR)
- Contains the Commerce Control List (CCL) of regulated commercial items, including “dual-use” items that have commercial, military or proliferation applications.
- Broad array of commodities, software and technologies including,
  - Building materials
  - Circuit boards
  - Automotive parts
  - Blue prints
  - Design plans
  - Retail software packages
  - Technical information

Not Export Sensitive

- Information related to general scientific, mathematical or engineering principles that is commonly taught in schools and colleges
- Information that is in the public domain
  - MIL Standards
- General marketing information or basic system descriptions
- “Form, Fit and Function” Descriptive Information

Not needed to safeguard US national security and further US foreign policy objectives

“EXPORT”

“Export” includes not only the shipment of products abroad, but also release of technical data to a foreign person which is deemed an export by its mere disclosure or transfer to a foreign person, *even if within U.S. borders*.

How is sensitive data protected?

- **Marked as “Export Sensitive”:**

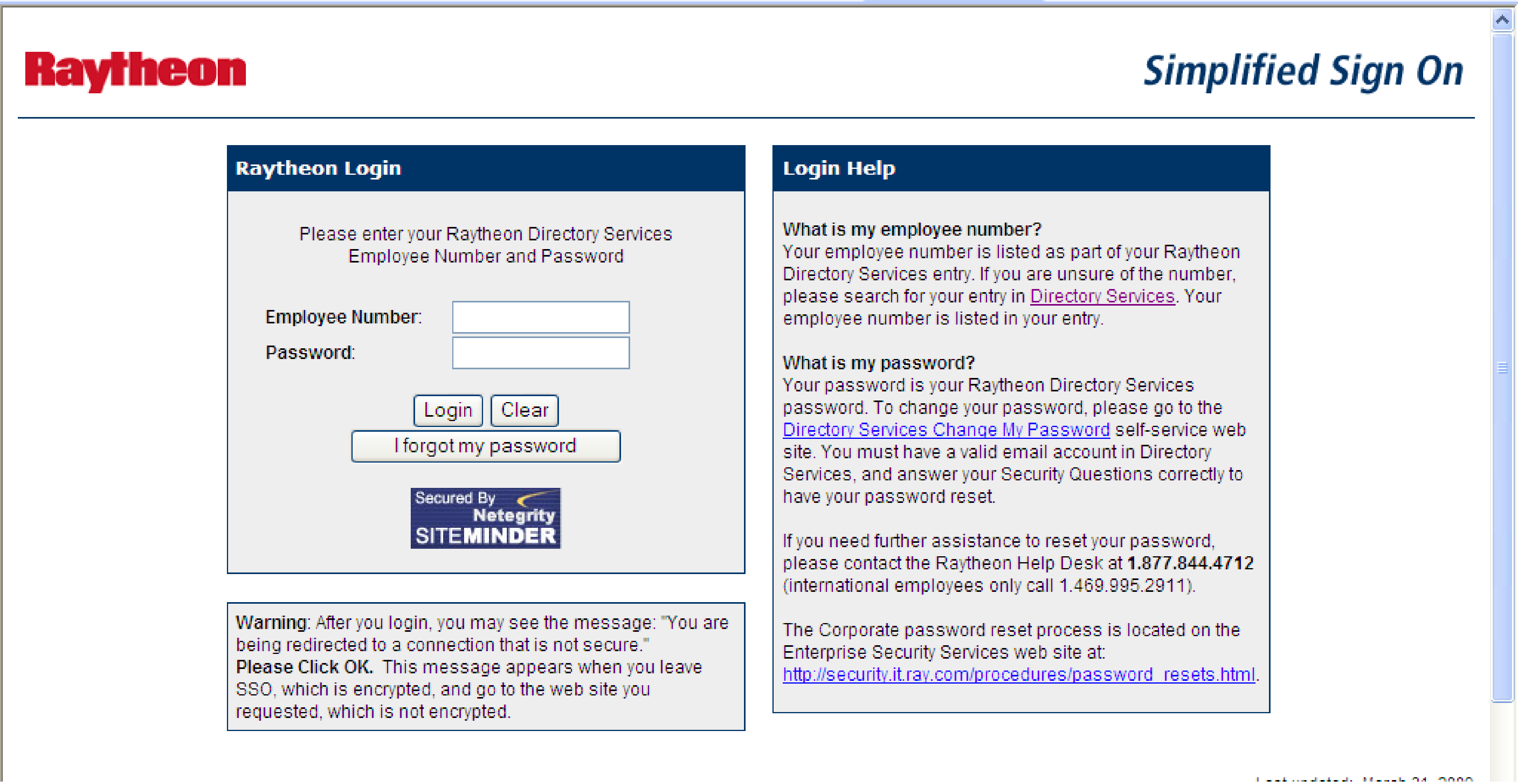
  This document (or software if applicable) contains data whose export/transfer/disclosure is restricted by U.S. law. Dissemination to non-U.S. persons whether in the United States or abroad requires an export license or other authorization.

- Screen displays when document is selected:

“WARNING - The document you are attempting to view may contain Technical Data within the definition of the International Traffic in Regulations (ITAR) and is subject to the export control laws of the U.S. Government. Transfer of this data by any means to a Foreign Person, whether in the United States or abroad, without an export license or other approval from the U.S. Department of State, is strictly prohibited.”

How is sensitive data protected? (continued)

- The “Filter” that permits access when an ITAR document is selected:



Raytheon Login

Please enter your Raytheon Directory Services Employee Number and Password

Employee Number:

Password:

Warning: After you login, you may see the message: "You are being redirected to a connection that is not secure." **Please Click OK.** This message appears when you leave SSO, which is encrypted, and go to the web site you requested, which is not encrypted.

Login Help

What is my employee number?
Your employee number is listed as part of your Raytheon Directory Services entry. If you are unsure of the number, please search for your entry in Directory Services. Your employee number is listed in your entry.

What is my password?
Your password is your Raytheon Directory Services password. To change your password, please go to the Directory Services Change My Password self-service web site. You must have a valid email account in Directory Services, and answer your Security Questions correctly to have your password reset.

If you need further assistance to reset your password, please contact the Raytheon Help Desk at **1.877.844.4712** (international employees only call 1.469.995.2911).

The Corporate password reset process is located on the Enterprise Security Services web site at: http://security.it.ray.com/procedures/password_resets.html.

Employee Database

Employee Profile

As of Date: 2009-10-27

Personal

Name: Ken Weinberg

Full Name: Kenneth I Weinberg

Eligible to access US export controlled data: Yes - Allowed

Export Control Awareness Training: Yes

Contact

Phone Number: 310-647-2669

Fax Number: 310.647.2263

Mail

Email Address: kiweinberg@raytheon.com

Work Mail Drop: EO/E01/A173

Work Mailing Address: 2000 E. El Segundo Blvd

City, State Zip: El Segundo, CA 90245

Work PO Box Address: PO Box 902

City, State, Zip: El Segundo, CA 90245

City: El Segundo

State: CA

What was the Initial Review Process?

- Trained reviewers review each paragraph of each document to determine status
  - Not Export Restricted – Contains No Technical Data or Technical Data which is not sensitive
  - Export Restricted – Contains Technical Data which is Sensitive

- Review Expense must be Included in Release Costs
- Review time must be Included in Release Schedule
- Review must be thorough to ensure not a threat to national security

What types of Directive Documents contain restricted data?

- 237 Directive Documents – 2 are restricted (<1%)
- 361 Non-Directive Enablers – 27 are restricted (7%)

- Directive Documents tell “What” to do and do not tell “how” to design or manufacture
- Non-Directive Enablers are guidelines, templates, samples, etc., which often tell “how” to design or manufacture

Which Documents are Export Controlled?

Raytheon
Space and Airborne Systems

- Purchased Parts Documentation
- Engineering Review Board Template
- Parts, Materials and Processes Control Plans
- Managing GIDEPs, General Alerts, Supplier Nonconforming Notices
- Built-In Test Checklist
- Prohibited Materials Program
- Separate Notes and Parts Listing
- Robust Design Guide
- Simulation Development
- Connector Saver Usage
- Onboard Regulator Power & Efficiency Calculations for Two Phase Buck Converter
- Current Sense Amplifier Design Guide
- Wilkinson Divider
- Rat Race Coupler
- Calculator for HW Design
- Transceiver Performance Worksheet for HW Analysis
- RFMW_SPW Worksheet for Transceiver HW Analysis
- RRFC Foundry Website/Design Rules
- Fastener Design Guide
- Structural Guidelines
- Cable Design Guidelines
- Packaging Module Design
- Multi-Layered Insulation Specification
- Connector Mating Interface Design
- Inspection of Planar Waveguides for High-Power Lasers
- Real-Time Laser Beam Analyzer
- X-Ray Fluorescence Equipment for Prohibited Materials Scanning

All Export Sensitive Documents are Technical and from Engineering Disciplines

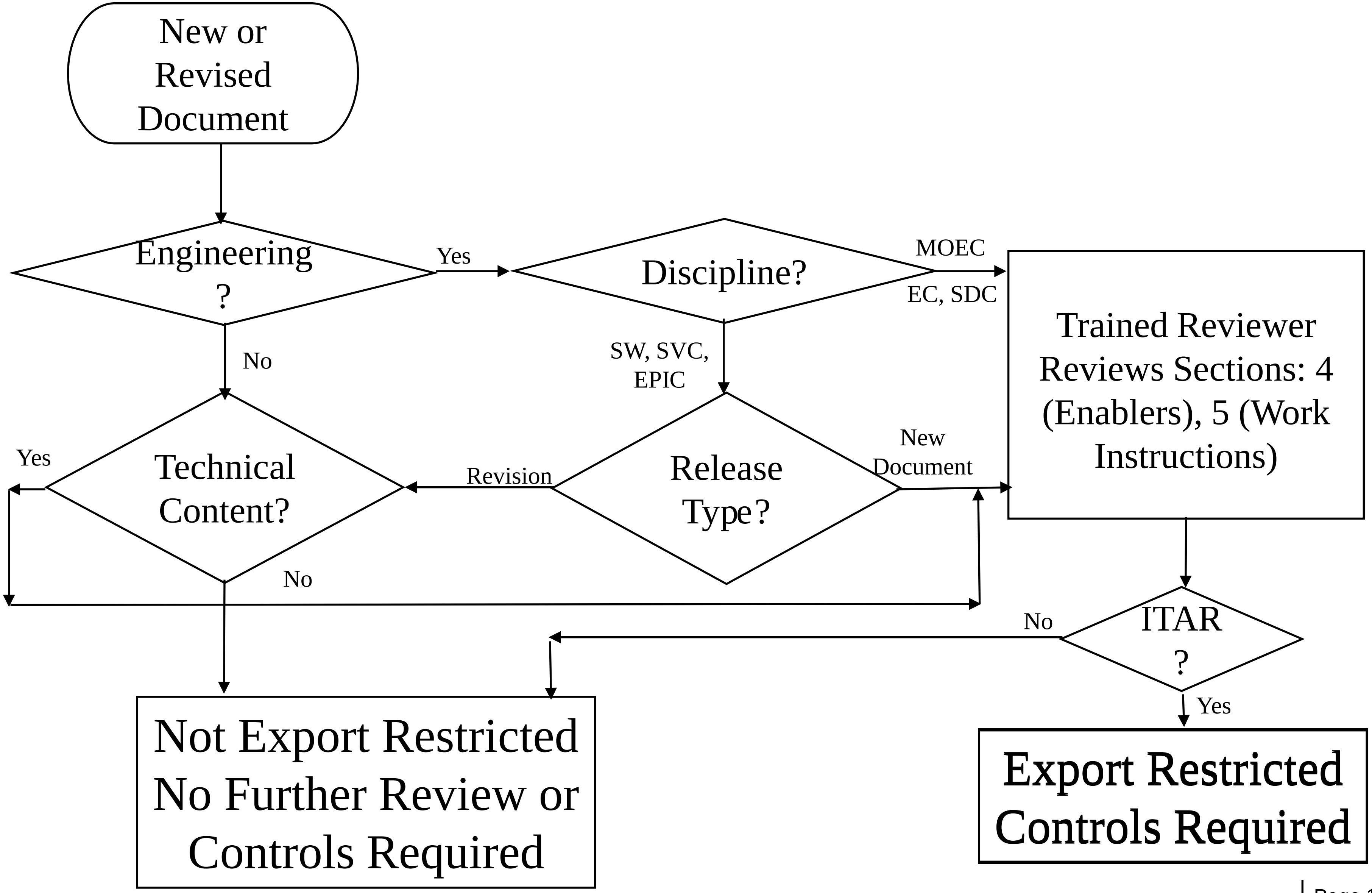
New Review Process

- Documents that are free of technical content do not need a trained ITAR review
  - Developed Guidelines Regarding Technical Content
  - Author or Discipline Process Representative Certifies that there is no technical content in document
  - Used for disciplines which are not typically technical (e.g., Configuration Management) and have no history of ITAR sensitive documents
- What is Reviewed by Trained Reviewers
  - Directive Documents – Only sections 5 (Instruction)
  - Non-Directive Enablers - Only section 4 (Technical Content)
  - Author or Discipline Process Representative Certifies that there is no technical content in remaining sections

Technical Content Guidelines

- Technical Content is technology associated with a product
  - Instructions to conformal coat electronics
  - Geometric Tolerance Guidelines for a specific item
  - How to measure timing of Image Processing Software
- Administrative data, Business Data, Instructions without the mention of product technology are not technical
  - Peer Review Process
  - Earned Value Calculations
  - Cost Estimation/ Cost Collection

New Review Process Flow



Benefits

- New Method Has Lower Cost
- New Method Has Shorter Schedule
- Little Risk of Release of Sensitive Material
  - Stored on internal servers
  - All non-marked material requires review before delivery outside of Raytheon

Review is Still Thorough Enough to Ensure no Threat to National Security

Lessons Learned

- **Analysis of the Data of a “Working” Process Can Provide Significant Improvement**
- **“Outsiders” looking at a process can often recognize areas for improvement better than those intimately involved in the process.**

Questions ? ? ?

CMMI® in a Small Company: The Cobbler’s Children Can Have Shoes (and best practices)

Michael J. Knox
Technical Software Services, Inc.
Director of Process Engineering
SEI Authorized Instructor

Cara E. Smith
Technical Software Services, Inc.
Deputy Director of Process Engineering

9th Annual NDIA CMMI® Conference
November 16, 2009

Overview

- Once upon a time
- Making shoes
- Tradecraft secrets
- Morals of the story

Many of us are like the cobbler.

Small businesses focused on servicing our customers, improving their organizations, and making them look good.

At some point, we have to take care of ourselves too!

Once upon a time...

Once upon a time…

…a small company called TECHSOFT was formed

- Technical Software Services (TECHSOFT) Inc., founded in 1990 in Pensacola, Florida
- Started as purely software development and maintenance company
- Evolved over 19 years into a true IT company and now provides:
  - Systems engineering
  - Software engineering
  - Security engineering
  - Process engineering
  - Network services
  - Training services (web-based development)

TECHSOFT
Technical Software Services, Inc.
A CMMI® Maturity Level 3 Company

Once upon a time…

…it was comprised of

- Two offices – Pensacola, FL; Charleston, SC
- 40 employees with diversified backgrounds:
  - U.S. Navy communications and National Security Agency (NSA) computer security backgrounds
  - Serve as certified adjunct faculty at local universities
  - Hold a broad range of Certifications and Technology Competencies
  - Work on ISO/IEC/IEEE systems, software, services, and project management standards

Once upon a time…
…and it worked for

- Primarily Department of Defense:

NSA

NAVSECG RU

OPTEVFOR

USMC

CC Corry Station

NCTAMS LANT DET Pensacola

NETC

NSGA Pensacola

SPAWAR Systems Center ATLANTIC

GENERAL DYNAMICS
Ordnance and Tactical Systems
Niceville, FL

CENTURUM
Charleston, SC

- Also commercial banks, law firms, health care, universities/colleges:

MEMPHIS & SHELBY COUNTY DPDGOV.com
Memphis & Shelby Co Tennessee

University of W Florida

PJC
Pensacola Junior College

Santa Rosa Co. Schools

Making shoes…

Making shoes…
…for others

- Early 1990s - 2001
  - Developed software and security engineering solutions
  - Implemented the SW-CMM at several NSA elements and at a U. S. Navy Worldwide Software Support Activity (SSA) in Pensacola
  - Focus was software and later web-based training development
- 2001-2002
  - Engaged by SPAWAR Systems Center Charleston (over **$2B** a year in revenue) to help them achieve their goal of becoming a World Class Systems Engineering organization
  - Opted to implement the new CMMI® model instead of the SW-CMM

Making shoes…

…for others

- 2002 - 2009
  - Successfully led organizations to CMMI® ML2 and ML3:
    - SSC-C (ML2 in 2005) (ML3 in 2007)
      - Implemented systems/software processes, training, and established Process Improvement infrastructure
    - General Dynamics Ordnance and Tactical Systems, Niceville FL (ML2 in 2007) (ML3 in 2009)
    - Centurum Inc., Charleston SC (ML2 in 2009)
    - SSC Atlantic – New Orleans (ML3 in 2009)
  - Committed funding and people to CMMI®:
    - 3 authorized SCAMPI℠ Lead Appraisers on staff
    - 3 authorized CMMI® Instructors on staff

Making shoes…

…for ourselves?

- TECHSOFT was such a busy cobbler making shoes for his customers that he had no time to make some for his own children
    - Why not?
        - Customer work kept us very busy
        - Pursuing CMMI® ML3 for TECHSOFT would be an overhead cost, and small companies cringe at the word "overhead"
        - Concerned with the ROI – would ML3 help TECHSOFT win contracts against Boeing, Lockheed, Raytheon?
        - Employees are already wearing multiple hats
        - Small projects
        - Limited tools
- The "Head Cobbler" decreed that it was time for TECHSOFT to practice what we were preaching
    - Formally started our journey to CMMI® ML3

Making shoes…

…was the right decision

- Why did we do it?
  - It was the right thing to do
  - It would give TECHSOFT a competitive edge over other small businesses
  - Contract wording was changing to include achievement of CMMI® ML3
  - We had seen the benefits of our customers implementing CMMI®
  - We knew HOW to do it and were using many of the best practices
  - If we did not do it now, we would never do it

Tradecraft secrets…

Tradecraft secrets…

…our strategy

- Goal
  - Achieve CMMI® ML3
- Approach
  - Roadmap: Developed a Process Improvement Plan
  - Share: Developed corporate plans for common areas:
    - Quality Assurance, Requirements Management, Risk Management, Configuration Management, Decision Analysis and Resolution, and Supplier Agreement Management
  - Projects responsible for Project Management and Engineering Plans
  - Set up monthly status meetings
  - Set up progress benchmarks in the form of Class C and B assessments

Tradecraft secrets…

…our infrastructure

- Formally established the PI infrastructure:
  - Management Steering Group (MSG)
  - Engineering Process Group (EPG)
  - Mentors
  - Evidence Custodian
  - Internal Assessors
- Designated the Appraisal WIZARD® as the evidence repository
  - Evidence Custodian was responsible for entry of all data into the Appraisal WIZARD® and maintenance of the evidence files

TECHSOFT
Technical Software Services, Inc.
A CMMI® Maturity Level 3 Company

Tradecraft secrets…
…our infrastructure

- MSG – Department Heads (4)
- EPG – Department Lead Systems Engineers (4)
- Mentors
  - Designated three experienced individuals as PI Mentors to lead the effort for 3 projects
  - Assigned to populate data for OPD, OPF, and OTP
  - Provided mentoring and coaching regarding evidence required
  - Drafted documents as needed
  - Conducted monthly status meetings with Focus projects– senior management involved
  - Identified and tracked action items to closure
- Internal Assessors
  - Identified two other CMMI-experienced employees to conduct multiple Class C assessments and then a Class B assessment

Tradecraft secrets…

…projects' reaction

- Just like the projects at other organizations!!
  - Slow in getting started
  - Not happy about writing plans
  - Struggled with collecting/centralizing evidence
  - Assumed the PI Mentors would do EVERYTHING and they could be bystanders
  - Claimed that they had a REAL JOB to do for some customer

ML3 TECHSOFT
Technical Software Services, Inc.
A CMMI® Maturity Level 3 Company

Tradecraft secrets…

…what happened

- Early 2007 - Initial schedule slipped by 3 months
  - Resource constraints/conflicts are real issues
- Mid 2007 – Established/Updated Standard Processes, Process Manuals, and Infrastructure
- Mentoring Projects – documenting project processes and SOPs
- Initial Class B/C project assessments (July, 2008) results were poor! Too many gaps
  - Schedule slipped another 3 months to plug gaps
- Nov, 2008 - Firm dates and Lead Appraiser selected
- Full Class B – Jan, 2009
- Final evidence collection
- SCAMPI A Appraisal held in May 2009
  - TECHSOFT achieved CMMI® ML3

Moral of the story…

Moral of the story…

Moral of the story…

…meeting the schedule

- The project evidence collection effort ALWAYS starts slowly
  - Recommendation: Conduct a Class C within 60 days of commencing the effort. Schedule several Class C's and a Class B
- Only with a hard, firm date for the SCAMPI will the projects start moving faster
  - Recommendation: Build a realistic schedule with multiple Class C assessments/appraisals and then a Class B

Red and Yellow results (weaknesses) from Class C/B assessments get attention

Moral of the story…

…identifying and storing evidence

- The project personnel had good knowledge of processes but limited knowledge of CMMI® and needed help determining which piece of evidence went with which practice
    - Recommendation: Identify Mentors early on to help projects with collecting evidence
- Needed a central location to organize/map to CMMI® and store the projects' evidence
    - Recommendation: Invest in an automated tool (e.g.: Appraisal Wizard®) to collect/store project evidence and be used for the Class C/B assessments, SCAMPI A Readiness Review and On-site

Moral of the story…

…involvement of 'Head Cobbler'

- If left alone, the project personnel would often fall behind schedule
  - Recommendation: Hold frequent progress meetings between mentors, project personnel and invite "Head Cobbler" for additional effect
- With Senior Management support made known to all, personnel who aren't completely on-board with CMMI® may continue to complain, but will still do their part
  - Recommendation: Make sure everyone in the company knows that Senior Management is on-board with the decision. Have Senior Management go directly to Project Leaders and Team Members, and not leave the burden to the Mentor(s)

Moral of the story…

…committed project resources

- Small Organizations need to take advantage of everyone's skills to share the roles
  - Project Manager - involved and committed to success
  - Document specialist/Technical Writer role for coordinating documentation, revisions
  - Active, skilled PPQA manager is a great benefit
    - Can also serve as the Measurement Analyst
  - Useful plans are built by the key players; shelfware is built by the novice or new contractor
  - Don't let one person wear too many hats
  - New technology and complex systems are NOT necessary for success

Moral of the story…

…be creative with model

- Small organizations/projects can struggle with certain areas (DAR, SAM)
  - Recommendation: Look for creative ways within organization to adapt / tailor the model
    - SAM – “free” software contains license agreements; corporate purchases of equipment
    - DAR – Organization-wide software tools; Charleston office decisions/alternatives
- Shorter duration projects/tasks are difficult to include in assessment planning
  - Recommendation: Consolidate similar projects and on-going tasks into longer term programs for assessment
    - Utilize evidence from multiple tasks to ensure full life cycle coverage

Moral of the story…

…benefits

- What has success meant?
  - New people hired in the last year are up to speed quickly due to the developed processes
  - Improved our overall training in the processes and sub-processes
  - Morale has improved
  - Measurement is more accurate
  - More sharing of ideas and processes
  - Have institutionalized process reviews
  - Now have a formal infrastructure for Process Improvement
  - MSG/EPG now meet regularly every quarterly, thus resulting in improved processes

Moral of the story…

…it was all worth it

- Took awhile to gain full commitment
- Used the same approach for TECHSOFT that we used for clients
- Don’t be surprised by same hurdles faced with clients

It was all worth it!!!!!

Any Questions?

Michael J. Knox
Technical Software Services, Inc.
Director of Process Engineering
SEI Authorized Instructor

Cara E. Smith
Technical Software Services, Inc.
Deputy Director of Process Engineering

CMMI Re-Appraisal

Moving Barriers & Making Strides

Overview

United Space Alliance (USA) Launch Processing System Software Development organization received a CMMI-DEV + IPPD Level 3 rating in September 2009

- Employed a lean approach to appraisal activities resulting in >50% cost and schedule reduction
- Proved that appraisals can be done faster, better, cheaper

Focused – Innovative – Trailblazers

This presentation provides:

- Company CMM/CMMI history and background
- Objectives, challenges and results of the recent CMMI appraisal
- Methodology and examples of lean appraisal practices
- Advice for others wishing to embark on a similar journey

United Space Alliance

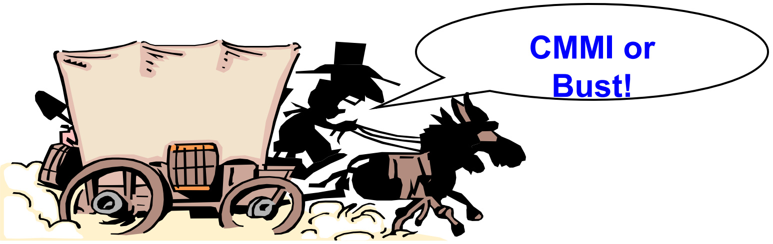
Who We Are . . .

United Space Alliance

History

- **2002**--USA began its journey towards CMM Level 3.
- **2003**--A mini-assessment was conducted across USA elements to determine readiness for a CMM Level 3
  - A common software process and appraisal at the company level was deemed not achievable
  - Decision was made for each element to develop their own framework and conduct individual assessments
- **2004**--LPS Software Development achieved SW-CMM Maturity Level 3
- **2006**--LPS Software Development completed CMMI-DEV (v 1.1) Maturity Level 3
  - No prior CMMI experience
  - Pathfinder for the entire company
  - All of the other business units benefited from the knowledge and expertise gained by LPS Software Development
- **2009**—LPS Software Development completed CMMI-DEV+IPPD (v 1.2) Re-Appraisal Maturity Level 3
  - LPS Software Development organization was the pathfinder for the entire company in re-appraisal activities

Where we started



Background

- Demonstrated compliance with CMMI-DEV v1.1 Maturity Level 3 in March 2006
- Business decision was made to forego any further appraisal activities
  - CMMI rating expired in March 2009
- Business shift with the possibility of Shuttle Program extension and the need for a current CMMI v1.2 rating in order to bid on future contracts
  - Decision for LPS Software to conduct a CMMI v1.2 re-appraisal (early April 2009)

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Why we did it

Main objectives of the re-appraisal:

- Ensure the software development process remains compliant with
  - Shuttle customer requirements (NSTS)
  - CMMI-DEV Maturity Level 3 framework
- Ensure the LPS Software Development processes meet the customer requirements for the Constellation Program in preparation for future work
- Compliance with version 1.2 of the CMMI-DEV model
- Enhance the software development framework to
  - Improve and refine the processes
  - Ensure continued improvement in the quality and reliability of delivered products

The Road Ahead

Challenges

- Sense of urgency with the pending release of the Exploration Ground Launch Services (EGLS) Request for Proposal (RFP) for the Constellation Program
- Concern from NASA with the amount of time invested for appraisal activities versus contractual obligations and value add for the customer
- Lack of work during transition from Shuttle to new Constellation program for re-appraisal activities
- LPS Software Development was challenged to conduct the re-appraisal in:
  1. Under $150K for external Lead Appraiser services (paid for by the company)
  2. $125K for appraisal team members (paid for by the company)
  3. PIID preparation by project personnel at an effort of 1680 labor hours (paid for by Shuttle Program).
  4. Schedule challenges…calendar year, before RFP—moving target

Re-Appraisal Theme: It's NO BIG DEAL!!

United Space Alliance

Did We Meet Our Challenges?

United Space Alliance

Results-Cost Savings

Overhead Cost Assessment

Lean Re-Appraisal Approach

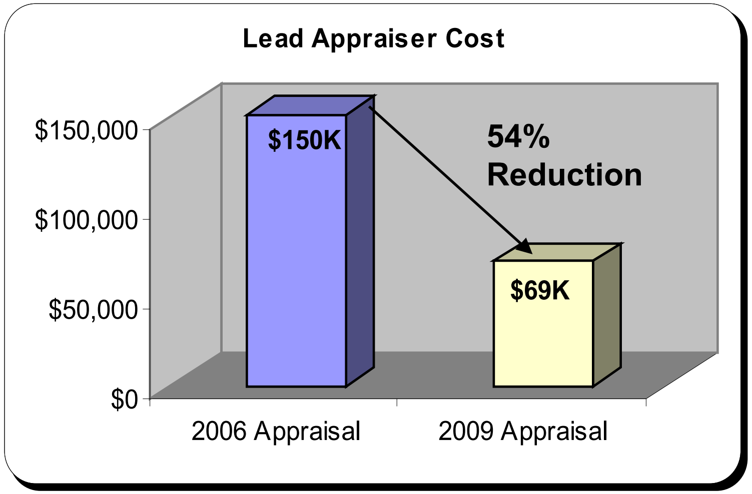
- ❑ Less training required (experienced team)
- ❑ Removal of Class B
- ❑ Condensed Readiness Review
- ❑ Condensed SCAMPI A
- ❑ *PIID implementation

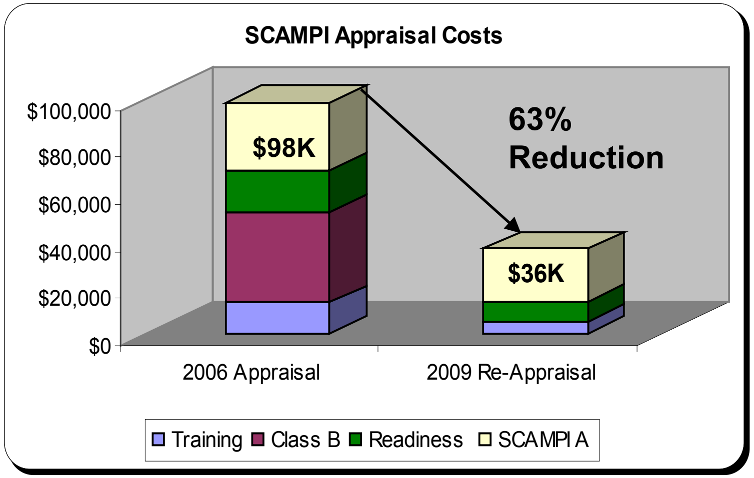
Resulting in

- ❑ Reduced Lead Appraiser cost by **54%**
- ❑ Reduced SCAMPI activity cost by **63%**

Met Challenges 1 & 2

*See next slide



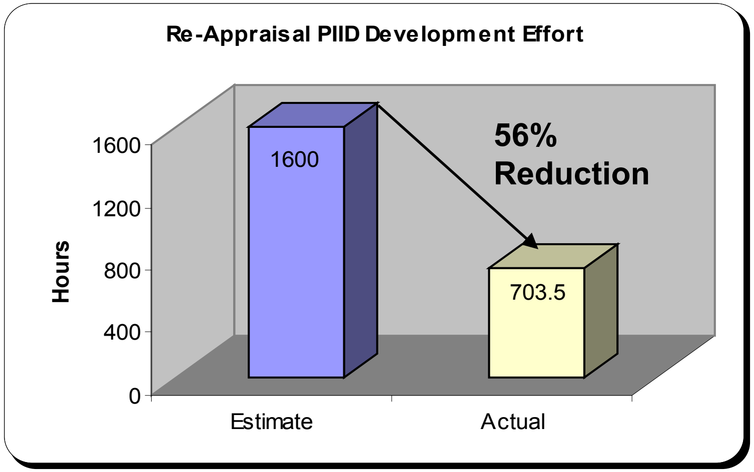


Results-PIID Productivity

PIID Effort Assessment

Lean Re-Appraisal Approach

- ❑ Reused PIID format with minimal changes
- ❑ Reused Model interpretation of required OE
- ❑ Experienced PIID team members



Resulting in

- ❑ Reduced PIID preparation activities by **56%**

Met Challenge 3

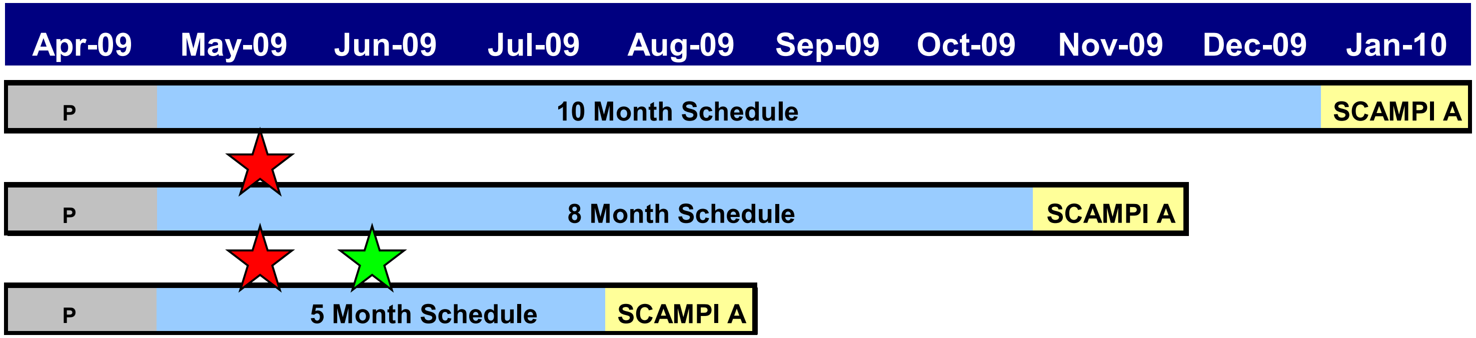
Results-Schedule

2006 Appraisal Timeline

Jan-05 Feb-05 Mar-05 Apr-05 May-05 Jun-05 Jul-05 Aug-05 Sep-05 Oct-05 Nov-05 Dec-05 Jan-06 Feb-06 Mar-06

CMM To CMMI Transition--15 Month Schedule | SCAMPI A

2009 Re-Appraisal Timeline



Apr-09 May-09 Jun-09 Jul-09 Aug-09 Sep-09 Oct-09 Nov-09 Dec-09 Jan-10

P | 10 Month Schedule | SCAMPI A

P | 8 Month Schedule | SCAMPI A

P | 5 Month Schedule | SCAMPI A

- **P** Planning
- 🟦 Appraisal Activities
- ★ Replan #1
- ★ Replan #2

Met Challenge 4

How We Did It . . .

CMMI

Re-Appraisal or Bust!!!

Lean Methodology

Lean Factors	Appraisal	Re-Appraisal	How
Team Makeup	**8** Appraisal Team Members (ATM)	**6** Appraisal Team Members (ATM)	**Reduced PIID OE**
	4 ATMs had no previous experience	**All** ATMs had either PIID or CMMI appraisal experience	**Leveraged USA ATM Experience**
Appraisal Time	**5** Day Readiness Review activity	**3** Day Readiness Review activity	**Lean Concept Applied**
	10 Day SCAMPI A	**8** Day SCAMPI A	**Experience & Lean Concepts**
PIID Reuse	**New** PIID format/tool	**Reused** general PIID format/tool	**Experience**
	All model practices had to be interpreted in relation to the organization	Practice interpretations were reviewed and reused 85% of the time	**Leveraged Previous PIIDs**
	Separate objective evidence (OE) for project and tasks	Effective techniques for project/task OE combinations	**Lean Concept Applied**
	4 Projects with 4 **Focus** Tasks	3 **Focus** Projects with 3+ Tasks	**Model Interpretation Maturity & Experience**
Training methods	PIID workshop used canned SEI examples/formats activities	PIID workshop used previous appraisal orgnaizational PIIDs	**LA Creative Approach**
	Appraisal team training used canned SEI training exercises	Appraisal team training used current PIIDs for exercises	

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Lean Methodology^2

Reduction of required PIID evidence

- Artifact reuse
    - Replaced 2006 evidence with current version of same artifact.
        - Estimate 85% of evidence types were reused
    - Reduced unique artifacts by 37%
- Direct evidence reduced by 22%
- Minimal Indirect evidence provided
    - Reduced by 62%
    - 1 piece of evidence per project per goal

Leveraging interviews for objective evidence

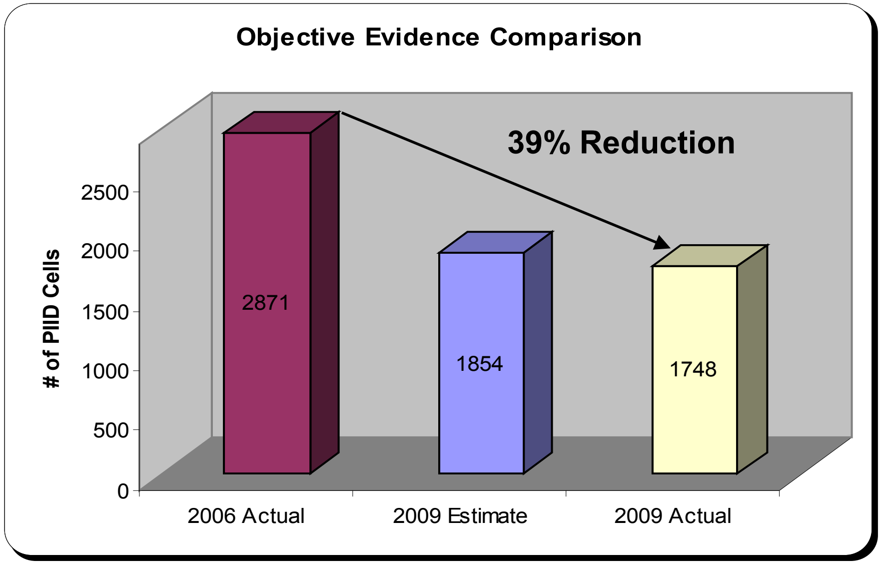
- Affirmations were required for model coverage (not relying on indirect evidence)
- LA provided generic scripts customized for organization.
    - Scripted questions were mapped to model practices
    - Reduced Appraisal team time for script preparation and note tagging

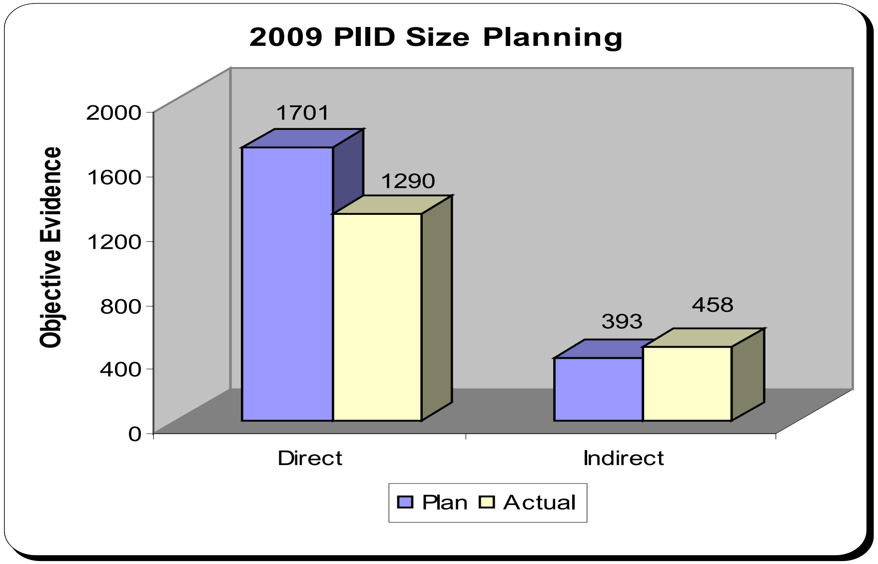
Lean Methodology^3

PIID Size Assessment

Resulting in

- ❑ Reduced number of PIID cells populated by **39%** from 2006 to 2009





Lean Methodology[4]

Appraisal Activity Assessment

- Decision was made to track types of appraisal activities using USATS
  - Appraisal Planning
    - Planning
    - Tracking
      - Schedule
      - Status Reporting
      - CM of PIID Artifacts
  - Appraisal Execution
    (internal personnel involved in interview and meeting support)
  - Process Compliance Audits (PIID Review & Development)
    - By Process Area (PA)
  - SCAMPI Activities
    - Appraisal Team Training
    - Readiness Review
    - SCAMPI A

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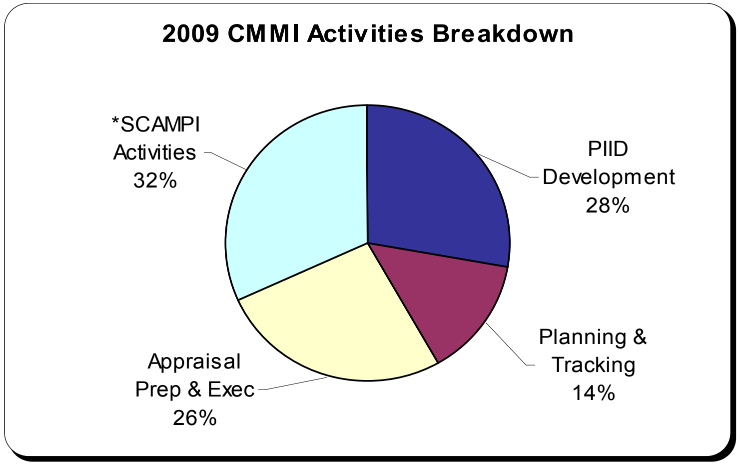
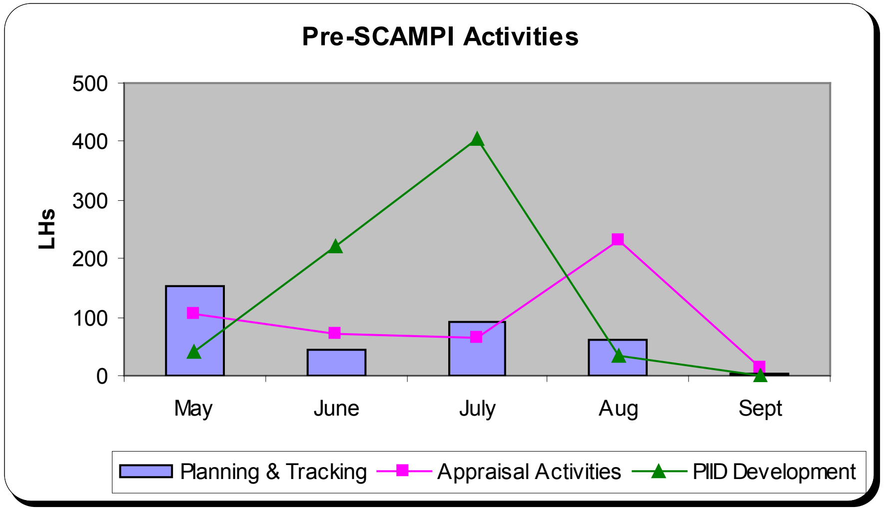


2009 CMMI Activities Breakdown

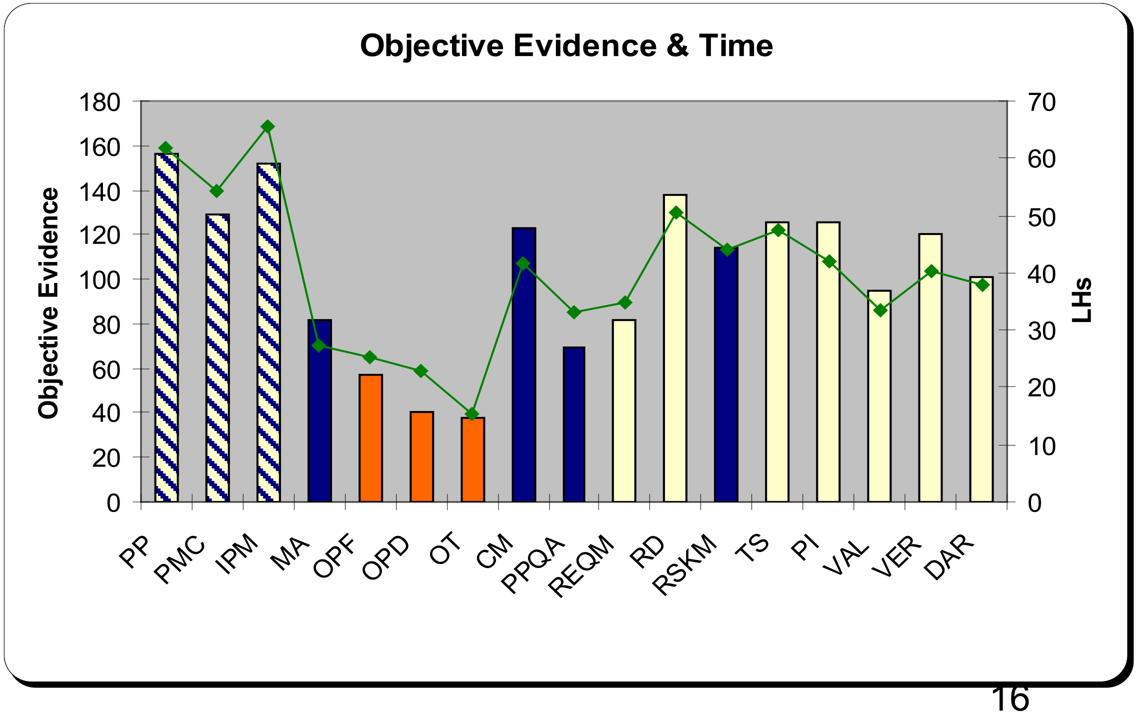


Pre-SCAMPI Activities

Lean Methodology^5

Appraisal Activity Assessment

- CMMI Process Areas
  - For each process area (PA) a unique USATS stat code was created which allowed effort to be tracked at a lower level than just PIID work
  - Each PIID PA contained:
    - Project Data (or)
    - Task Data (or)
    - Both Project and Task Data (or)
    - Organizational Data



Legend:

■ Project Only

□ Task Only

▨ Project & Task

■ Organization

— Labor Hours

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Re-Appraisal Milestones

2009 Re-Appraisal Timeline

Apr-09	May-09	Jun-09	Jul-09	Aug-09	Sep-09	Oct-09	Nov-09	Dec-09	Jan-10

Assumptions:	Based on 2006 information & contract business needs Normal SEI path (Class C, Class B, Readiness Review, SCAMPI A) Available work to appraise on shuttle work Grade A mentality--No risk
Activities:	Lead Appraiser selected Appraisal Plan drafted

Trigger:	Need to complete appraisal activities in CY2009
Activities:	PIID format and changes agreed to Focus Projects and tasks identified Appraisal team personnel identified
Replan results:	Started Class C's for PA's with highest risk Gave indication of minimal gaps and drifts Lean Methodology approach discussed (smaller team, fewer appraisal days) All class C's conducted ASAP – reducing possible rework

Trigger:	Contractual need
Activities:	Risks were acceptable with mitigation Discussions of business needs and value of SCAMPI B vs SCAMPI A Completed PIID workshops and Class C's DAR performed to assess possibility of schedule reduction
Replan results:	DAR results provided feasibility to pull schedule to left SCAMPI B removed Grade A mentality change-recognition of weaknesses IPPD included in scope of appraisal 4th project added as non-focus task for 2 PA's Provided 100% coverage across entire organization

P	Planning
🟦	Appraisal Activities
★	Replan #1
★	Replan #2

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PIID Measures

- On average the time spent populating a PIID "cell" is approximately 30 minutes/cell
  - Populating a "cell" means
    - Interpreting CMMI model and identifying type of artifact from organization that provides compliance
    - Providing Black Text artifact name
    - Providing Green Italic Text descriptions
      - How the objective evidence meets the intent of the CMMI model practice
    - Providing associate link to artifact

No matter how much (or little) PIID evidence you need to collect and populate, you can estimate the effort needed to complete PIID work.

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PIID example

Practice	PRJ	PIID Concerns	Evidence			
			Direct	Direct Hyperlink	Indirect	Indirect Hyperlink
SP 1.5 Manage the project using the project plan, the other plans that affect the project, and the project's defined process.	ORG		IDS Organizational Software Process IDS-SEPG-058 Rev J (PS 1.3) *Monitoring and Control of the project, including team meetings, formal reviews, audits, etc.*	..\Docs_All_Projects\IDS-SEPG-058.pdf	LPS Software Project Management IDS-SEPG-049 Rev G (4.4) *Directs the monitoring of the project's progress and status against the approved plans.*	..\Docs_All_Projects\IDS-SEPG-049.pdf
	P1 Project		LPS PMR *Pages 4-11 (PDF pages 5-12) of the May 2009 LPS Project Managment Review (PMR) identify the Application Software Project implementation of the Project Management processes as well as the implementation of the task level processes.*	..\LPS_Artifacts\LPS_PMR_052209.pdf		
	P1 Task		AppSw/MathModel Earned Value Variance Report *This report shows the variance between planned and actuals (effort and size) at the task level for commitments of the task. (Page 7 of 29, ESR K89569 P1, GLS). The STMs run the variance reports weekly and review them to ensure that tasks have not violated any of the thresholds identified in the projects SPP.*	..\MM_Artifacts\Math_Model_VR_Summary_Report.pdf	TrackStudio Monitoring SPI and CPI. *TrackStudio Action Item #5915 opened as a result of the variance report indicatng SPI and CPI were out of tolerance for HYD ESR K89393. The corrective action was determined to be a schedule rebaseline along with a return visit to CCB requesting approval of additional hours.*	..\Appsw_Artifacts\06_09_Trackstudio_TaskVariance.pdf

PIID Format Benefits

Organizational Rows

Provided mapping of model practice to organizational process documentation.

Green Text

Provided explanation of how the OE applies to the model. Resulted in getting everyone up to speed and appraisal team time savings (only looked at applicable document sections)

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Artifact Checklist Example

Date Received	Requestor	Brief Description of Artifact	Project	Artifact Folder SCAMPI_	Date Scanned	Hyperlink
05/28/2009	Robin Hurst	Integrated Data Systems Configuration Control Board Operations USA004623 Rev 6-Errata	All	Docs All Projects	Softcopy	..\Docs_All_Projects\USA004623.pdf
05/28/2009	Robin Hurst	LPS System Software Technical Review Panel IDS-SSWA-087 Rev F (	SysSw	Docs All Projects	softcopy	..\Docs_All_Projects\IDS-SSWA-087.pdf
05/28/2009	Robin Hurst	LPS Application Software Technical Review Panel USA004732 Rev 7 (	Appsw/MM	Docs All Projects	Softcopy	..\Docs_All_Projects\USA004732.pdf
05/29/2009	Dreama Poff	Verification & Validation Test Plan IDS-VAL-047	SysSw	Syssw Artifacts	Softcopy	..\Syssw_Artifacts\IDS-VAL-047.pdf
05/29/2009	Dreama Poff	System Software Documentation Standards 80K61006 Rev 2	SysSw	Syssw Artifacts	Softcopy	..\Syssw_Artifacts\80K61006.pdf
05/29/2009	Dreama Poff	System Software Engineering Standards 80K61127	SysSw	Syssw Artifacts	Softcopy	..\Syssw_Artifacts\80K61127.pdf

Artifact Checklist Benefits

Checklist Concept

Provided Configuration Management of all artifacts, identified their requestor, project and storage location. It also provided a quick reference to locating artifact already provided by any person or project.

Hyperlink

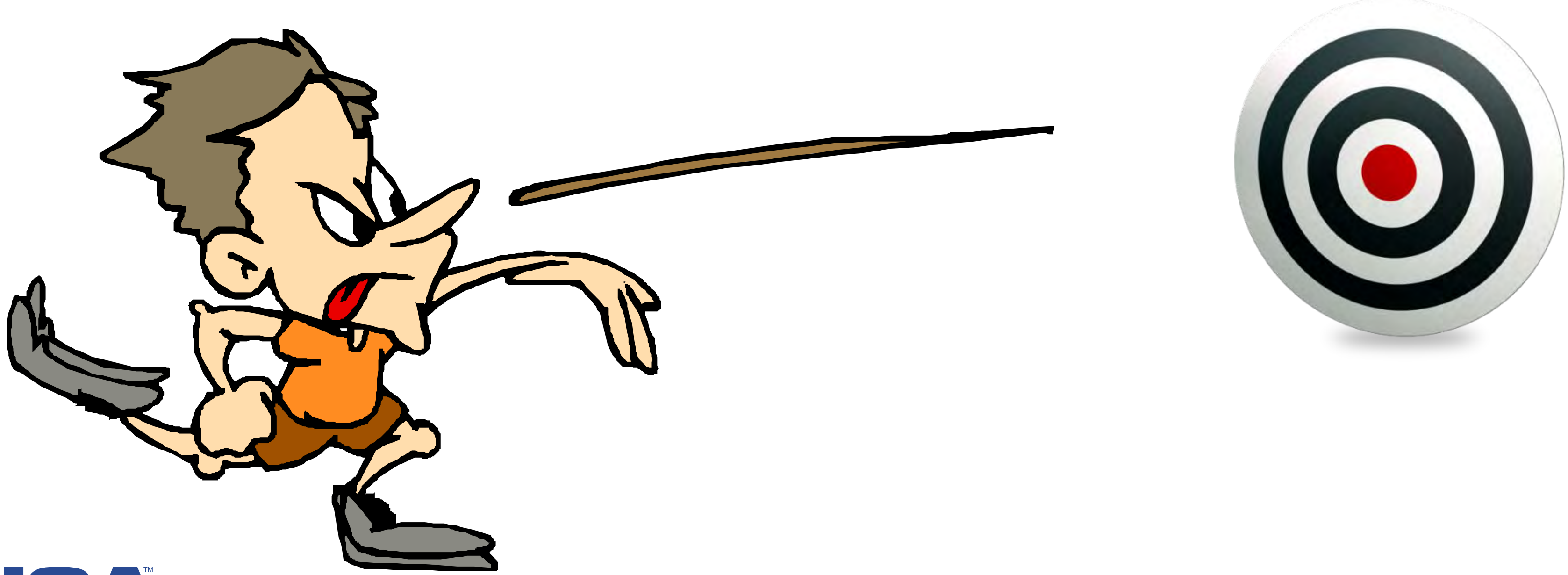
Saved the PIID populators time by being able to copy and paste the link into the PIIDs.

Allowed access to an artifact for ATMs who didn't have it in their assigned PA but needed to reference it.

Noteworthy
Lead Appraiser Traits

- Availability (to support you)
  - Consultations to determine availability
- Experience
  - In appraising organizations with similar domains
- Soft Skills
  - Good Oral & written communication skills
  - Facilitative
  - Knowledgeable of Industry & CMMI Best Practices
    - Understanding cost effectiveness and applicability to organization (not academic)
    - Balancing business needs with compliance
  - Creative
  - Effective leader
    - May need to alter the culture of the organization
- Expectations
  - What is expected from the organization
  - What is expected from the LA – status reports, etc
- Resources (tools, training etc)
  - Available training from LA
  - Available consultation from LA
  - Tools LA requires for PIID or appraisal use

How You Can Do It Too!!



Advice to Others

It can be done faster, better, cheaper!!

How?

1. Maintain institutionalization (Duh!)
    - Aggressive PPQA – avoid “drift” from process
    - Active SEPG – evolve/improve steadily
2. Don’t gold plate SCAMPI
    - Avoid A+ mentality
    - External personnel (ATM’s and LA) must be reasonable
        - Avoid unnecessary rework from your LA
        - Work within existing PIID format, interpretations, approach
3. Be Lean and Green
    - SCAMPI Optimization (fewer indirects, scripts, etc.)
    - Reduce PIID content,
      Reuse experience team members and
      Recycle PIID format and scripts.

Questions??

It’s No Big Deal!!

CMMI® for Large-Scale, System of Systems Projects

9th Annual CMMI Technology Conference and User Group
National Defense Industrial Association (NDIA)

Patrick J. McCusker
patrickjmccusker@gmail.com
November 17, 2009

Agenda

- The Problem with Large-Scale, System of Systems Projects
- Lessons from Bridge Building
- How the CMMI can be Adapted
- CMMI-based Project Modeling

“Make things as simple as possible, but not simpler.”

Albert Einstein

“Make things as simple as possible, but not simpler.”

Albert Einstein

“For every complex and difficult problem, there is an answer that is simple, easy, and wrong.”

H. L. Mencken

When considering systems engineering, big is not better

- There are many examples of recent failures with large-scale projects.

- The Government Accountability Office (GAO) provides authoritative statistics –

Examples of [Large-Scale] DOD Programs with Reduced Buying Power *

Program	Initial estimate	Initial quantity	Latest estimate	Latest quantity	Percent of unit cost increase
Joint Strike Fighter	$189. 8 billion	2,866 aircraft	$206.3 billion	2,458 aircraft	26.7
Future Combat Systems	$82.6 billion	15 systems	$127.5 billion	15 systems	54.4
F-22A Raptor	$81.1 billion	648 aircraft	$65.4 billion	181 aircraft	188.7
Evolved Expendable Launch Vehicle	$15.4 billion	181 vehicles	$28.0 billion	138 vehicles	137.8
Space Based Infrared System High	$4.1 billion	5 satellites	$10.2 billion	3 satellites	315.4
Expeditionary Fighting Vehicle	$8.1 billion	1,025 vehicles	$11.1 billion	1,025 vehicles	35.9

* GAO, Assessments of Selected Major Weapon Programs, March 2006, GAO-06-391

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* GAO, Assessments of Selected Major Weapon Programs, March 2006, GAO-06-391

Large-scale projects face common challenges

- The National Reconnaissance Office (NRO) found common program management flaws with large-scale projects *
  - Overzealous Advocacy
  - Immature Technology
  - Lack of Corporate Roadmaps
  - Requirements Instability
  - Ineffective Acquisition Strategy and Contractual Practices
  - Unrealistic Program Baselines
  - Inadequate Systems Engineering
  - Inexperienced Workforce and High Turnover
- “[Nearly all of the most important and costly projects] continue to cost significantly more, take longer to produce, and deliver less than was promised.” **

---

* Best Practices for Large-Scale Federal Acquisition Programs, Steven Meier, Ph.D., PMP, (National Reconnaissance Office)

** U.S. Government Accountability Office, Assessments of Selected Weapon Programs, Mar. 2008, GAO-08-467SP

The definition of a “System of Systems” (SoS) is still being developed

- *A configuration of systems in which component systems can be added/removed during use; each provides useful services in its own right; and each is managed for those services. Yet, together they exhibit a synergistic, transcendent capability.*

  System-of-Systems Engineering for Air Force Capability Development, July 2005, U.S. Air Force United States Air Force Scientific Advisory Board

- *A set or arrangement of systems that results when independent and useful systems are integrated into a larger system that delivers unique capabilities [DoD, 2004(1)]. Both individual systems and SoS conform to the accepted definition of a system in that each consists of parts, relationships, and a whole that is greater than the sum of the parts; however, although an SoS is a system, not all systems are SoS.*

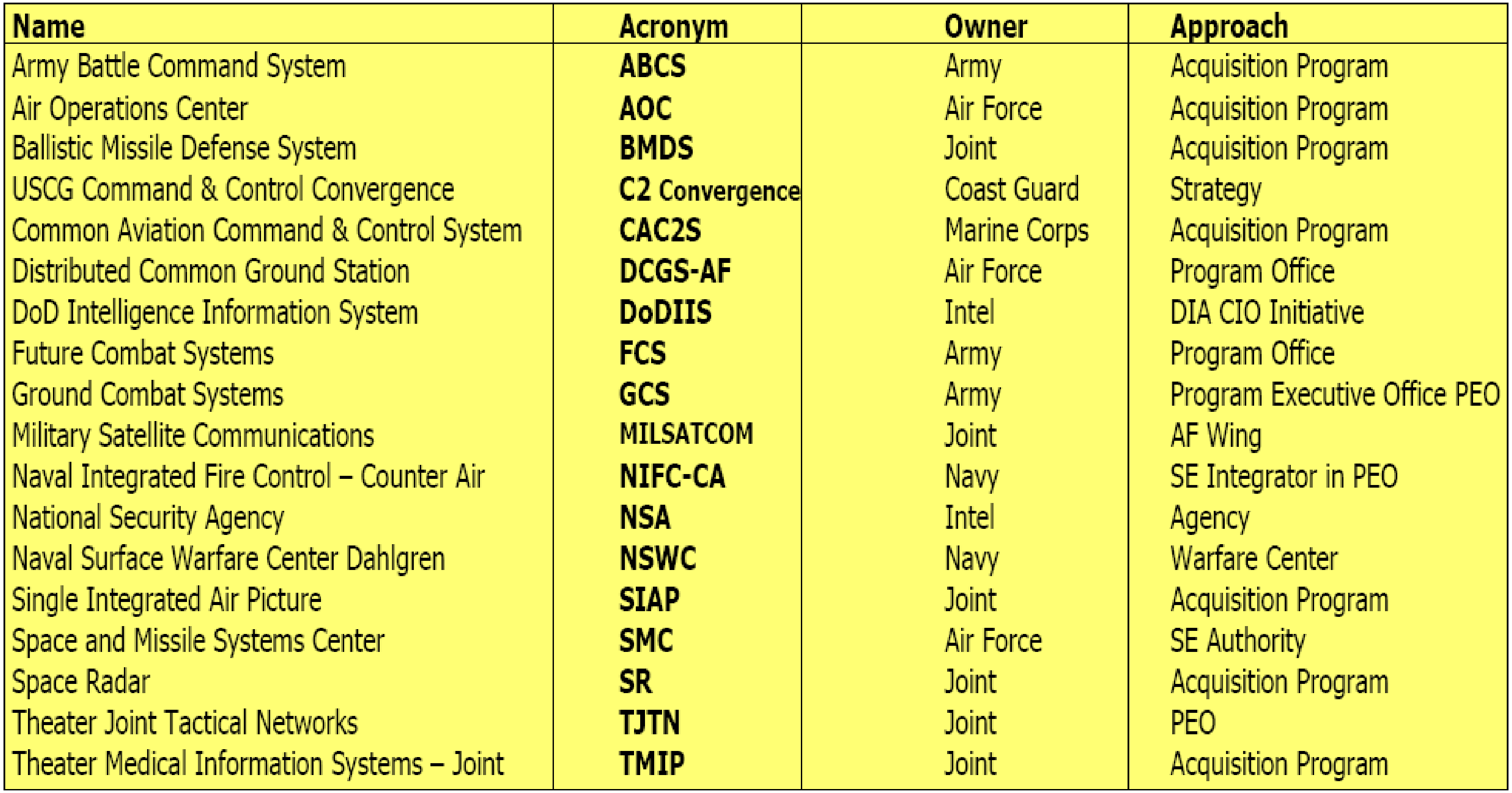
  Systems Engineering Guide for Systems of Systems, Version 1.0 August 2008, Director, Systems and Software Engineering, Deputy Under Secretary of Defense (Acquisition and Technology), Office of the Under Secretary of Defense

- A system of systems is a “supersystem” comprised of other elements that themselves are independent complex operational systems and interact among themselves to achieve a common goal. Each element of an SoS achieves well-substantiated goals even if they are detached from the rest of the SoS.

  Mo Jamshidi, System of Systems Engineering: Innovations for the 21st Century, John Wiley & Sons, Inc., Hoboken, New Jersey, 2009

A DoD study of SoS provides useful insights

- Identified several current SoS programs –



Name	Acronym	Owner	Approach
Army Battle Command System	**ABCS**	Army	Acquisition Program
Air Operations Center	**AOC**	Air Force	Acquisition Program
Ballistic Missile Defense System	**BMDS**	Joint	Acquisition Program
USCG Command & Control Convergence	**C2 Convergence**	Coast Guard	Strategy
Common Aviation Command & Control System	**CAC2S**	Marine Corps	Acquisition Program
Distributed Common Ground Station	**DCGS-AF**	Air Force	Program Office
DoD Intelligence Information System	**DoDIIS**	Intel	DIA CIO Initiative
Future Combat Systems	**FCS**	Army	Program Office
Ground Combat Systems	**GCS**	Army	Program Executive Office PEO
Military Satellite Communications	**MILSATCOM**	Joint	AF Wing
Naval Integrated Fire Control – Counter Air	**NIFC-CA**	Navy	SE Integrator in PEO
National Security Agency	**NSA**	Intel	Agency
Naval Surface Warfare Center Dahlgren	**NSWC**	Navy	Warfare Center
Single Integrated Air Picture	**SIAP**	Joint	Acquisition Program
Space and Missile Systems Center	**SMC**	Air Force	SE Authority
Space Radar	**SR**	Joint	Acquisition Program
Theater Joint Tactical Networks	**TJTN**	Joint	PEO
Theater Medical Information Systems – Joint	**TMIP**	Joint	Acquisition Program

- Defined four types of SoS: Directed, Collaborative, Virtual, and Acknowledged.

SoS literature also shows that like large-scale projects, they face common challenges as well *

- System elements operate independently
- System elements have different life cycles
- The initial requirements are likely to be ambiguous
- Complexity is a major issue
- Management can overshadow engineering
- Fuzzy boundaries cause confusion
- SoS engineering is never finished

* INCOSE Systems Engineering Handbook, v 3.1

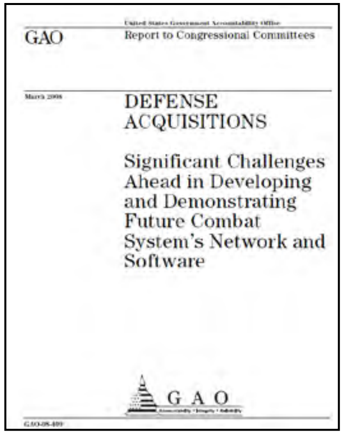
There appears to be some overlap in the challenge set for these two types of projects

Large-Scale Project Challenges (NRO)

1. **Overzealous Advocacy**
2. **Immature Technology**
3. **Lack of Corporate Roadmaps**
4. **Requirements Instability**
5. Ineffective Acquisition Strategy and Contractual Practices
6. **Unrealistic Program Baselines**
7. **Inadequate Systems Engineering**
8. Inexperienced Workforce and High Turnover

SoS Project Challenges (INCOSE)

1. System elements operate independently
2. **System elements have different life cycles**
3. **The initial requirements are likely to be ambiguous**
4. **Complexity is a major issue**
5. **Management can overshadow engineering**
6. **Fuzzy boundaries cause confusion**
7. SoS engineering is never finished

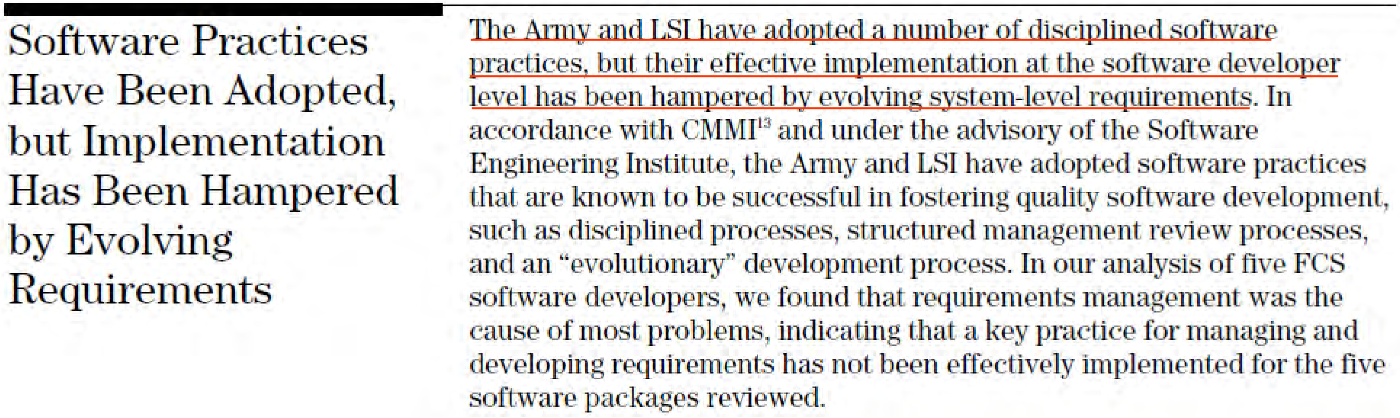


GAO

Report to Congressional Committees

DEFENSE ACQUISITIONS

Significant Challenges Ahead in Developing and Demonstrating Future Combat System's Network and Software



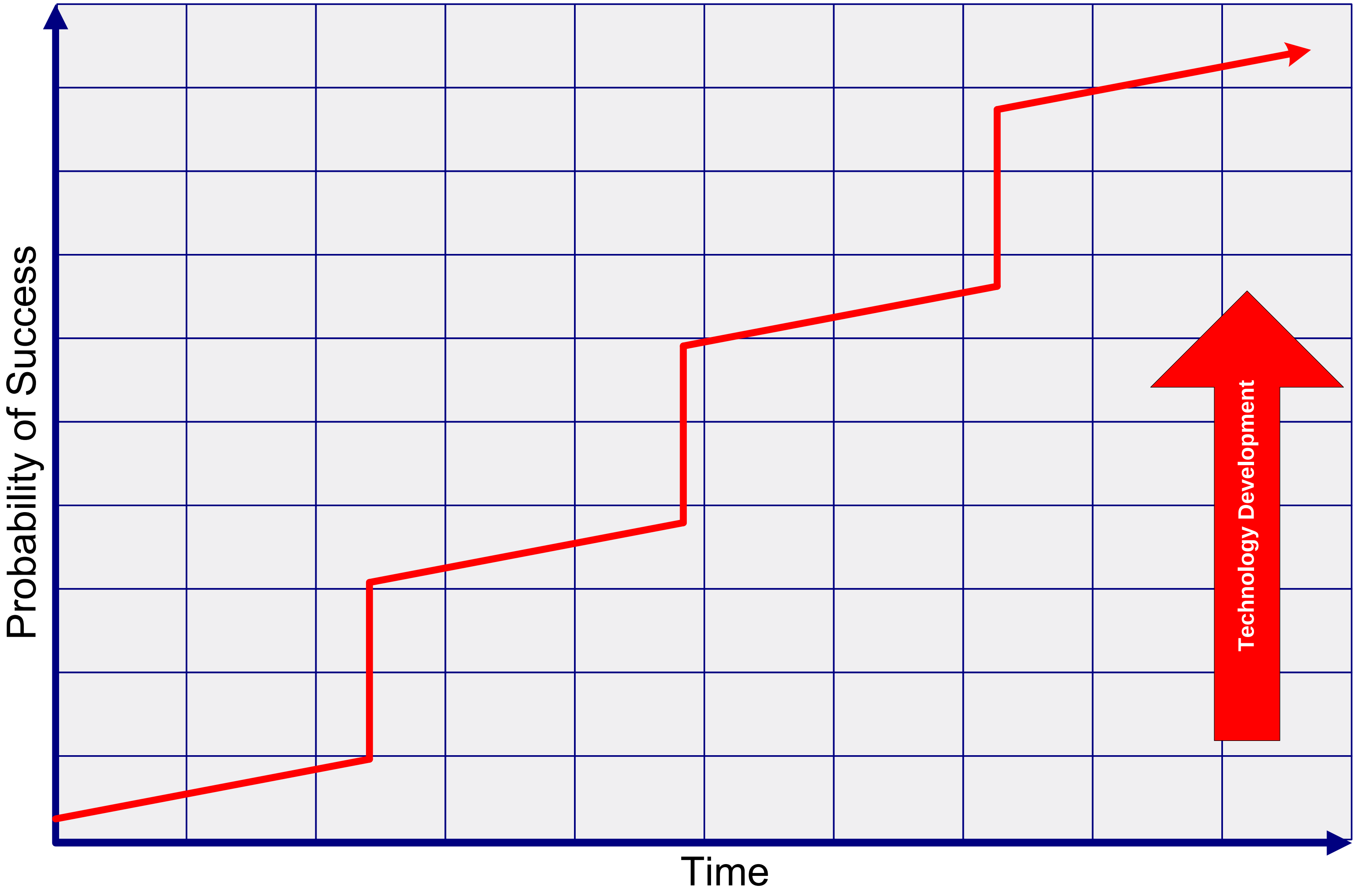
Software Practices Have Been Adopted, but Implementation Has Been Hampered by Evolving Requirements

The Army and LSI have adopted a number of disciplined software practices, but their effective implementation at the software developer level has been hampered by evolving system-level requirements. In accordance with CMMI[13] and under the advisory of the Software Engineering Institute, the Army and LSI have adopted software practices that are known to be successful in fostering quality software development, such as disciplined processes, structured management review processes, and an "evolutionary" development process. In our analysis of five FCS software developers, we found that requirements management was the cause of most problems, indicating that a key practice for managing and developing requirements has not been effectively implemented for the five software packages reviewed.

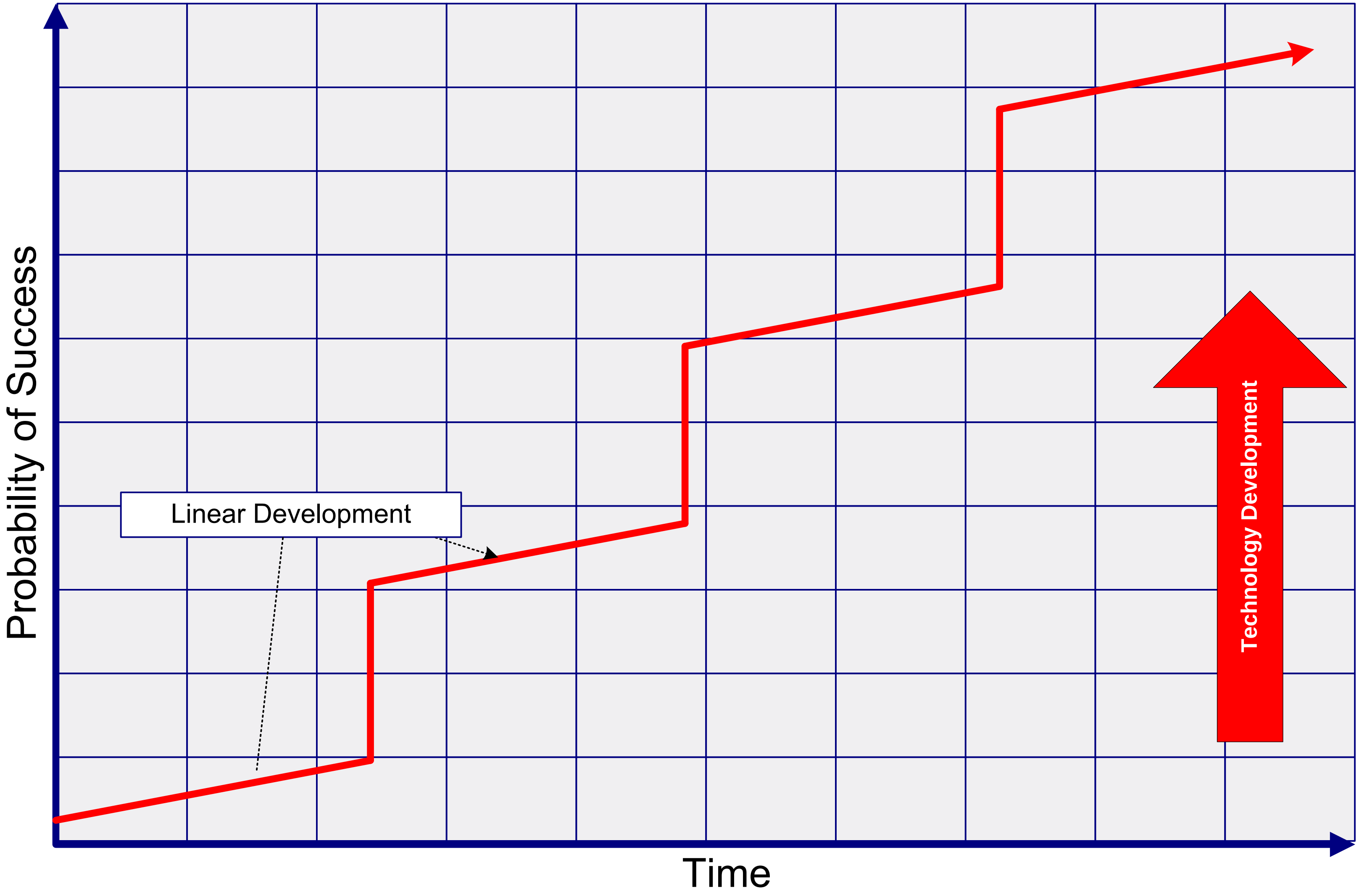
“It is tradition in this untraditional software field for everyone to do things his own way. We are still in the prehistoric age.”

Robert N. Britcher

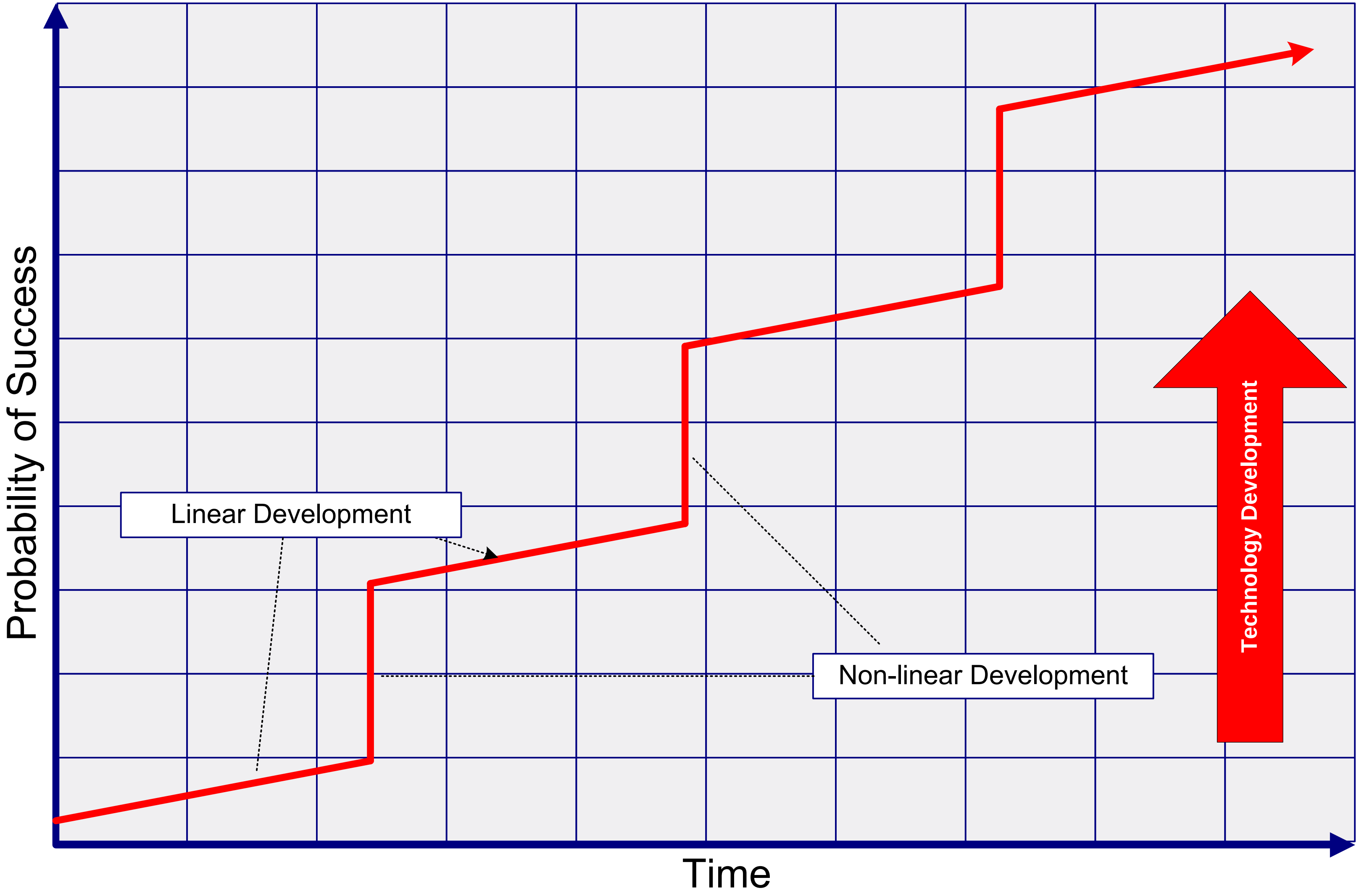
We know that projects use technology and technology changes over time…



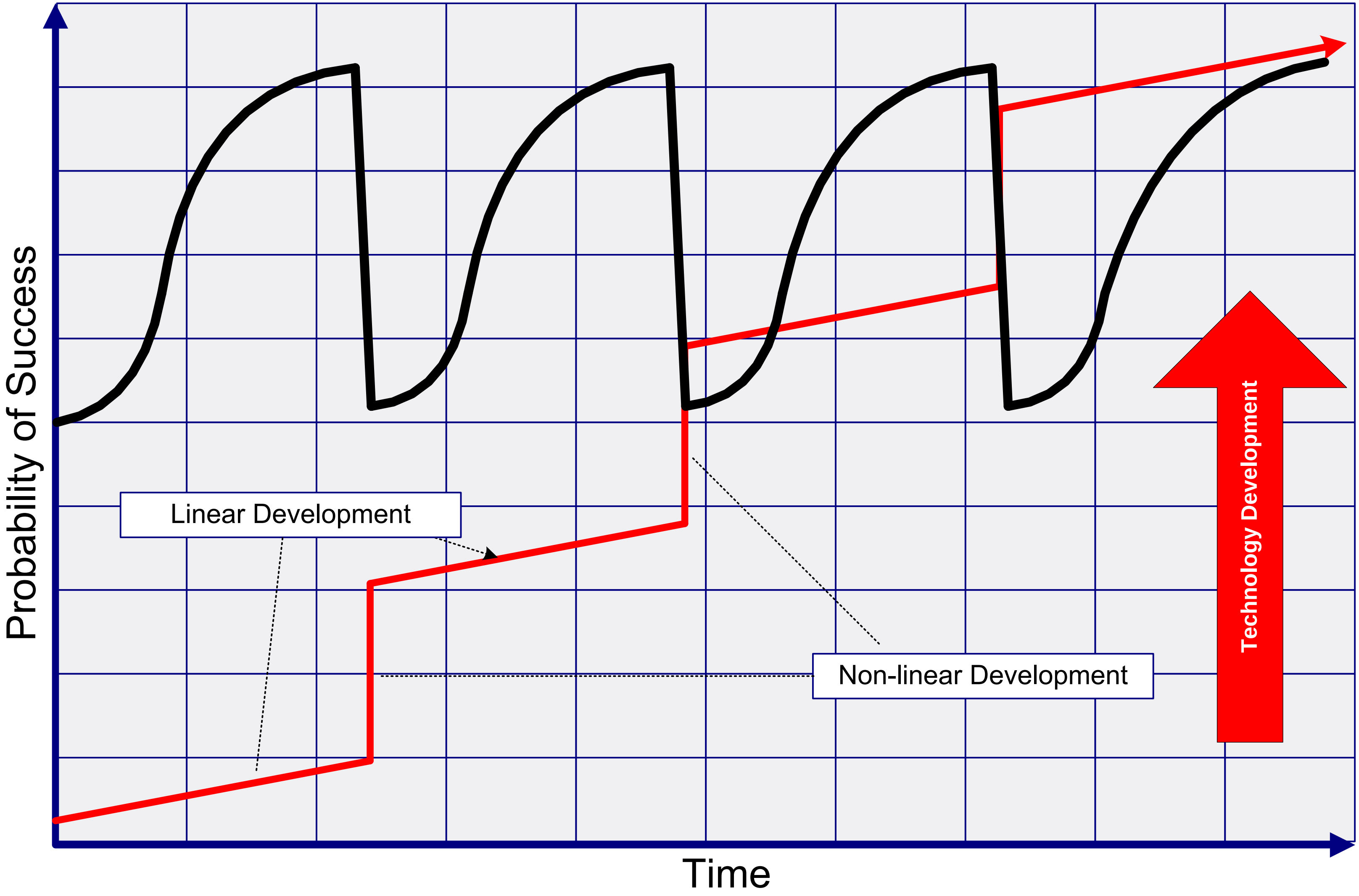
Normally the progression of technical capabilities is predictable and widely understood…



But, technical advancement is not always linear, planned, predicted, controlled, understood, or acknowledged…



Those project managers that attempt to build with new technology bare the greatest risk

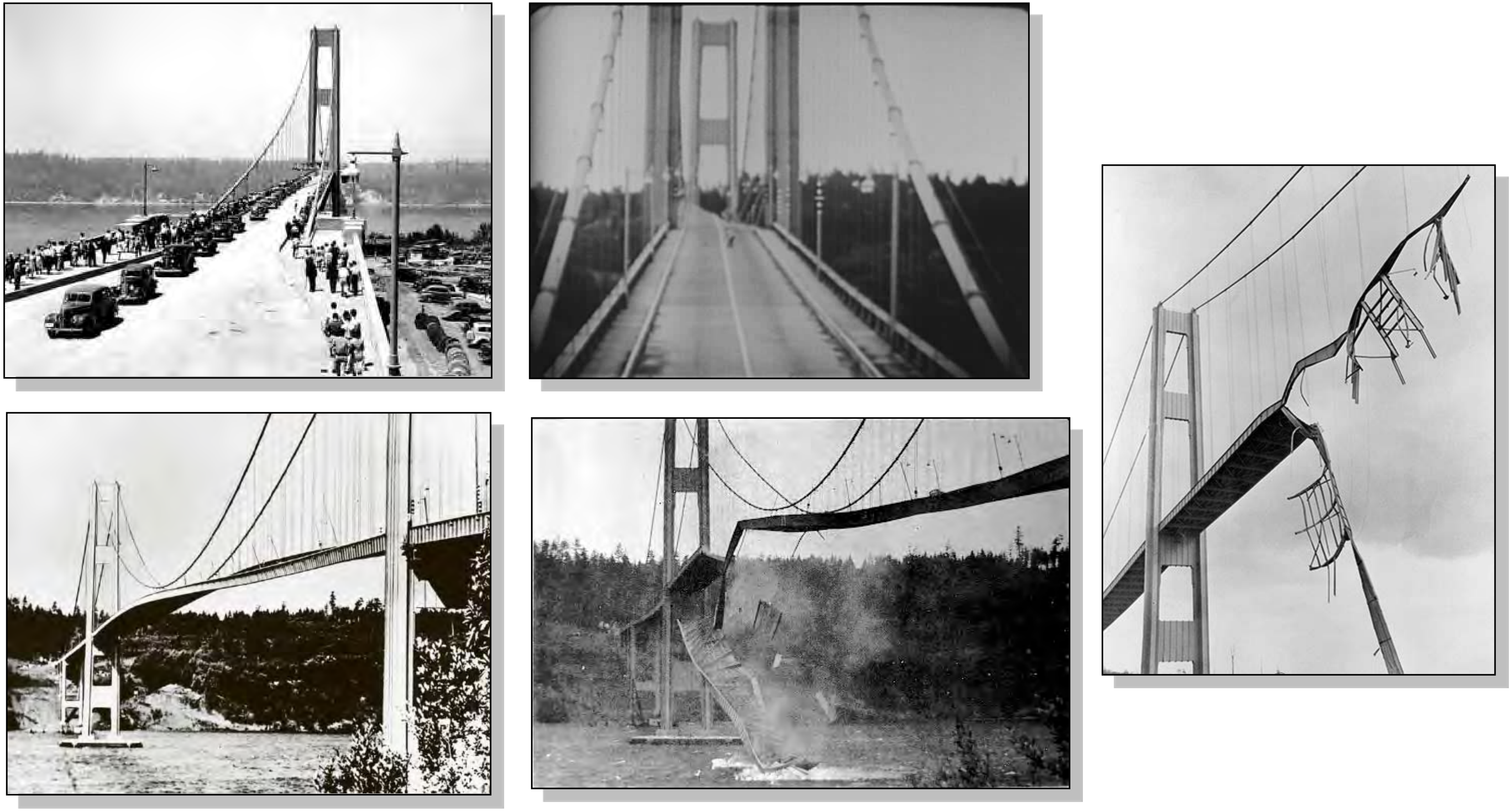


Agenda

- The Problem with Large-Scale, System of Systems Projects
- Lessons from Bridge Building
- How the CMMI can be Adapted
- CMMI-based Project Modeling

Perhaps the progression of bridge building through the ages might provide useful insights

New technical capabilities such as steel and calculus created opportunities and threats



The Brooklyn Bridge Project exhibited many of the challenges we see with Large Scale, SoS projects today

- Project Duration: 14 years
  - Construction began: January 3, 1870
  - Opening date: May 24, 1883
- Length: 5,989 feet
  - Longest in the world by 50%
  - Remained the longest for 20 years
- Cost: $16,000,000 ($270M today)
- Builders: John Roebling, then Washington & Emily Roebling

The bridge was a very dangerous project, especially for the project manager

THE CAISSON.

HM May 1883 Building
Brooklyn Bridge

There were several key enablers of success for the Brooklyn Bridge Project

- Project management
  - “Owned” the design and implementation
  - Excellent succession planning
  - Leadership
- Technical leadership
  - Detailed designs developed prior to construction
  - Understood the risks
- Engineering management
  - Used the best practices of that time
  - Highly respected

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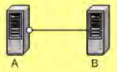
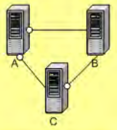
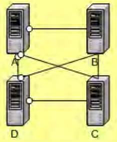
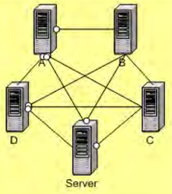
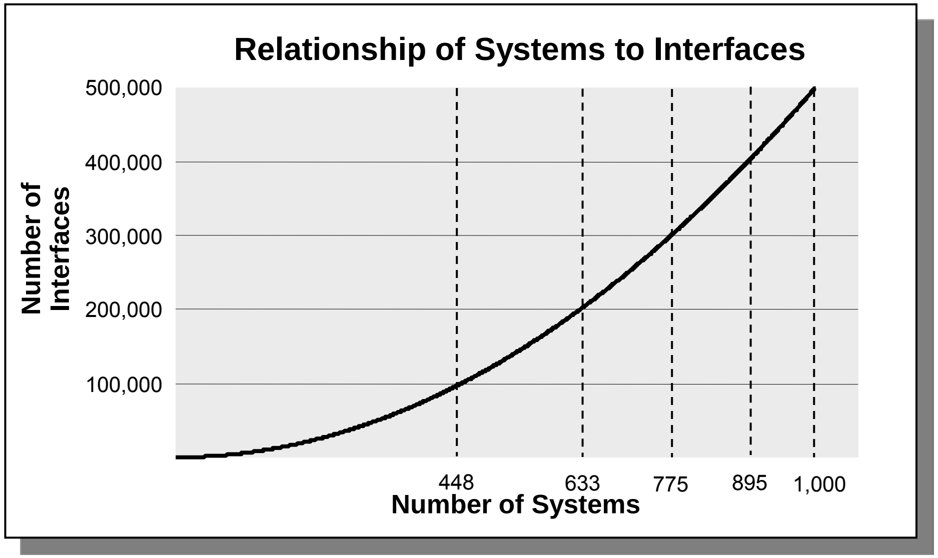
Interface management, as part of Product Integration (PI), becomes more difficult with each added system

- A critical aspect of product integration is the management of internal and external interfaces of the products and product components to ensure compatibility among the interfaces. Attention should be paid to interface management throughout the project. *

- Large-scale SoS projects have difficulty managing interfaces because –
  - Size/scale
  - Unpredictable
  - Uncontrollable
  - Poorly understood

- If it is difficult to manage a big project when the external environment is stable, it is infinitely more difficult to do so when it is changing.

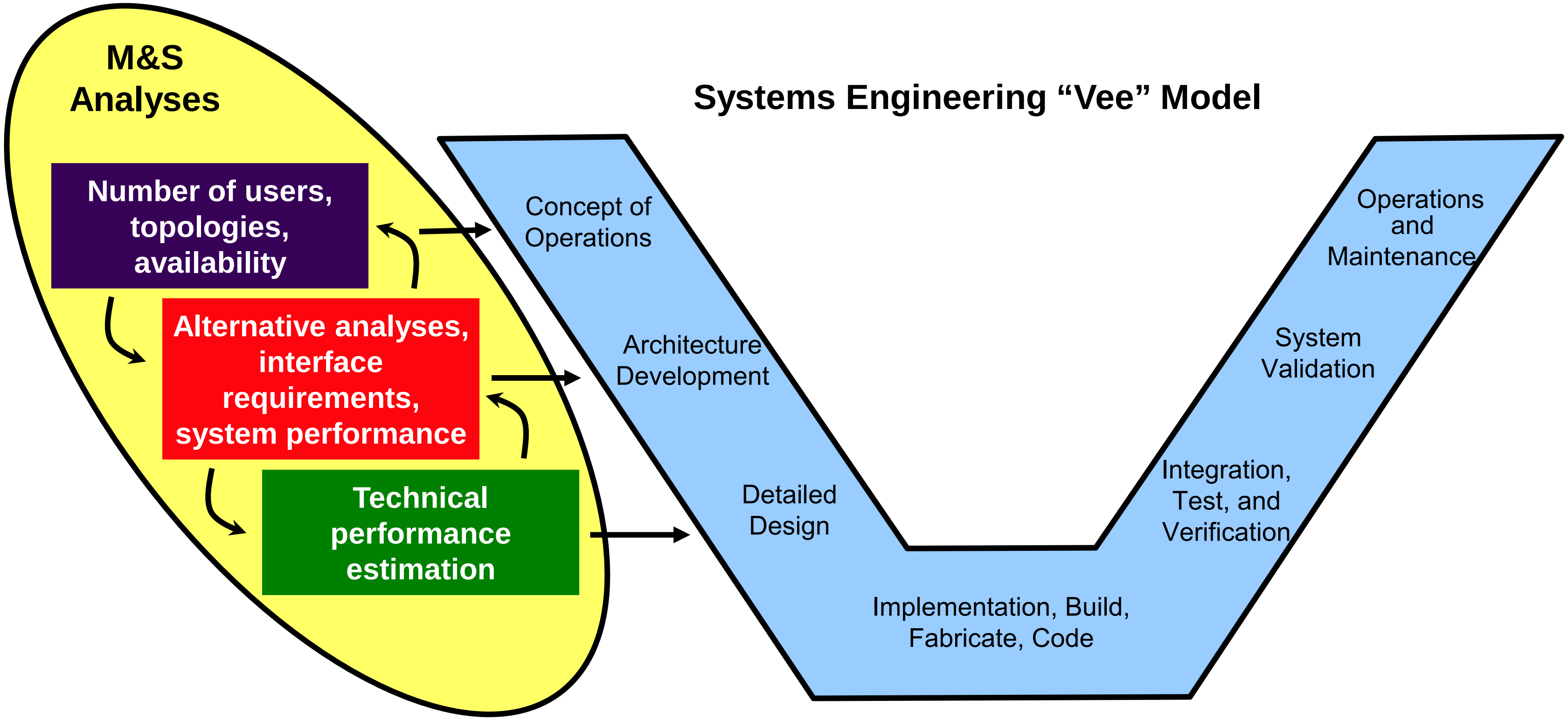
Number of Systems	Number of Interfaces
	1
	3
	6
	10



* CMMI for Development, Version 1.2, (Product Integration Process Area)

Modeling and Simulation (M&S) is a primary method used for Decision Analysis and Resolution (DAR) in the overall SE process *

- M&S can reduce risk throughout the SE process, especially during the early phases of the project.



M&S Analyses

Number of users, topologies, availability

Alternative analyses, interface requirements, system performance

Technical performance estimation

Systems Engineering "Vee" Model

Concept of Operations

Architecture Development

Detailed Design

Implementation, Build, Fabricate, Code

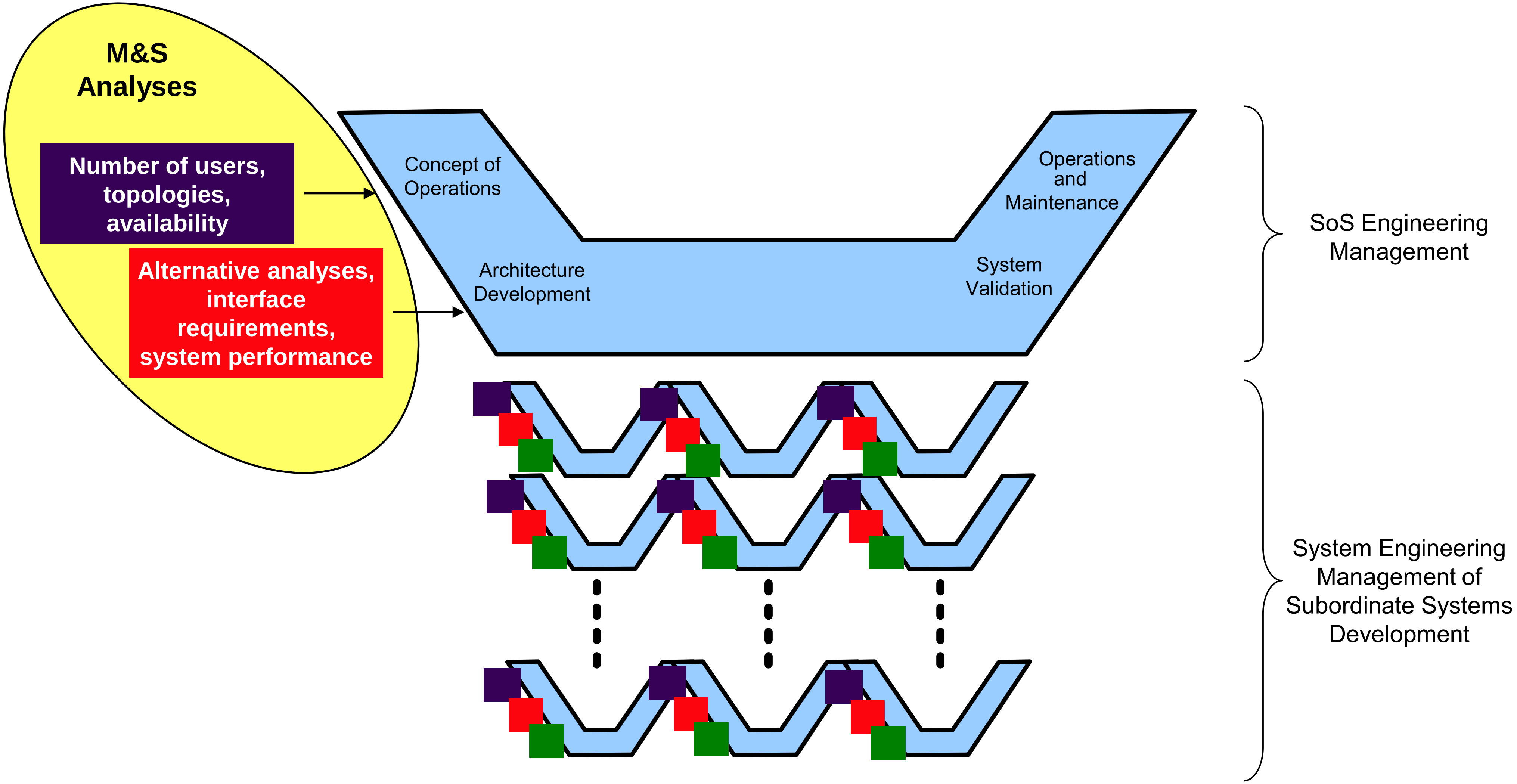
Integration, Test, and Verification

System Validation

Operations and Maintenance

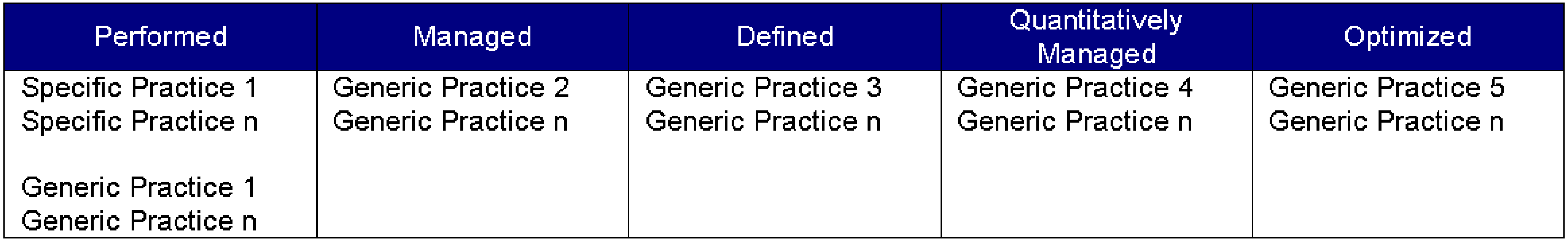
* CMMI for Development, Version 1.2, (DAR Process Area)

High quality M&S becomes much more difficult when developing a large-scale, SoS



CMMI capability levels can be adapted to help manage greater complexity

General Structure of the Capability Levels for each Process Area



Performed	Managed	Defined	Quantitatively Managed	Optimized
Specific Practice 1 Specific Practice n Generic Practice 1 Generic Practice n	Generic Practice 2 Generic Practice n	Generic Practice 3 Generic Practice n	Generic Practice 4 Generic Practice n	Generic Practice 5 Generic Practice n

- Parse the capability levels –
  - People: *what specific staff need to be in place to achieve the planned performance?*
  - Process: *what are the specific process results that will indicate success?*
  - Tools: *what specific tools will be needed to perform the process?*
  - Documentation: *what specific document should be produced?*
- Apply the capability level at both the system (project) level and SoS level (program, enterprise)

For each process area, the capability levels can be refined such that organization-specific metrics can be identified

	1. Performed		2. Managed		3. Defined		4. Quantitatively Managed		5. Optimized	
People	Specific Practice 1 Specific Practice n	System	Generic Practice 2 Generic Practice n	System	Generic Practice 3 Generic Practice n	System	Generic Practice 4 Generic Practice n	System	Generic Practice 5 Generic Practice n	System
	Generic Practice 1 Generic Practice n	SoS		SoS		SoS		SoS		SoS
Process	Specific Practice 1 Specific Practice n	System	Generic Practice 2 Generic Practice n	System	Generic Practice 3 Generic Practice n	System	Generic Practice 4 Generic Practice n	System	Generic Practice 5 Generic Practice n	System
	Generic Practice 1 Generic Practice n	SoS		SoS		SoS		SoS		SoS
Tools	Specific Practice 1 Specific Practice n	System	Generic Practice 2 Generic Practice n	System	Generic Practice 3 Generic Practice n	System	Generic Practice 4 Generic Practice n	System	Generic Practice 5 Generic Practice n	System
	Generic Practice 1 Generic Practice n	SoS		SoS		SoS		SoS		SoS
Documentation	Specific Practice 1 Specific Practice n	System	Generic Practice 2 Generic Practice n	System	Generic Practice 3 Generic Practice n	System	Generic Practice 4 Generic Practice n	System	Generic Practice 5 Generic Practice n	System
	Generic Practice 1 Generic Practice n	SoS		SoS		SoS		SoS		SoS

Example 1 – Product Integration, Level 1, *Documentation Requirements*

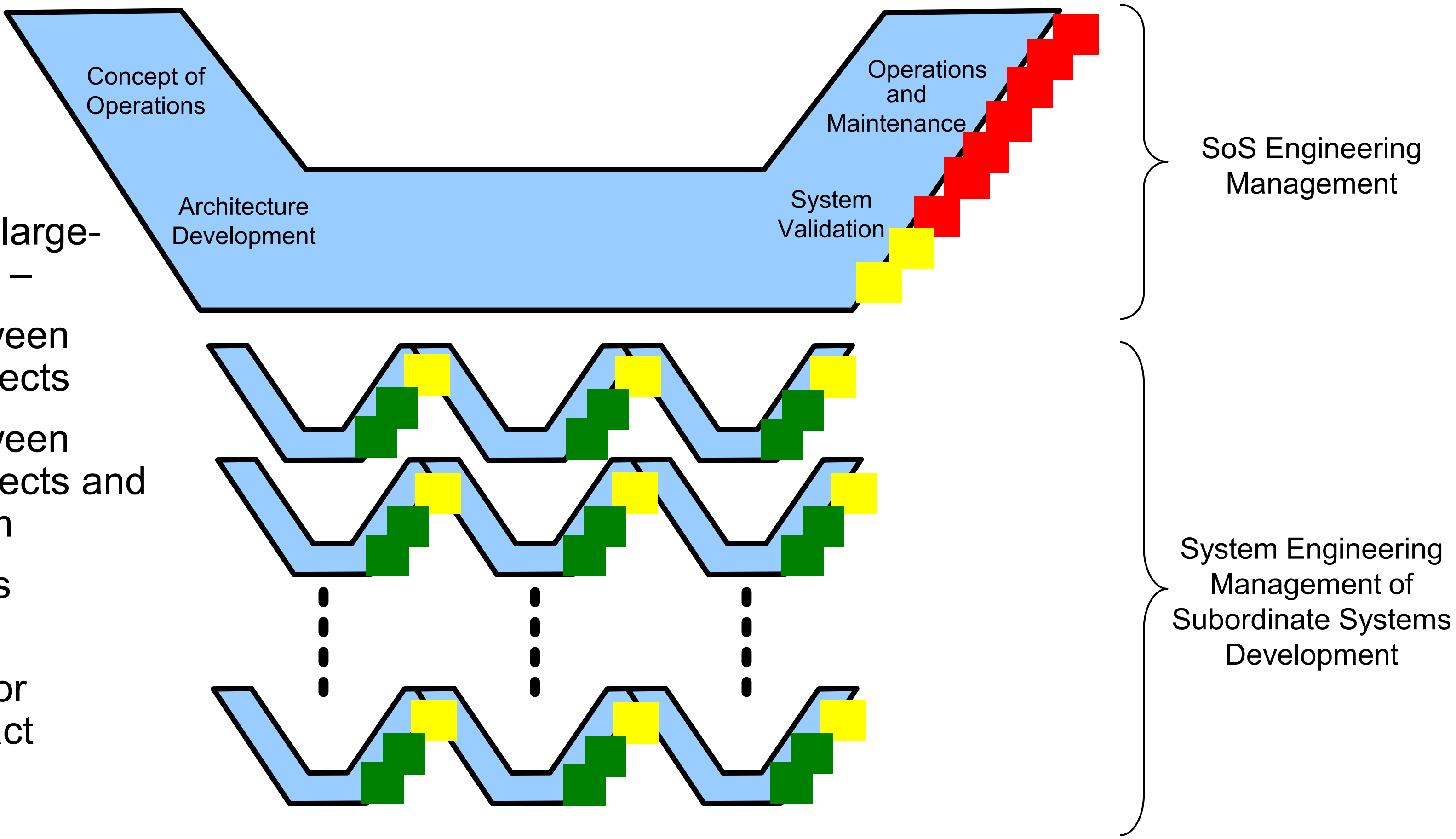
- Integration Plan
- Integration Procedures
- Integration Criteria

Example 2 – Product Integration, Level 5, *People Requirements*

- PI staff understand and contribute to process optimization activities
- Appropriately skilled and trained staff are assigned to monitor PI, support root cause analyses, and implement PI process improvements.

Product Integration (PI) processes might be more quickly assessed and problem areas targeted for improvement

- PI challenges with large-scale SoS projects –
  - Disconnect between subordinate projects
  - Disconnect between subordinate projects and the SoS program
  - Disjoint business practices
  - Diverse vendor or integrator contract requirements



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Business Process Management (BPM) technology might be used to better plan and manage large-scale, SoS projects

- Common BPM capabilities allow for –
  - Modeling a process, typically in a graphical format
  - Integrating a variety of processes, external applications, and databases with the defined process
  - Managing step-by-step process execution across multiple personnel roles
  - Creating exception handling and alternative processes
  - Monitoring the health and fulfillment cycle of the process
  - Assigning roles to personnel either by user direction within the process or based on current workload queues
  - Collecting metrics on process execution
  - Simulating the execution of the defined process based on either empirical results or user-provided parameters

FILENET

METASTORM

INTALIO

bea Think liquid.

K2

APPIAN

TIBCO The Power of Now

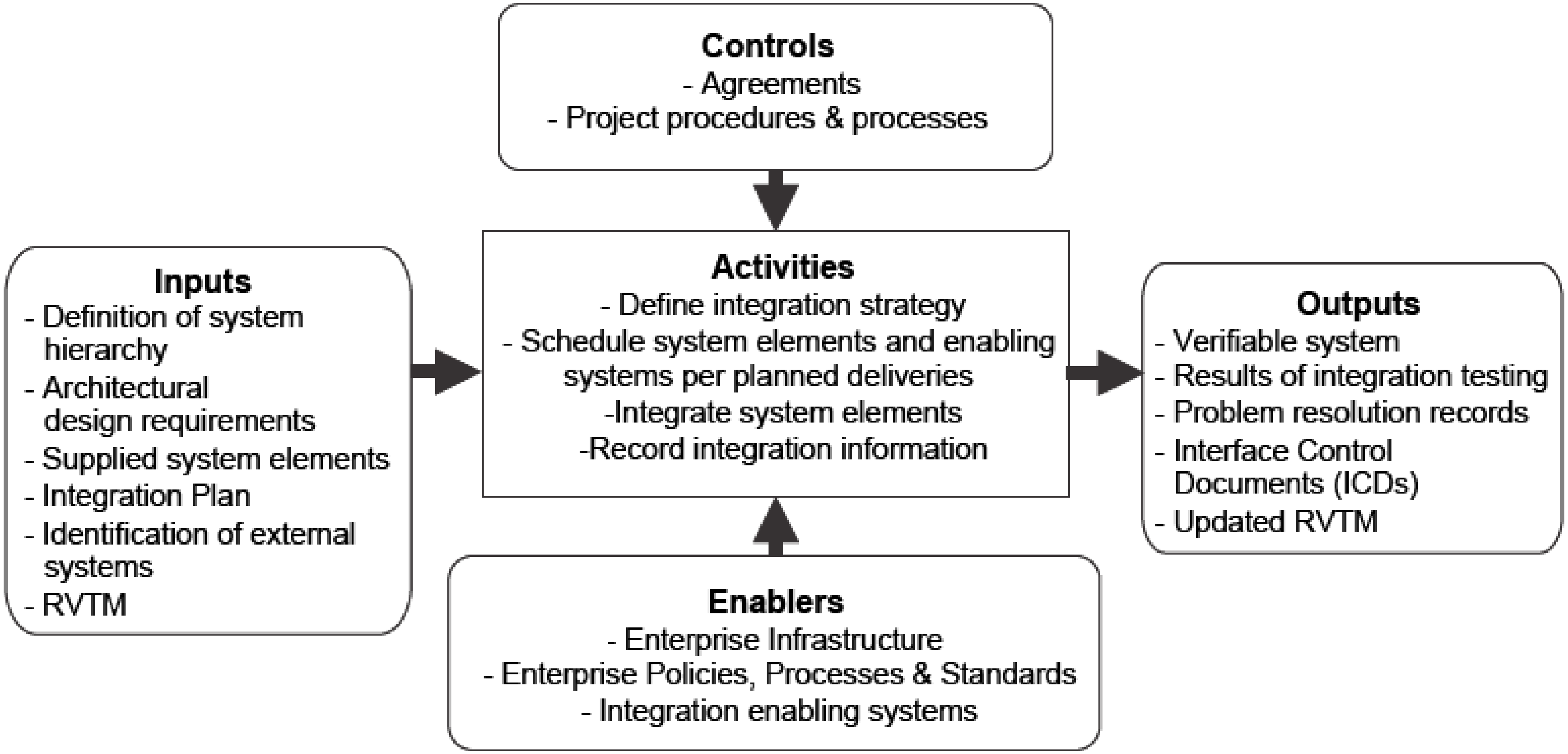
Lombardi

Adobe

Pega Pegasystems Inc.

As an example, we can use the PI process

Context Diagram for the Integration Process *



Controls
- Agreements
- Project procedures & processes

Inputs
- Definition of system hierarchy
- Architectural design requirements
- Supplied system elements
- Integration Plan
- Identification of external systems
- RVTM

Activities
- Define integration strategy
- Schedule system elements and enabling systems per planned deliveries
- Integrate system elements
- Record integration information

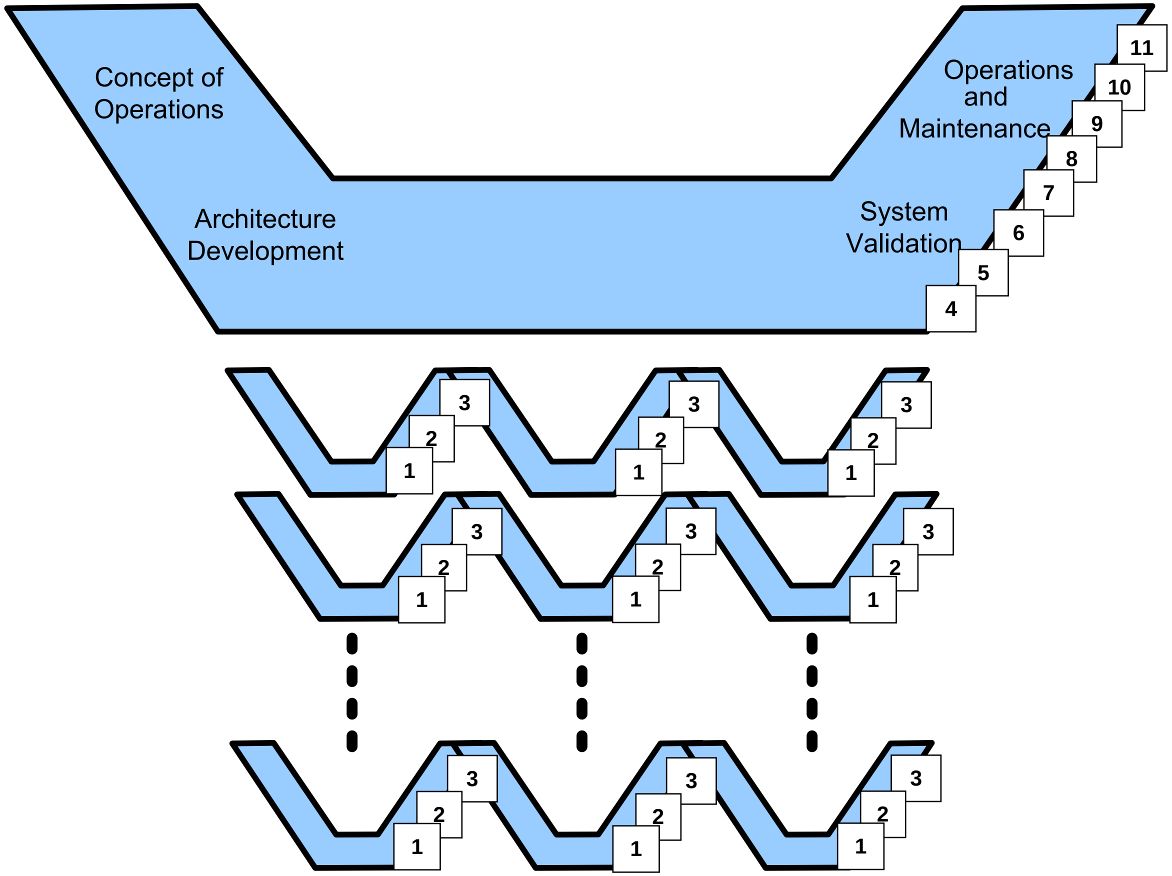
Outputs
- Verifiable system
- Results of integration testing
- Problem resolution records
- Interface Control Documents (ICDs)
- Updated RVTM

Enablers
- Enterprise Infrastructure
- Enterprise Policies, Processes & Standards
- Integration enabling systems

* INCOSE Systems Engineering Handbook, v.3.1

Since integration processes must occur at each level of the SoS hierarchy, they can be modeled to support project planning

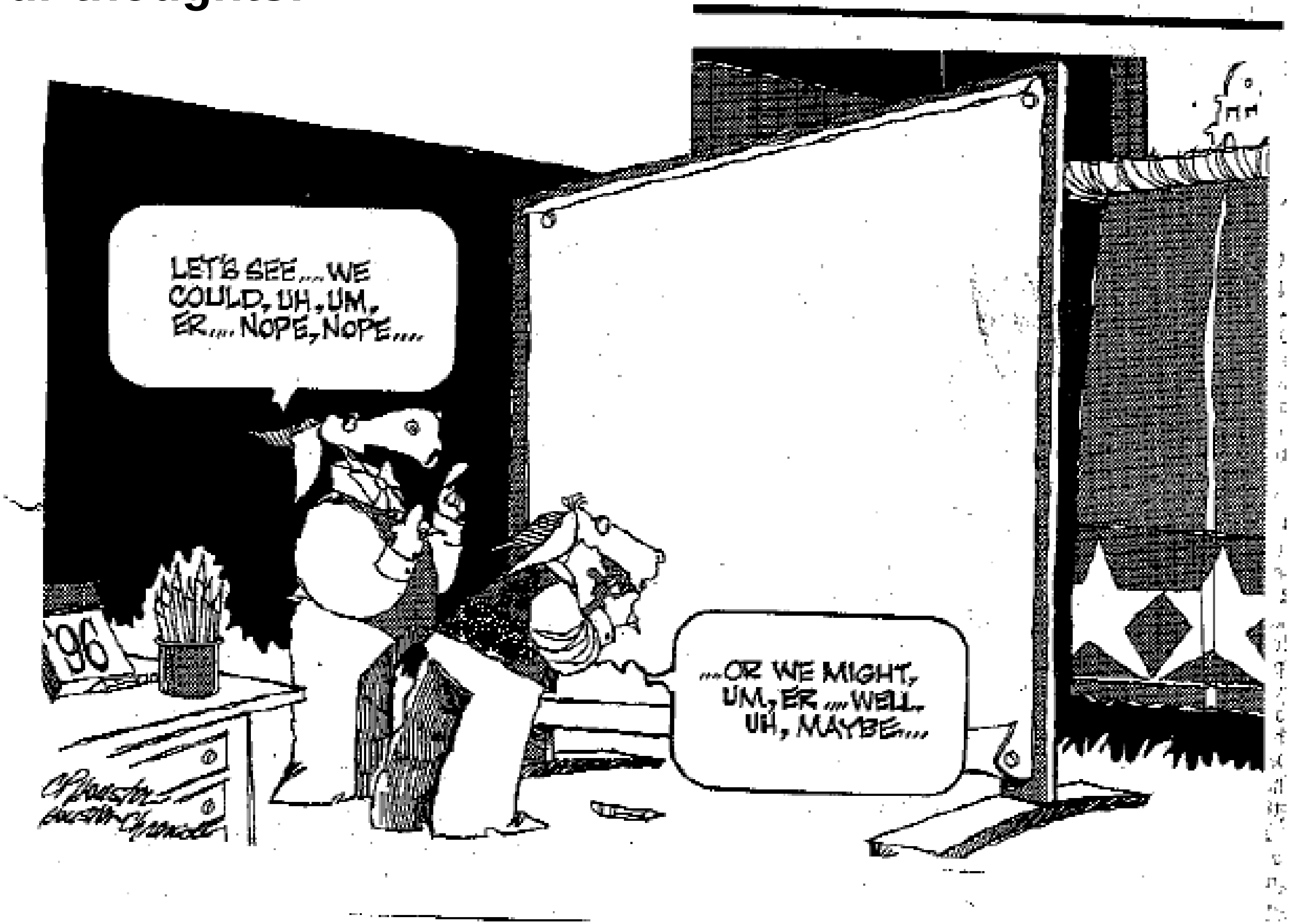
- Level of Effort (LOE)
- Documentation
- Review cycles
- Staffing requirements to Quantitatively Manager and/or Optimize
- Tool and database requirements
- Organizational issues and communications flow



In summary…

- Large-Scale, SoS projects are challenged on many fronts.
- Project Managers are not equipped to make excellent decisions.
- One key issue is that standard processes tend to break down.
- Large-Scale, SoS projects are much more complicated and therefore the planning (i.e., project modeling) and management (i.e., monitoring, assessments, control, improvement) of engineering processes must also be more sophisticated.
- The CMMI community can help with this problem by adapting proven methodologies so that they can be readily applied to these larger projects.

I am happy to take your questions and look forward to hearing your thoughts!



Making CMMI Level 5 Statistical Principles Palatable to an Employee-Wide Demographic

OST®

CMMI LEVEL 3 | ISO 9001:2008

Agenda

- Couple of questions
- Session 1
- What worked
- Additional Resources

Lets get a current baseline of CNN viewers…

Do you watch CNN everyday?

Anderson Cooper…

Do you know who Anderson Cooper is?

- http://video.google.com/videosearch?sourceid=navclient&rlz=1T4RNWN_enUS284US284&q=anderson%20cooper%20cnn%20heroes&hl=en&um=1&ie=UTF-8&sa=N&tab=wv#

Role Play

- Approach for this segment

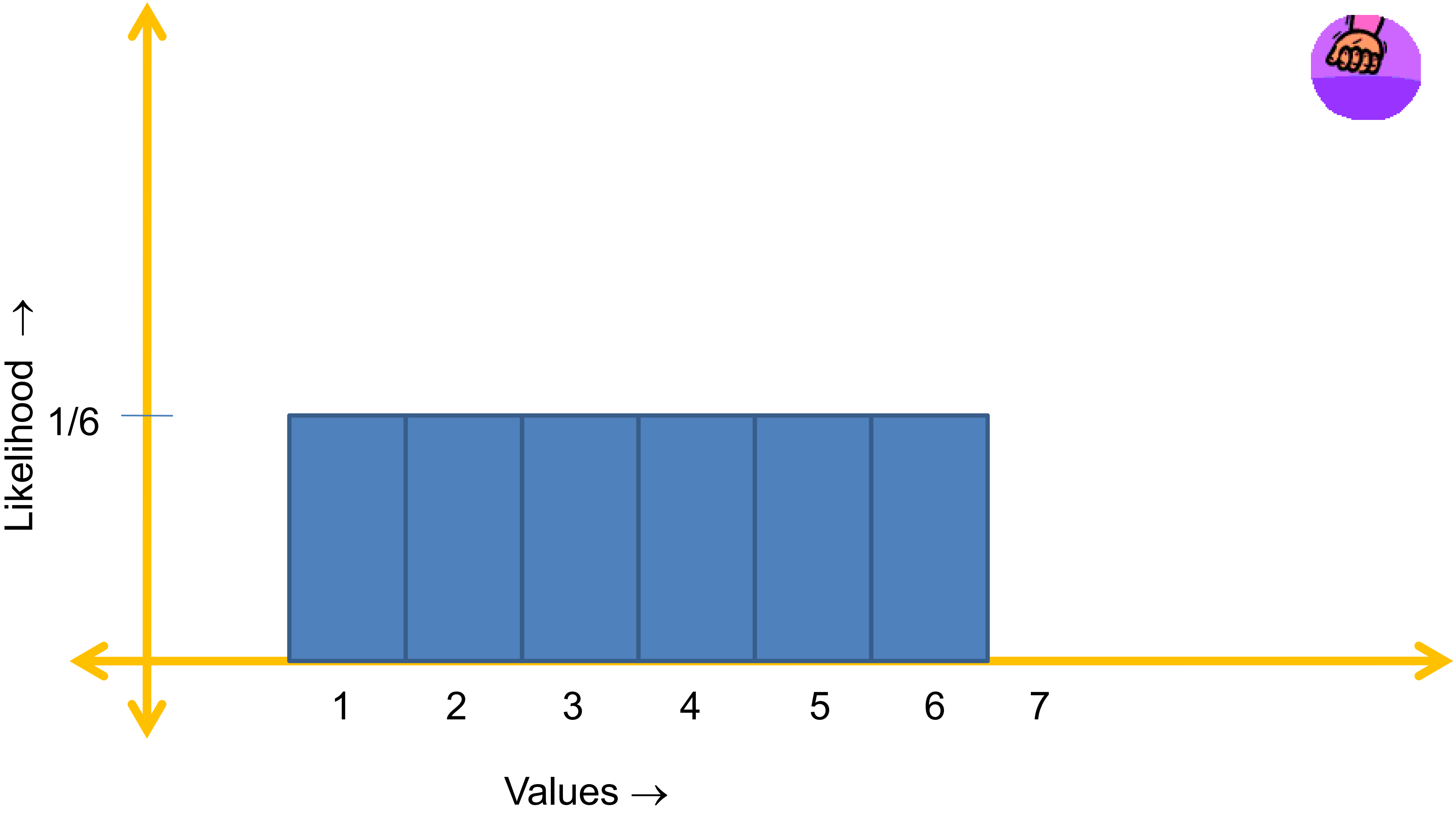
Role Play!!!

Participate!!!

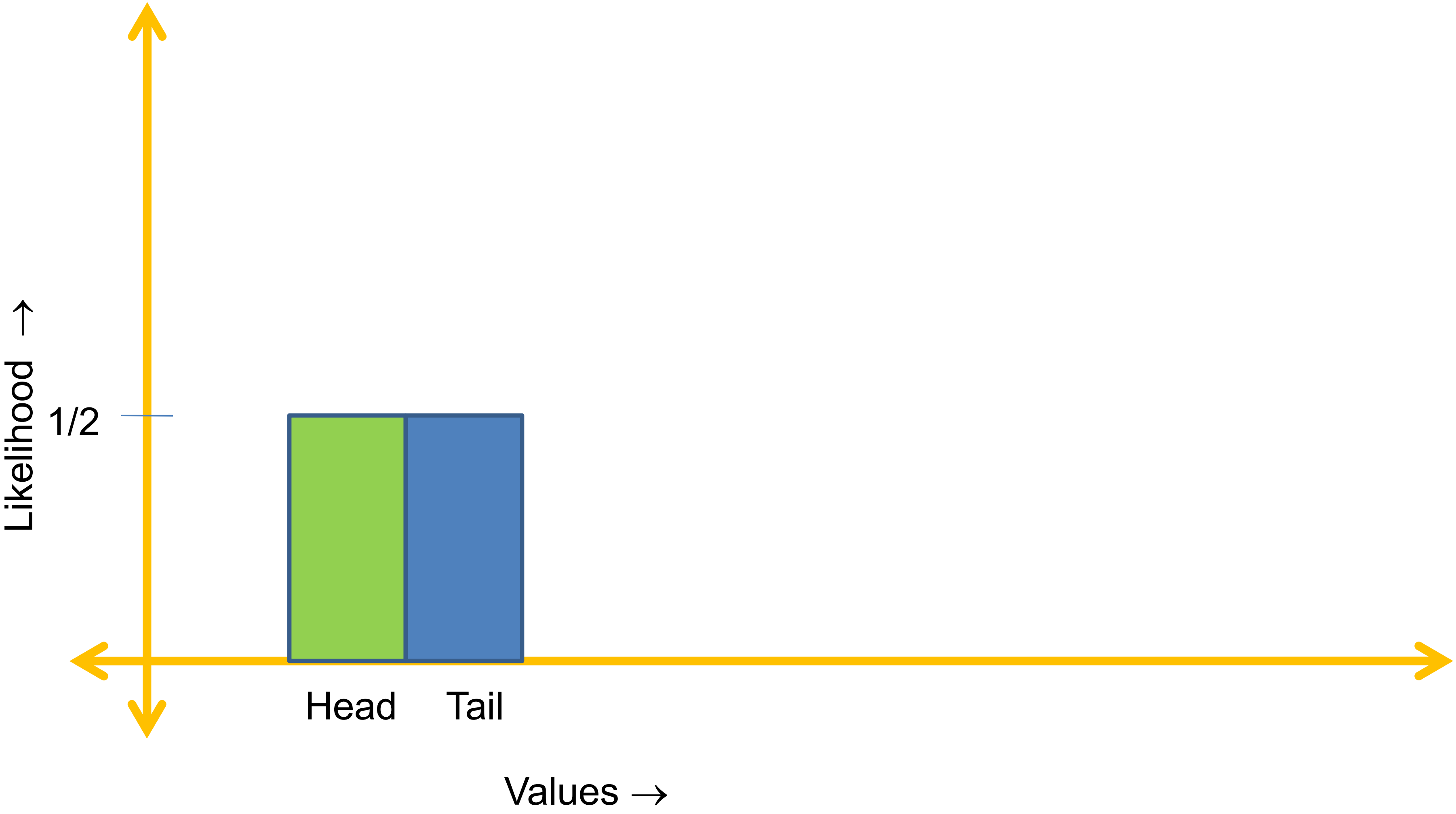
Lets establish a baseline of current understanding…

Variable “A” follows a lognormal distribution as determined by the A-D goodness of fit test. The Chi-Square test shows it has a p-value of 0.002.

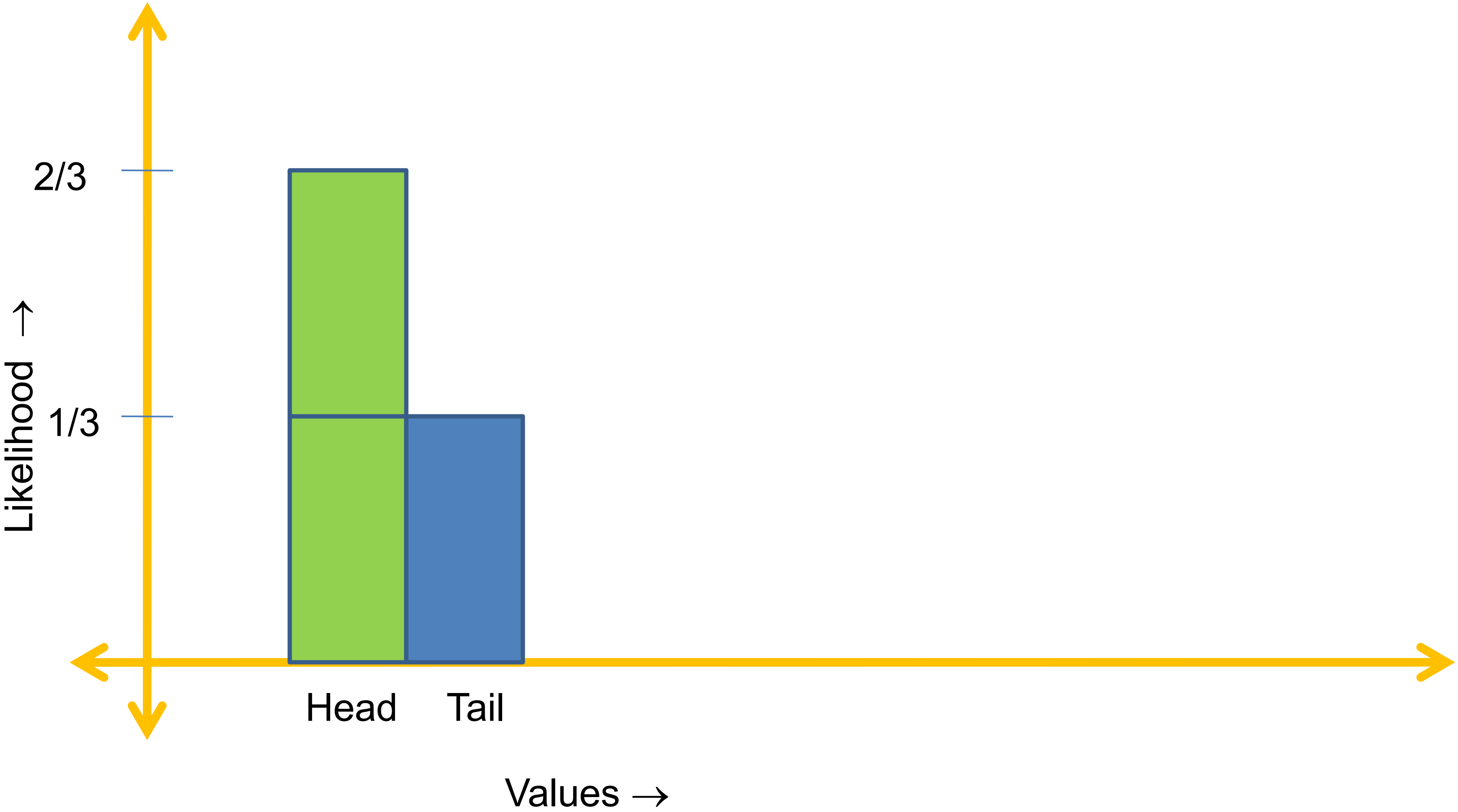
Roll a dice…



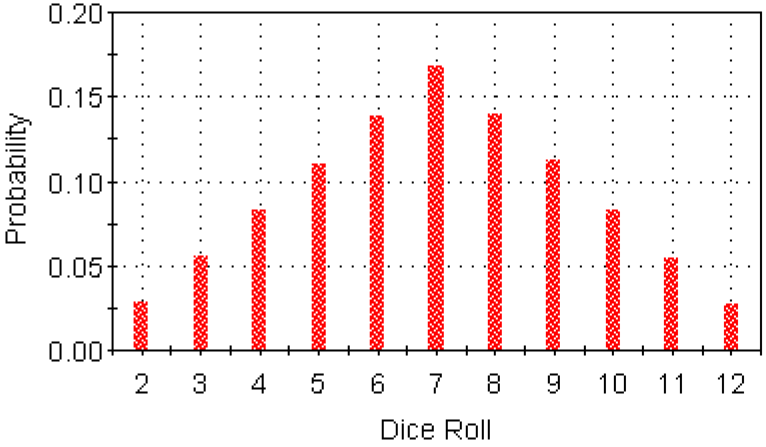
Coin toss…



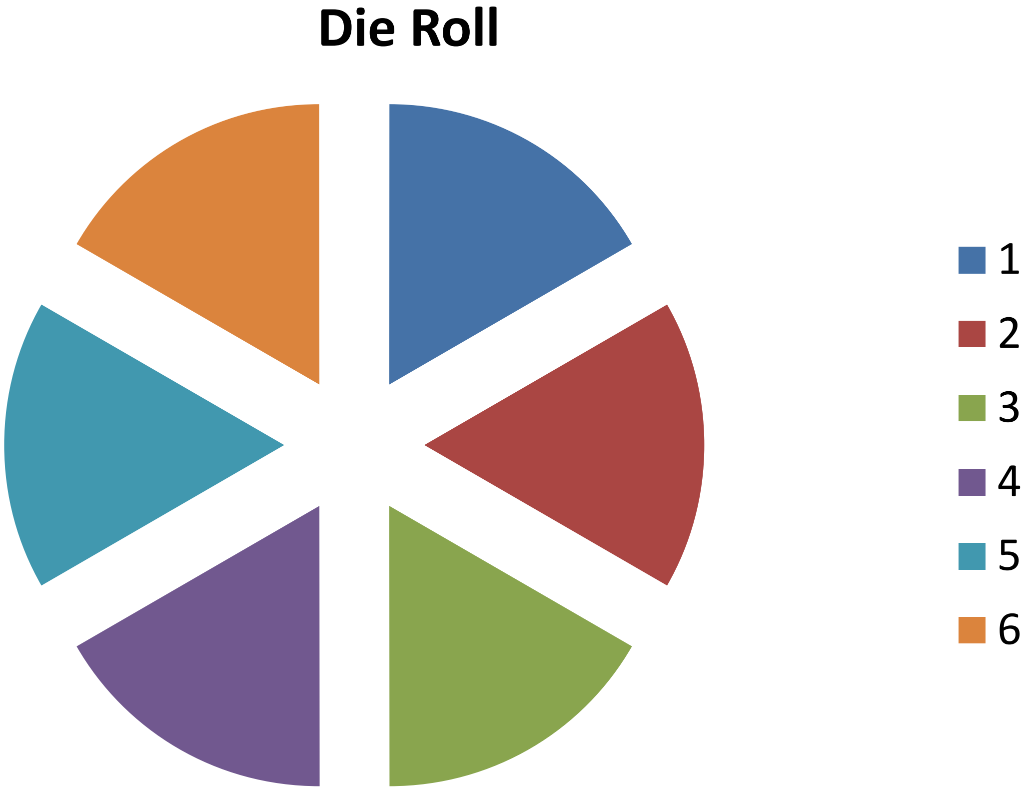
Coin toss…(unfair coin)



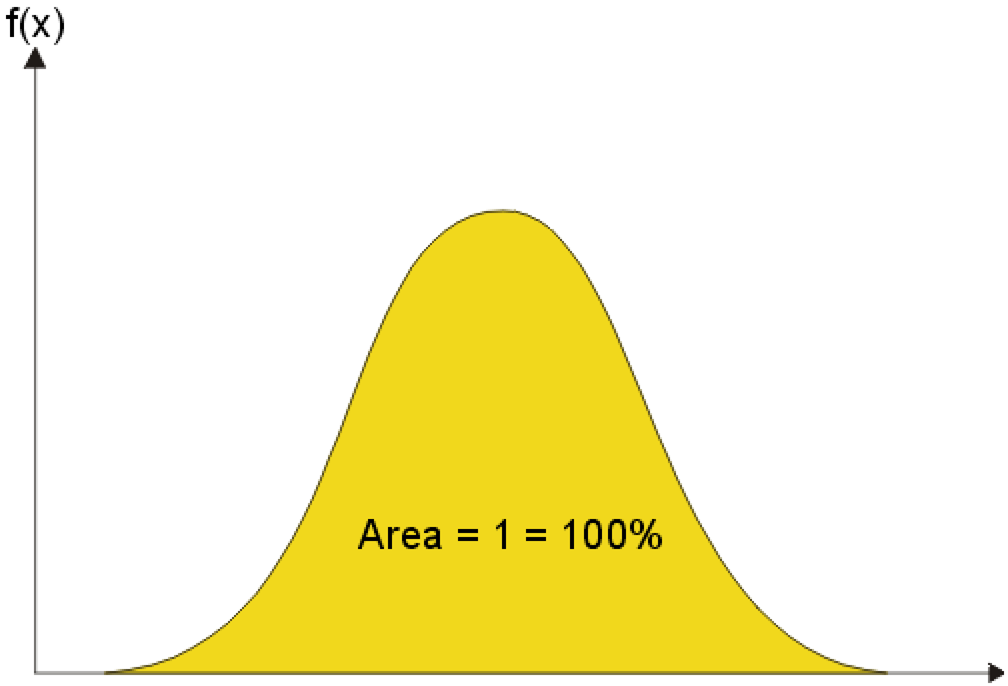
Two die…



Probability…0 to 1; 0% to 100%



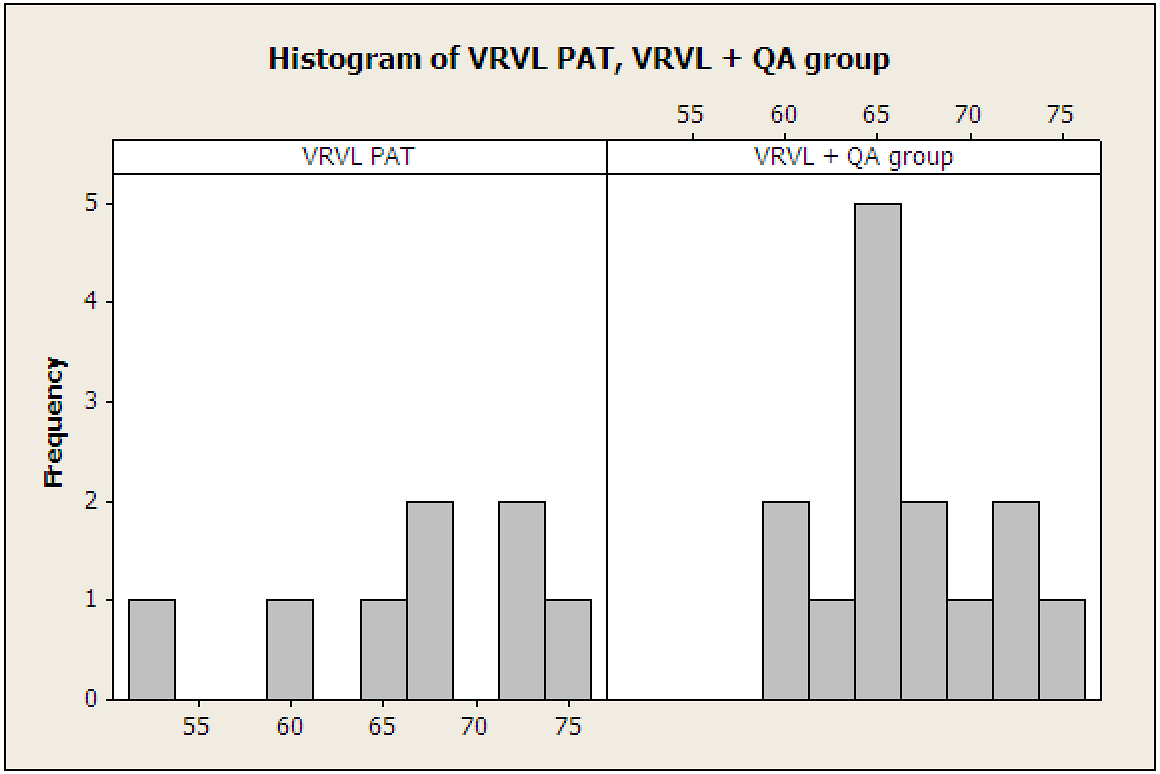
Area under a curve…



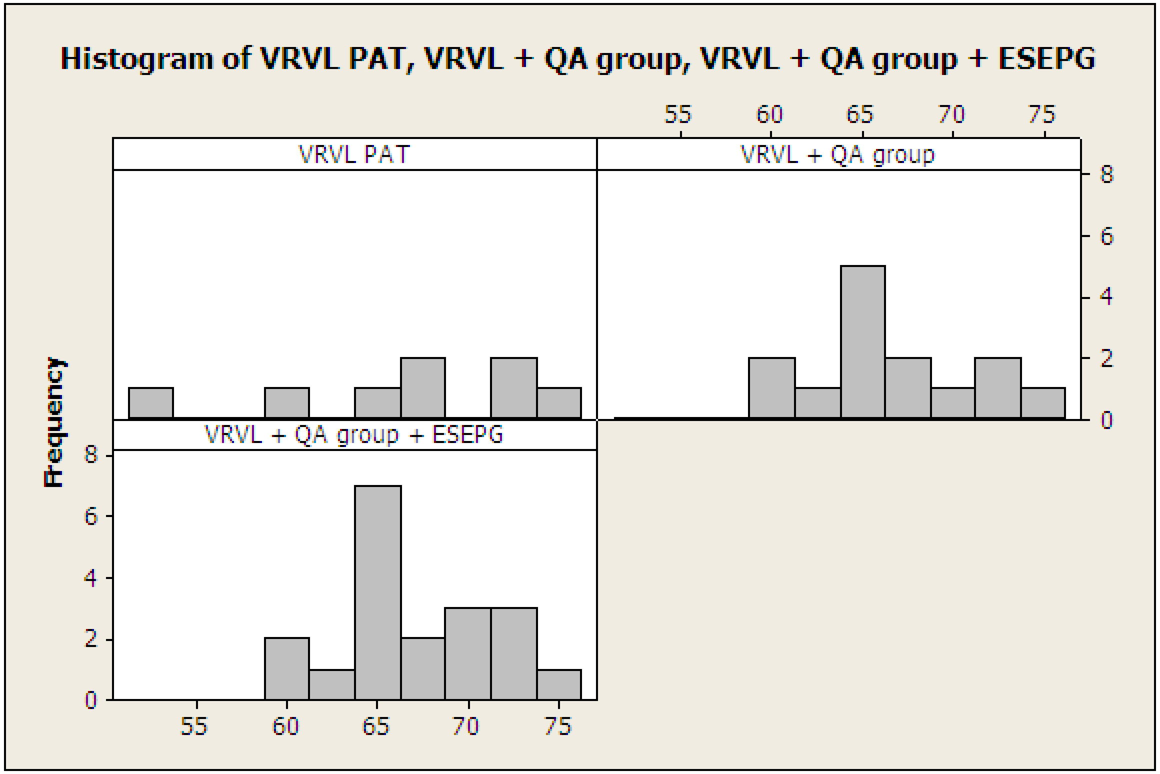
Heights of the VRVL PAT…+ QA group+ ESEPG

Joann – 5’ 1”
Lakshmi – 5’ 4”
Domenic – 5’ 8”
Krithika – 5’ 8”
Hongda – 6’ 1”
Jerome – 6’ 1”
James – 6’ 3”
Charlotte - 5'6"
Carolina - 5'5"
Surya - 5'9"
Nalini - 5'0"
Barbara - 5'5"
Nishi - 5'2"
Deepti - 5'6"
Dan Renfroe -
Joe - 5'11
Jack - 5'10"
Ajay - 6'0"
Vijay - 5'5"

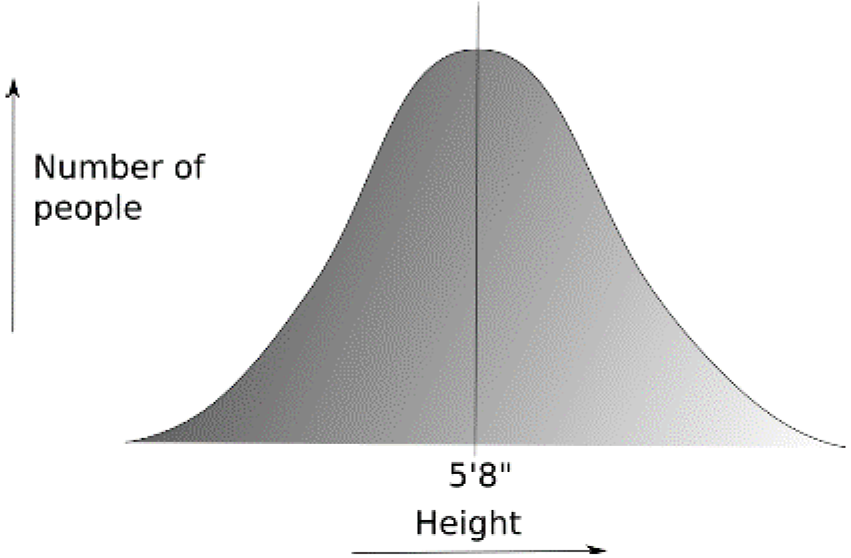
Histograms...PDF



Histograms


Histogram of VRVL PAT, VRVL + QA group, VRVL + QA group + ESEPG
VRVL PAT
VRVL + QA group
VRVL + QA group + ESEPG
Frequency
0
2
4
6
8
55
60
65
70
75

Heights in general…



Some other distributions…

Anderson – Darling…Does this fit?

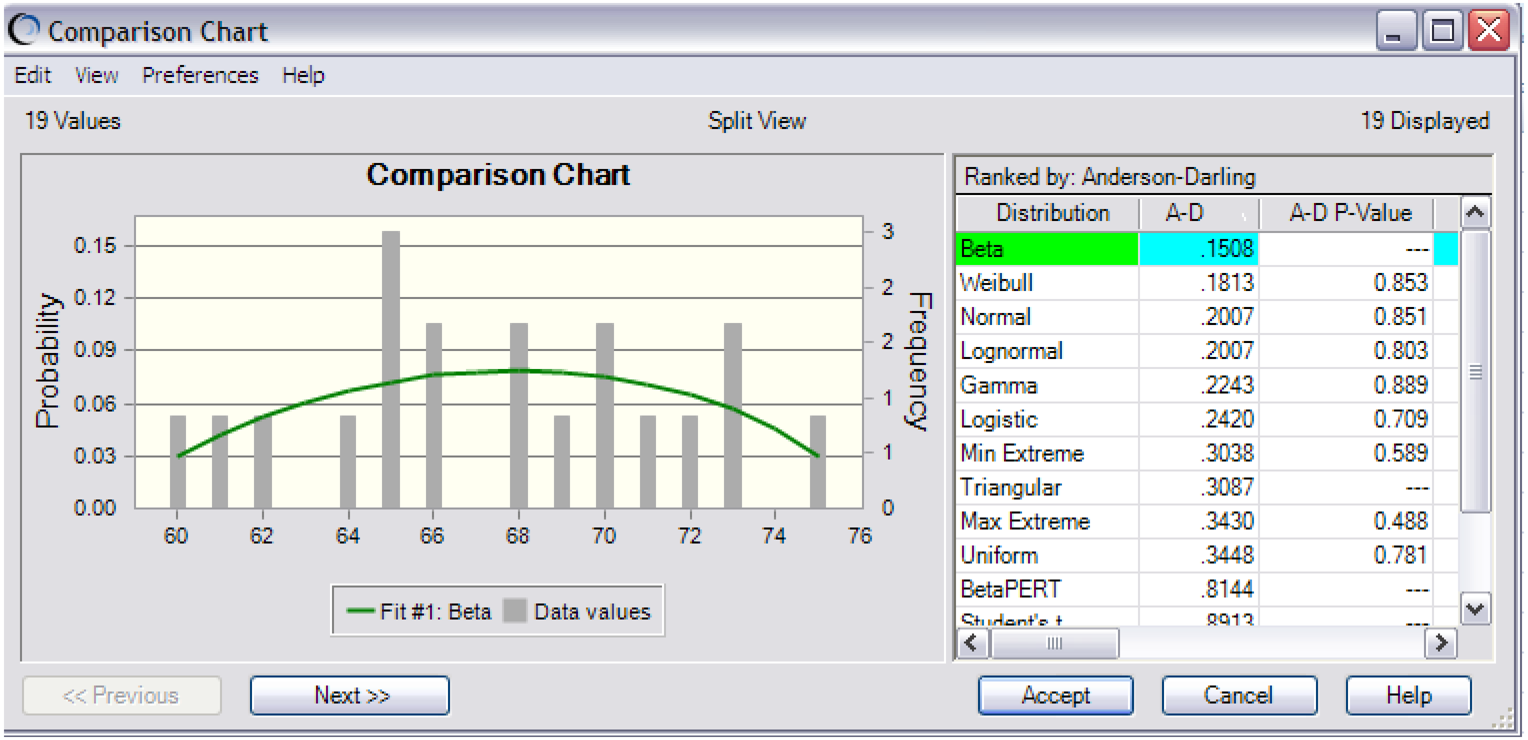
○ Anderson-Darling

○ Kolmogorov-Smirnov

○ Chi-Square

Name	Is a good fit if…	More details
Anderson-Darling	A-D<1.5	
Chi-Square	P Value>0.05	Oldest
Kolmogorov-Smirnov	K-S<0.03	

Results of Goodness of fit test…for heights



Ranked by: Anderson-Darling

Distribution	A-D	A-D P-Value
Beta	.1508	---
Weibull	.1813	0.853
Normal	.2007	0.851
Lognormal	.2007	0.803
Gamma	.2243	0.889
Logistic	.2420	0.709
Min Extreme	.3038	0.589
Triangular	.3087	---
Max Extreme	.3430	0.488
Uniform	.3448	0.781
BetaPERT	.8144	---
Student's t	.8913	---

Do we understand…

A distribution…Goodness of fit…p-value

Lets get another baseline…

- Variable "A" follows a lognormal distribution as determined by the A-D goodness of fit test. The Chi-Square test shows it has a p-value of 0.002.

And CNN viewership??

- What is it now?

Which baselines changed?

- CNN Viewership's?
- Do you know what Anderson Cooper looks like?
- Your “assumed identities” understanding of the statement?

Why/Why not?

Other tests

- **chi-square** - The oldest and most common goodness-of-fit test. This test gauges the general accuracy by breaking down the distribution into areas of equal probability and comparing the data points within each area to the number of expected data points. Generally, a *p*-value greater than 0.5 indicates a close fit.

- **Kolmogorov-Smirnov** - A goodness-of-fit test, the result of which is essentially the largest vertical distance between the two cumulative distributions. Generally a value less than 0.03 indicates a good fit.

- **Anderson-Darling** - A goodness-of-fit test that closely resembles the Kolmogorov-Smirnov test, except that it weights the differences between the two distributions at their tails greater than at their mid-ranges. Use this test when you need a better fit at the extreme tails of the distributions. Generally a value less than 1.5 indicates a close fit.

Role play over

- Thank you for the role play

This was a real session!

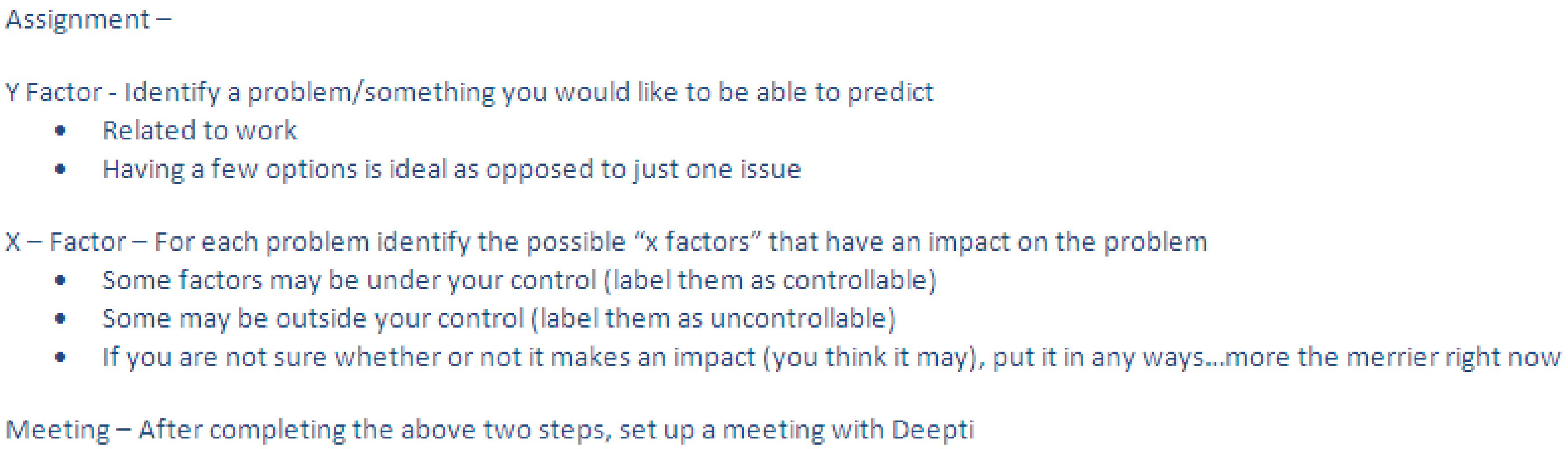
Moving on with our agenda….

Stuff that worked or we'd do differently

- Worked well
  - Socratic method
  - Their data
  - Everyday examples
  - Everyone participates
  - No fear

- What we are doing differently
  - More exercises
  - Come up with x and y factors sooner

What we did next…Assignment



Assignment –

Y Factor - Identify a problem/something you would like to be able to predict

- Related to work
- Having a few options is ideal as opposed to just one issue

X – Factor – For each problem identify the possible "x factors" that have an impact on the problem

- Some factors may be under your control (label them as controllable)
- Some may be outside your control (label them as uncontrollable)
- If you are not sure whether or not it makes an impact (you think it may), put it in any ways…more the merrier right now

Meeting – After completing the above two steps, set up a meeting with Deepti

Results

- Sample models that came up
  - Time I need to spend on the help desk
  - Time to develop reports
  - Quality of end product
  - My productivity
  - LOE needed for Testing
  - Etc.

What’s in the Appendix?

- Material from additional sessions
- If you need help, we’ll be happy to chat via:
  - Email
  - Phone
  - Etc.

…to provide tips from our experience

Our Contact Information

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Questions

Any Questions?

Appendix

Appendix:
Supporting material

Some more samples

- Hypothesis Tests and Jokes
- Standard Deviation and Variability
- Two real life models
- L5 and basic steps
- Tool trainings

Do you understand this statement…

- The NULL hypothesis was rejected in favor of the alternative hypothesis since the p value was…

- Let’s get a baseline from the class
  - How many Get It?
  - Somewhat?
  - Do NOT get it?

Have you heard…

- Innocent until proven guilty
  - The person is innocent
  - The person is guilty

Null Hypothesis

Alternative Hypothesis

Which of the above statements is…

- Status Quo
- Conventional wisdom
- Doesn’t need to be proved
- Accepted without additional proof

Null Hypothesis

Alternative Hypothesis

- Not Status Quo
- Not Conventional wisdom
- The burden of proof rests on
    - One who challenges
    - Makes a new claim
    - Wants to change the status quo

So what’s a hypothesis test?

- ✓ …To Suppose
- ✓ A pair of statements (not questions)
- ✓ Can be tested
- ✓ Has a clear yes/no answer
- ✓ If one is true the other is false
- ✓ Nothing “slips through the cracks”

Ho: Djindo is on the AITS project.
Ha: Djindo is not on the AITS project.

Ho: Sonu is on the AITS project.
Ha: Jadrana is not on the HSEEP project.

Ho: Dan’s height is 5.11.
Ha: Dan’s height is 6.2.

Ho: Is Arthur really tall?
Ha:

Ho: Is Surya a Doctor?
Ha:

So what's a hypothesis test?

- ✓ …To Suppose
- ✓ A pair of statements (not questions)
- ✓ Can be tested
- ✓ Has a clear yes/no answer
- ✓ If one is true the other is false
- ✓ Nothing "slips through the cracks"

Ho: Kusum was born in Washington DC.
Ha: Kusum was not born in Washington DC.

Ho: Julie is a doctor.
Ha: Julie is not a doctor.

Ho: Sean watches CNN every day.
Ha: Sean does not watch CNN every day.

So what's a hypothesis test?

- ✓ …To Suppose
- ✓ A pair of statements (not questions)
- ✓ Can be tested
- ✓ Has a clear yes/no answer
- ✓ If one is true the other is false
- ✓ Nothing "slips through the cracks"

Ho: Apple's help desk answers calls in 2 min or less.
Ha: Apple's help desk answers calls in more than 2 min.

Ho: The average GPA of GW is 2.6 or higher.
Ha: The average GPA of GW is less than 2.6.

Ho: Dan's height is 5.11 or taller.
Ha: Dan's height is less than 5.11.

Once you run the hypothesis test you get a

- P-Value…

When the p is low, the null must go

When the P is high, the null must fly

Less than (<) 0.05 or 5%

Equal to or Greater than (<=) 0.05 or 5%

So what's a hypothesis test?

p = 0.25

o: Apple's help desk answers calls in 2 min or less.
Ha: Apple's help desk answers calls in more than 2 min.

Ho: The average GPA of GW is 2.6 or higher.
Ha: The average GPA of GW is less than 2.6.

p = 0.04

Ho: Dan's height is 5.11 or taller.
Ha: Dan's height is less than 5.11.

p = 0.80

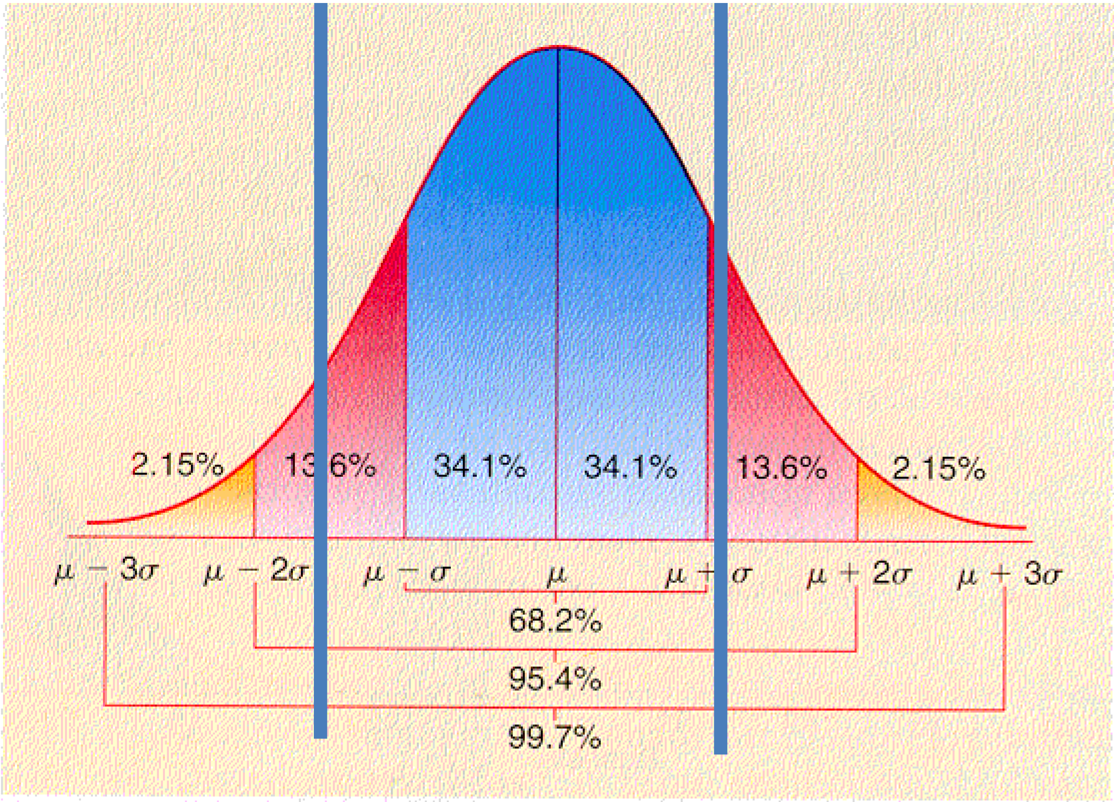
Do you understand this statement…

- The NULL hypothesis was rejected in favor of the alternative hypothesis since the p value was…

- Let's get a baseline from the class
  - How many Get It?
  - Somewhat?
  - Do NOT get it?

Technical Terms…P value is the

- Probability of Null being true…or accepting the null



Questions

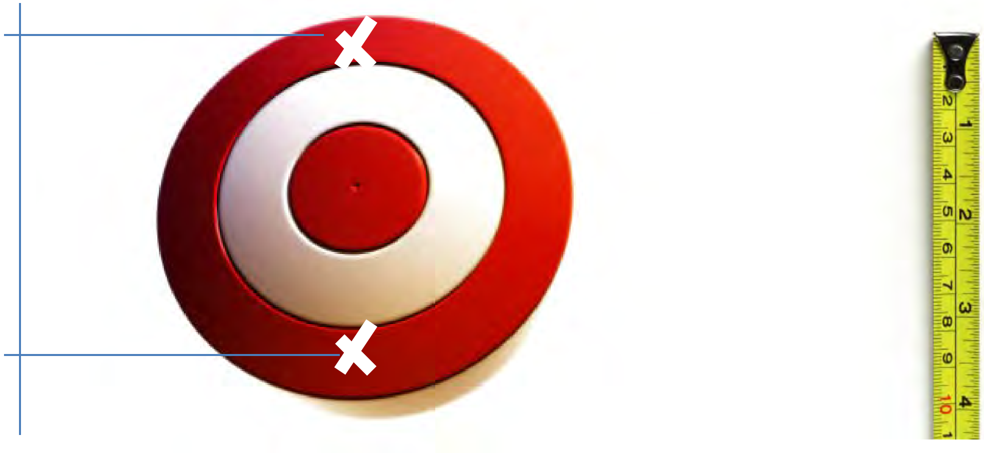
Any Questions?

Some terms…

- CENTRAL TENDENCY
  - Mean/Average
  - Median

- VARIANCE

The weakness of using Central tendency alone…



May be a far cry from reality…

The weakness of using Central tendency alone…

You are a Manager for Boeing.

Expectation - 50 jet engines on June 29th.

You will store them in a warehouse.

Each day (late) –You loose $2 million.

Each day (early) – You pay $50,000 extra for warehouse costs.

Bidder A: Average 20 days

Bidder B: Average 20 days

Past deliveries…

- Bidder A
  - 10 days
  - 20 days
  - 30 days
- Bidder B
  - 19 days
  - 20 days
  - 21 days

- Bidder A

  -10,0,10

- Bidder B

  -1,0,1

Not a good measure of reliability…

So how do we measure it?

- -10, 0, 10
- Square them first – 100, 0, 100
- Divide by total number of values
- Square root
- Standard Deviation –

$$\sigma = \sqrt{\frac{1}{N}\sum_{i=1}^{N}(X_i - \mu)^2}$$

Some more terms…

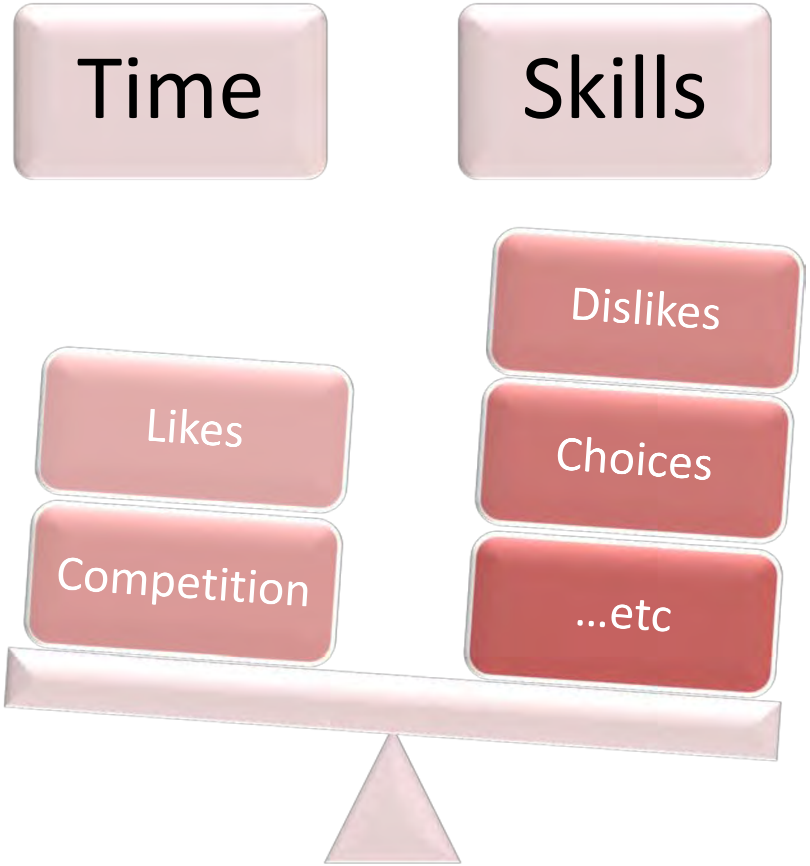
- baselines

What we do is important

- Keeping planes in the air
- Ensuring people have access to insurance claims
- Ensuring government’s money is spent well
- Housing for the needy
- Homeland Security
- Tracking progress for government spending

So we need to do well

- Continuously…
- In spite of the constraints…


Time

Skills

Likes

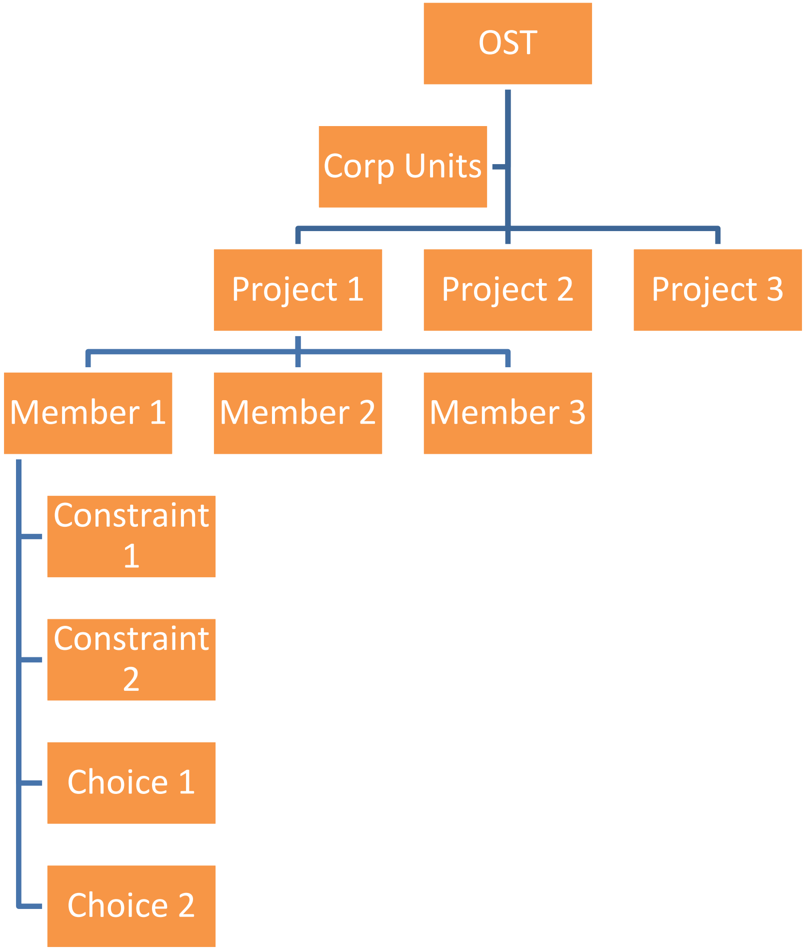
Competition

Dislikes

Choices

…etc

Variability…



So now that we have variability…what can we do?

Blind
Guessing

Educated
Guessing

Systematic
Prediction

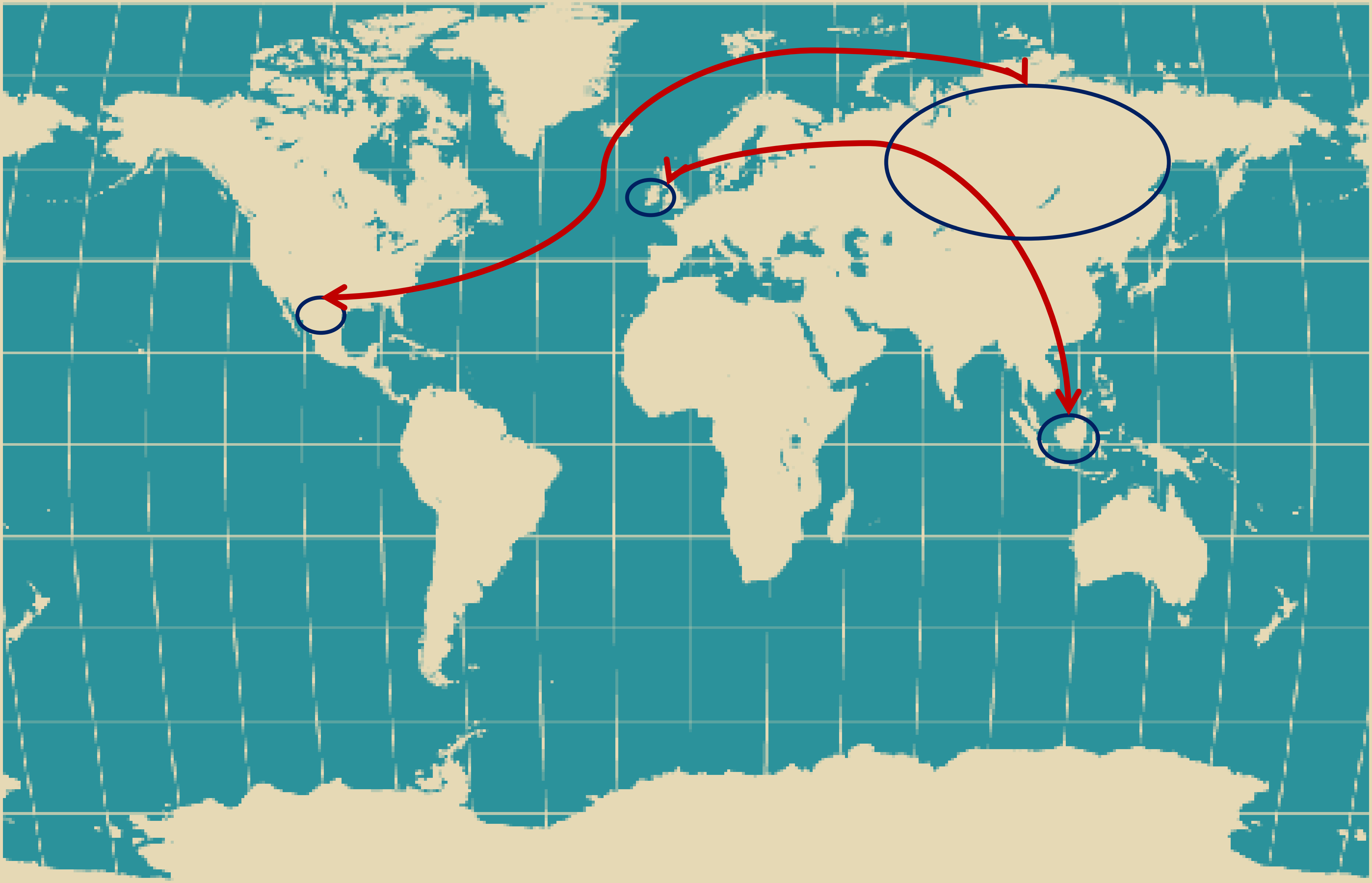
Make the variability go away…

Nirvana

Great Concept, but does this really work?

- The Heart Break Model
  - Heart Break…
  - Stress cardiomyopathy
  - Apical ballooning syndrome
  - Mr. Li goes to Wallstreet
  - Default Correlation
  - Examples –
    - Chance of a dairy farm going bust – 10%
    - Chance of a dairy going bust – 5%
    - What if the dairy farm goes bust
    - And what if the dairy gets its supplies from this dairy…
    - Chance of dairy going bust…Rise

Default Correlation Examples…



The love calculator…

- Now that I have a model…
- Don’t need conventional wisdom…
- Rating Agencies…
- Lot’s of buyers…
- Market explosion…
  - From 10’s of billions of $ in 2000 to $2 trillion in 2007
- Supply and demand…
- Loans become cheap…qualify easily
- Defaults…

The effects…

- Banks are scared to lend
- Liquidity dries up
- Businesses can’t get loans
- Economy grinds to a halt…

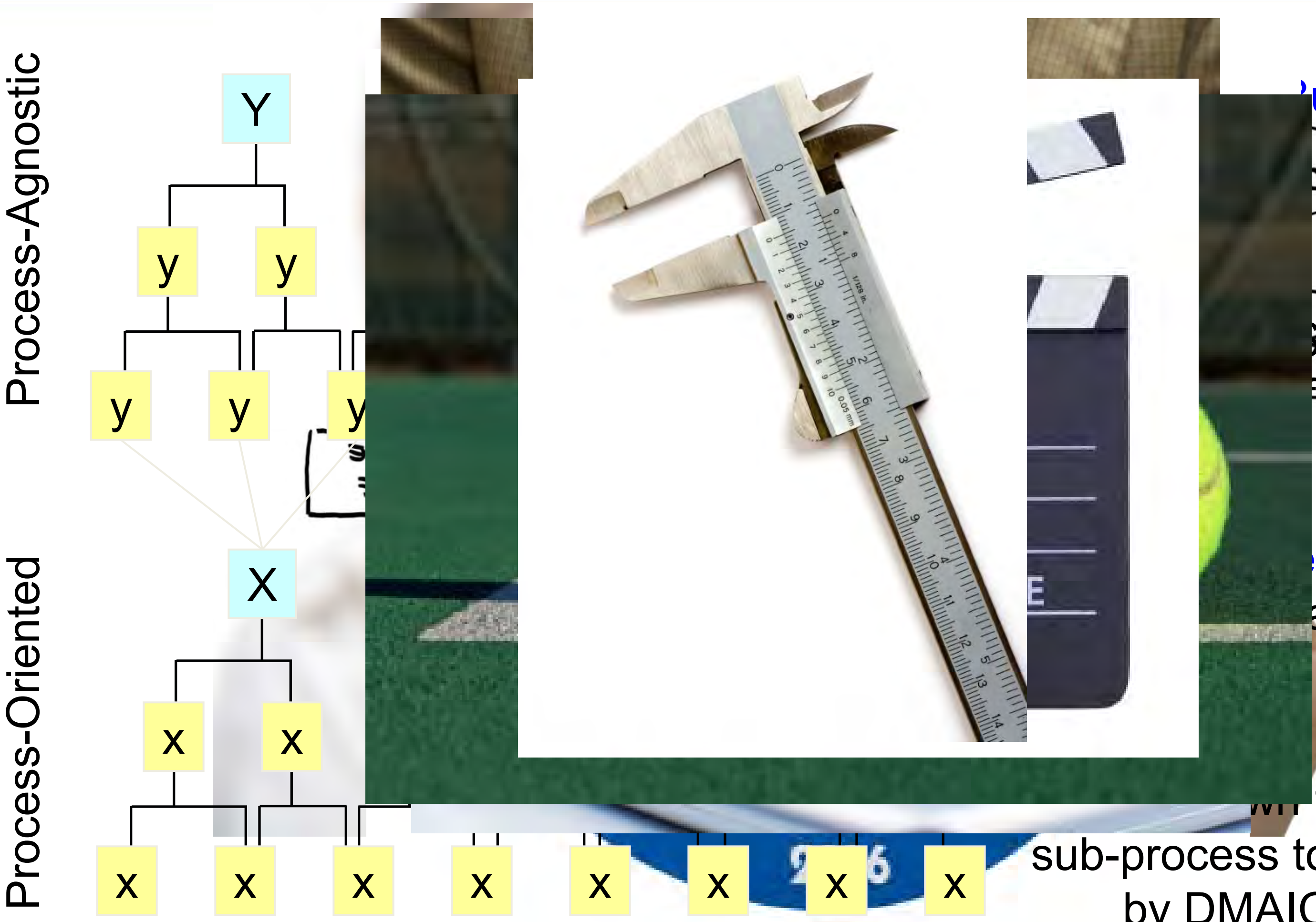
What went wrong?

- Companies and people are different
- Models weren't updated
- Assumptions…
- Not used as intended…
- Understanding…

Sample 2

- OST Accounts
  - Know before you go – Risk Free!
    - What if scenarios – Virtually
    - Efficiencies
    - Bottlenecks
  - Great Idea? Synergy!
  - Accurately Evaluate Opportunities
  - Powerful clear communications
  - Predict the future!!

Ok, how do we get there?



usiness Goals
Scorecard)

Business Goals
Buckets,
formance)

evel Process
ational Processes)

Processes
to a Vital x
sub-process to be tackled
by DMAIC team)

Assess Data Quality and Integrity

Create Process Model

Identify Sub processes

Identify Outcomes (Y) and factors (X)

Jokes

MUST READ

Three men are in a hot-air balloon. Soon, they find themselves lost in a canyon somewhere. One of the three men says, "I've got an idea. We can call for help in this canyon and the echo will carry our voices far." So he leans over the basket and yells out, "Hellllooooooo! Where are we?" (They hear the echo several times.)

Fifteen minutes pass. Then they hear this echoing voice: " Hellllooooooo! You're lost!!" One of the men says, "That must have been a statistician." Puzzled, one of the other men asks, "Why do you say that?" The reply: "For three reasons. (1) he took a long time to answer, (2) he was absolutely correct, and (3) his answer was absolutely useless.“

I asked a statistician for her phone number... and she gave me an estimate.

ARGUING WITH A STATISTICIAN IS A LOT LIKE WRESTLING WITH A PIG. AFTER A FEW HOURS YOU BEGIN TO REALIZE THE PIG LIKES IT.

Then there's the one that if you laid every statistician on the face of the earth end to end you wouldn’t reach a conclusion.....Probably.

There was this statistics student who, when driving his car, would always accelerate hard before coming to any junction, whizz straight over it , then slow down again once he'd got over it. One day, he took a passenger, who was understandably unnerved by his driving style, and asked him why he went so fast over junctions. The statistics student replied, "Well, statistically speaking, you are far more likely to have an accident at a junction, so I just make sure that I spend less time there.”

Jokes

JUST FOR FUN

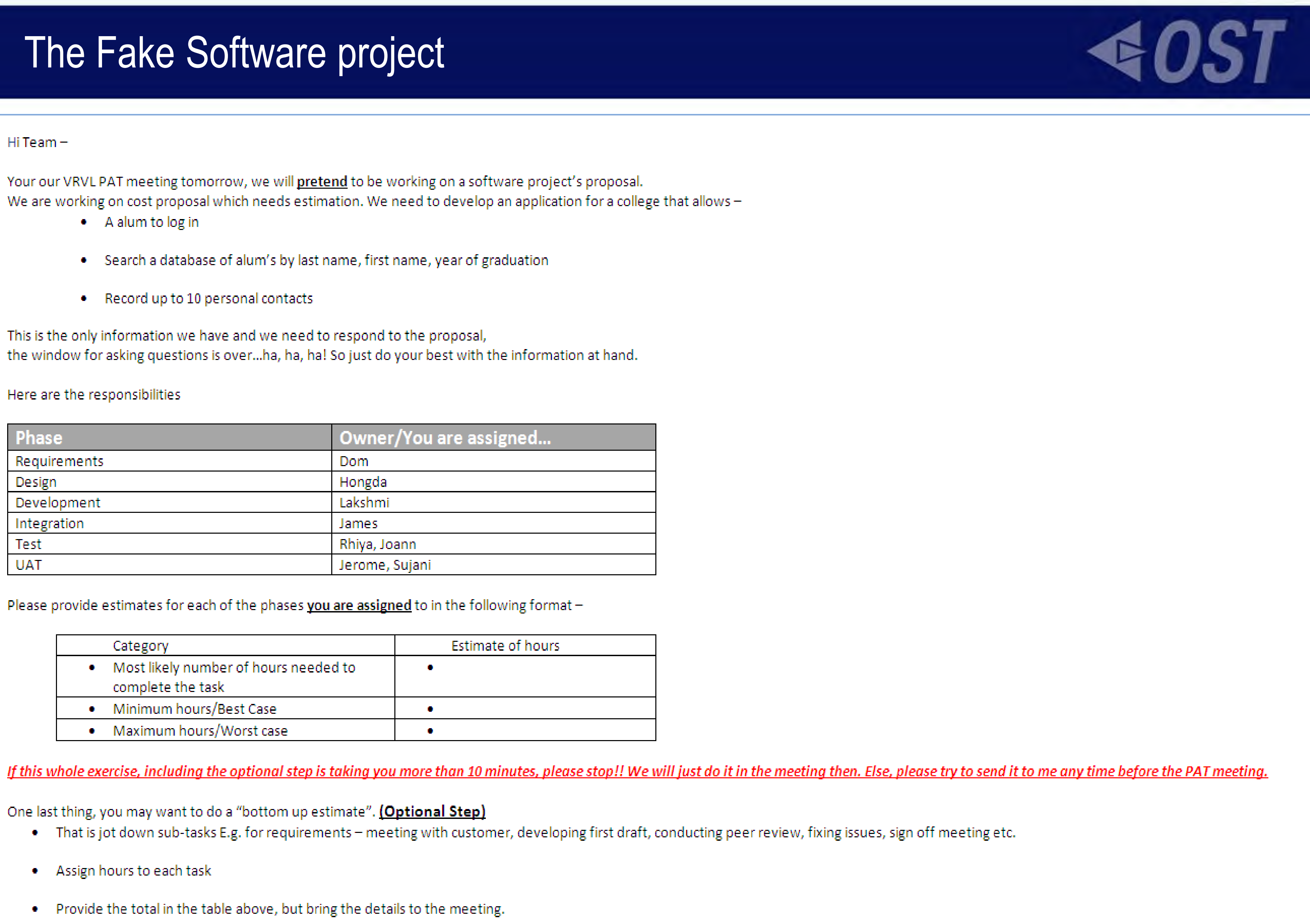
Three professors (a physicist, a chemist, and a statistician) are called in to see their dean. Just as they arrive the dean is called out of his office, leaving the three professors there. The professors see with alarm that there is a fire in the wastebasket.

The physicist says, "I know what to do! We must cool down the materials until their temperature is lower than the ignition temperature and then the fire will go out."

The chemist says, "No! No! I know what to do! We must cut off the supply of oxygen so that the fire will go out due to lack of one of the reactants."

While the physicist and chemist debate what course to take, they both are alarmed to see the statistician running around the room starting other fires. They both scream, "What are you doing?"

To which the statistician replies, "Trying to get an adequate sample size."



The Fake Software project

Hi Team –

Your our VRVL PAT meeting tomorrow, we will **pretend** to be working on a software project's proposal.
We are working on cost proposal which needs estimation. We need to develop an application for a college that allows –

- A alum to log in
- Search a database of alum's by last name, first name, year of graduation
- Record up to 10 personal contacts

This is the only information we have and we need to respond to the proposal,
the window for asking questions is over...ha, ha, ha! So just do your best with the information at hand.

Here are the responsibilities

Phase	**Owner/You are assigned...**
Requirements	Dom
Design	Hongda
Development	Lakshmi
Integration	James
Test	Rhiya, Joann
UAT	Jerome, Sujani

Please provide estimates for each of the phases **you are assigned** to in the following format –

Category	Estimate of hours
• Most likely number of hours needed to complete the task	•
• Minimum hours/Best Case	•
• Maximum hours/Worst case	•

If this whole exercise, including the optional step is taking you more than 10 minutes, please stop!! We will just do it in the meeting then. Else, please try to send it to me any time before the PAT meeting.

One last thing, you may want to do a "bottom up estimate". **(Optional Step)**

- That is jot down sub-tasks E.g. for requirements – meeting with customer, developing first draft, conducting peer review, fixing issues, sign off meeting etc.
- Assign hours to each task
- Provide the total in the table above, but bring the details to the meeting.

Making Smart Choices: Strategies for CMMI Adoption

CMMI Technology Conference and User Group
16-19 November 2009

Rick Hefner, Ph.D.
Northrop Grumman Corporation
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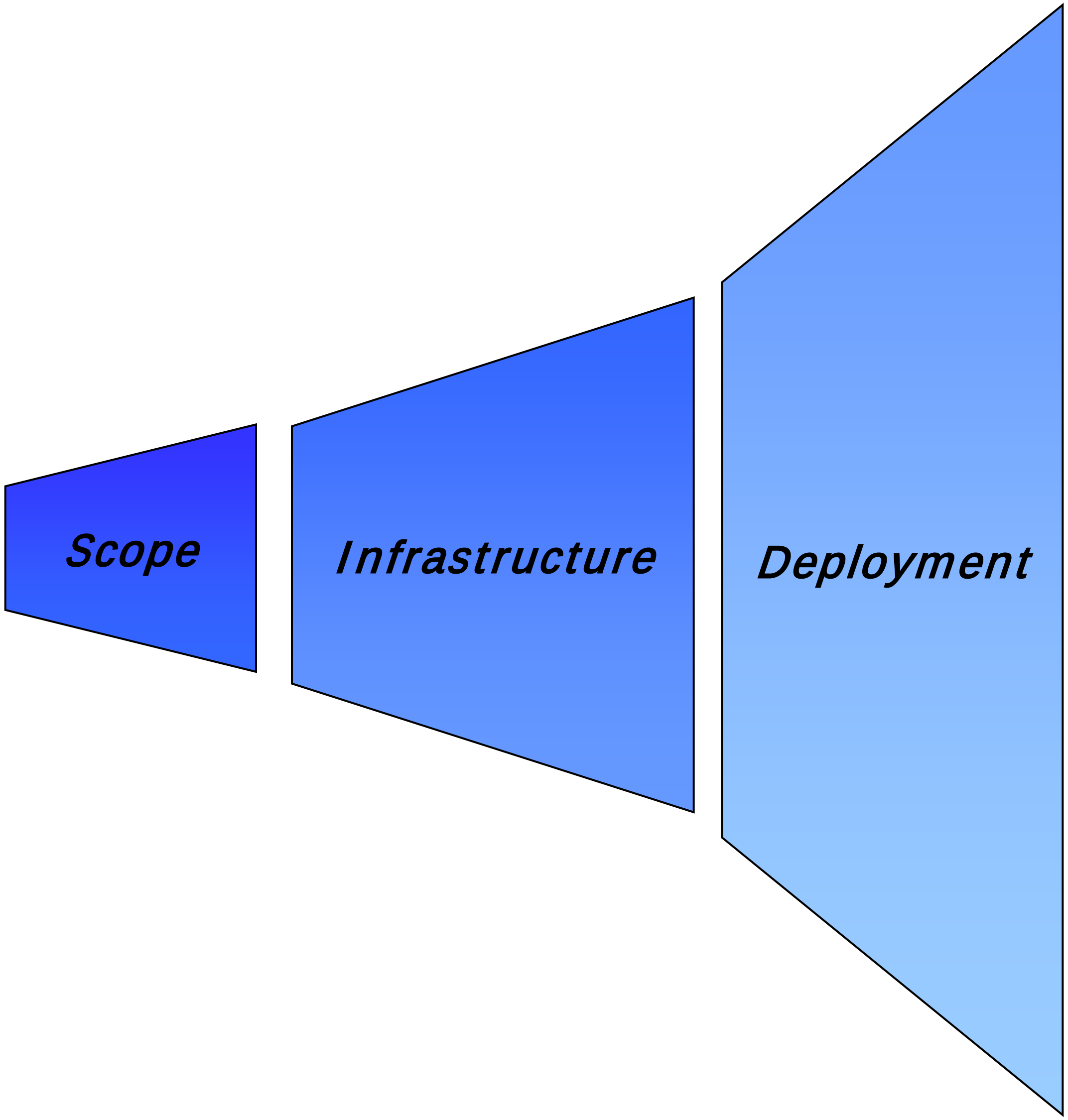
Background

- **An organization adopting the CMMI model has to make numerous decisions:**
  - Scope of the improvement effort
  - Model representation
  - IPPD extension
  - Structure of the policies and processes
  - Training program
  - Measurement repository
  - Etc.
- **These choices made have a profound effect on the value of the improvements, the buy-in of the organization, and the ultimate success of the CMMI effort**
- **This tutorial will discuss the key decisions to be made and options to be considered**

Topics

- **How decisions drive success**
- **Scope decisions**
  - Organizational scope
  - Model scope
- **Infrastructure decisions**
  - Policies, processes, procedures, and plans
  - Process asset library
  - Measures and measurement repository
  - Training

How Decisions Drive Success



Scope

Infrastructure

Deployment

Value of the improvements

Perceived value of the improvements

Success of the improvements

Cost of the improvements

Speed of the improvement

“Dead-ends”

Fit with culture

Strengthening of culture

Perceived bureaucracy

Buy-in

Ability to address other improvement goals

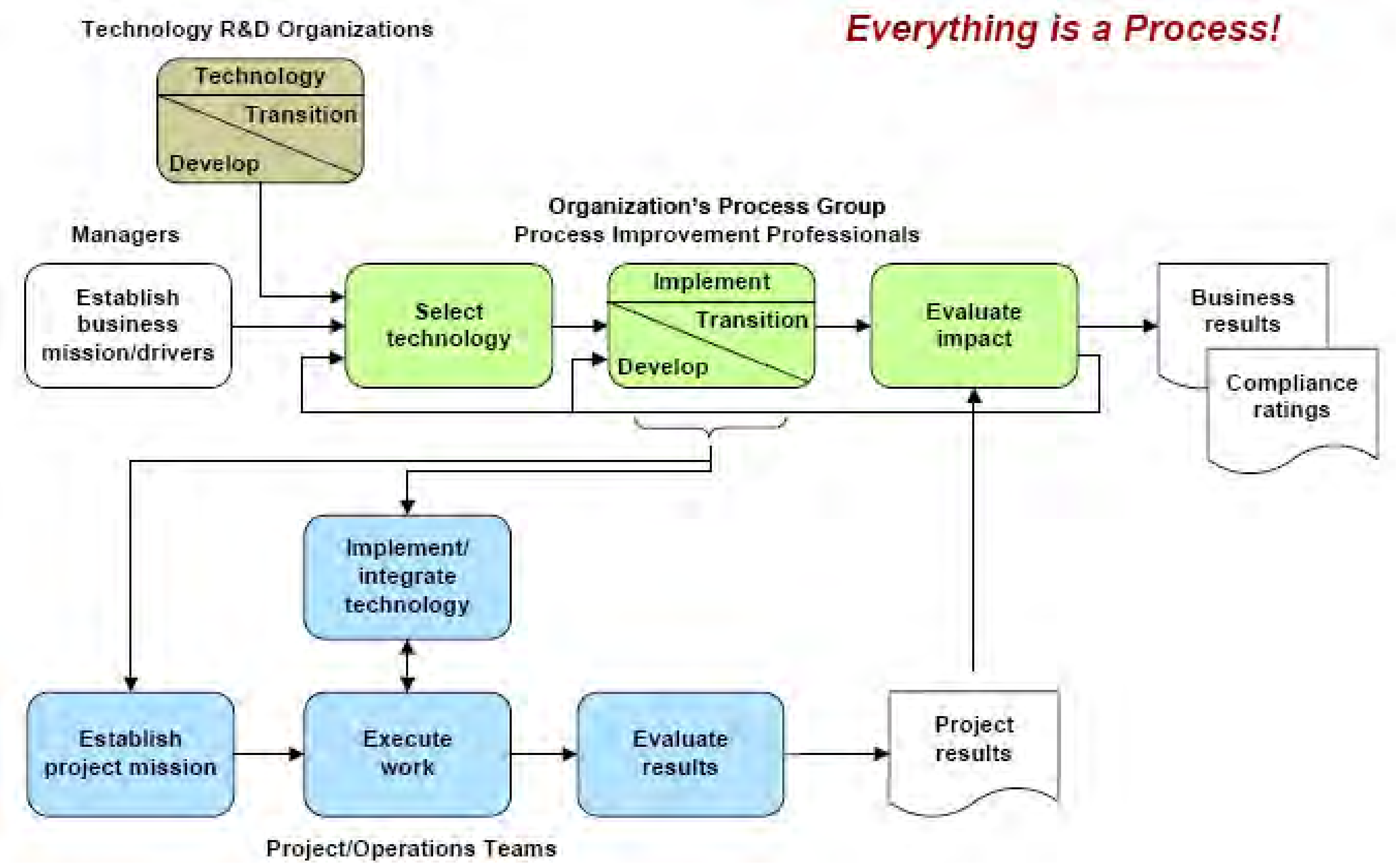
Why Does an Organization Adopt CMMI?

- **CMMI supports successful, predictable program performance**
  - Lowered cost, reduced risk
  - Industry data indicates Level 3 is ~20% cheaper than Level 1
- **CMMI can be a program requirement**
  - RFPs may call out a requirement to be CMMI Level 3, across the team
  - Primes are anxious to team with CMMI Level 3 suppliers
- **CMMI can be a competitive discriminator**
  - Demonstrates your capabilities, against an well-known industry standard

What Does It Mean to “Adopt” CMMI?

- **Organizations adopt CMMI to ensure they are implementing industry best practices**
- **This requires appraising whether or not the organization and its projects are currently performing these practices**
- **Based on the results of an initial (“gap”) appraisal, the organization and projects implement improvements**
  - Often requires new practices, clearer documentation, consistency in following plans and processes, checks and balances
- **When the requires improvements have been made, the organization conducts a formal appraisal and receives their Level**

A Process Paradigm



Everything is a Process!

Technology R&D Organizations

Technology

Transition

Develop

Managers

Establish business mission/drivers

Organization's Process Group
Process Improvement Professionals

Select technology

Implement

Transition

Develop

Evaluate impact

Business results

Compliance ratings

Implement/ integrate technology

Establish project mission

Execute work

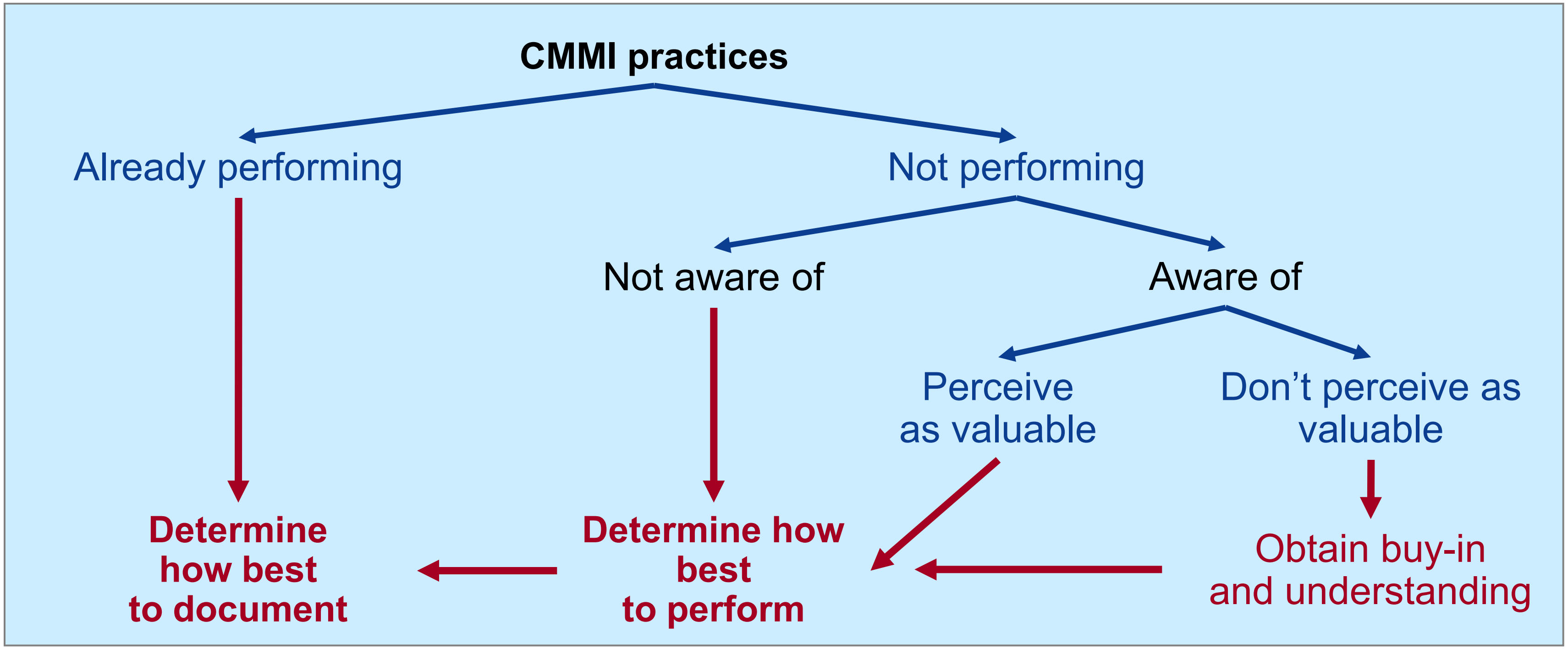
Evaluate results

Project results

Project/Operations Teams

Jeanine Siviy and Eileen Forrester, Accelerating CMMI Adoption Using Six Sigma, CMMI Users Group, 2004

Adopting the CMMI



CMMI practices

Already performing

Not performing

Not aware of

Aware of

Perceive as valuable

Don't perceive as valuable

Determine how best to document

Determine how best to perform

Obtain buy-in and understanding

- **Key enablers**
  - Willingness to learn unfamiliar practices
  - Desire to extract value rather than "check the box"
  - Ability to interpret the CMMI in your context
  - Access to experts

Exercise – What are your organization's improvement goals?

- **What are your organization's business goals (beyond achieving some CMMI level)?**
  - E.g., reduce cost, increase quality, decrease schedule, increase market share, etc.
- **What does senior management really care about?**
- **In making the changes, what should not change?**

Topics

- **How decisions drive success**
- **Scope decisions**
  - Organizational scope
  - Model scope
- **Infrastructure decisions**
  - Policies, processes, and procedures
  - Process asset library
  - Measures and measurement repository
  - Training

Organizational Scope

- **Must decide where to adopt the model**
  - Discipline: software, systems, hardware, services
  - Organizational scope: project, business unit, division, sector, company
  - Piloting vs. organizational-wide deployment
- **Key considerations**
  - Do you know how big the gaps are?
  - How much money and staff are available to assist the projects?
  - Where can you gain some early successes?
  - Where are you experiencing the most pain?
  - How much resistance will there be to the improvements?

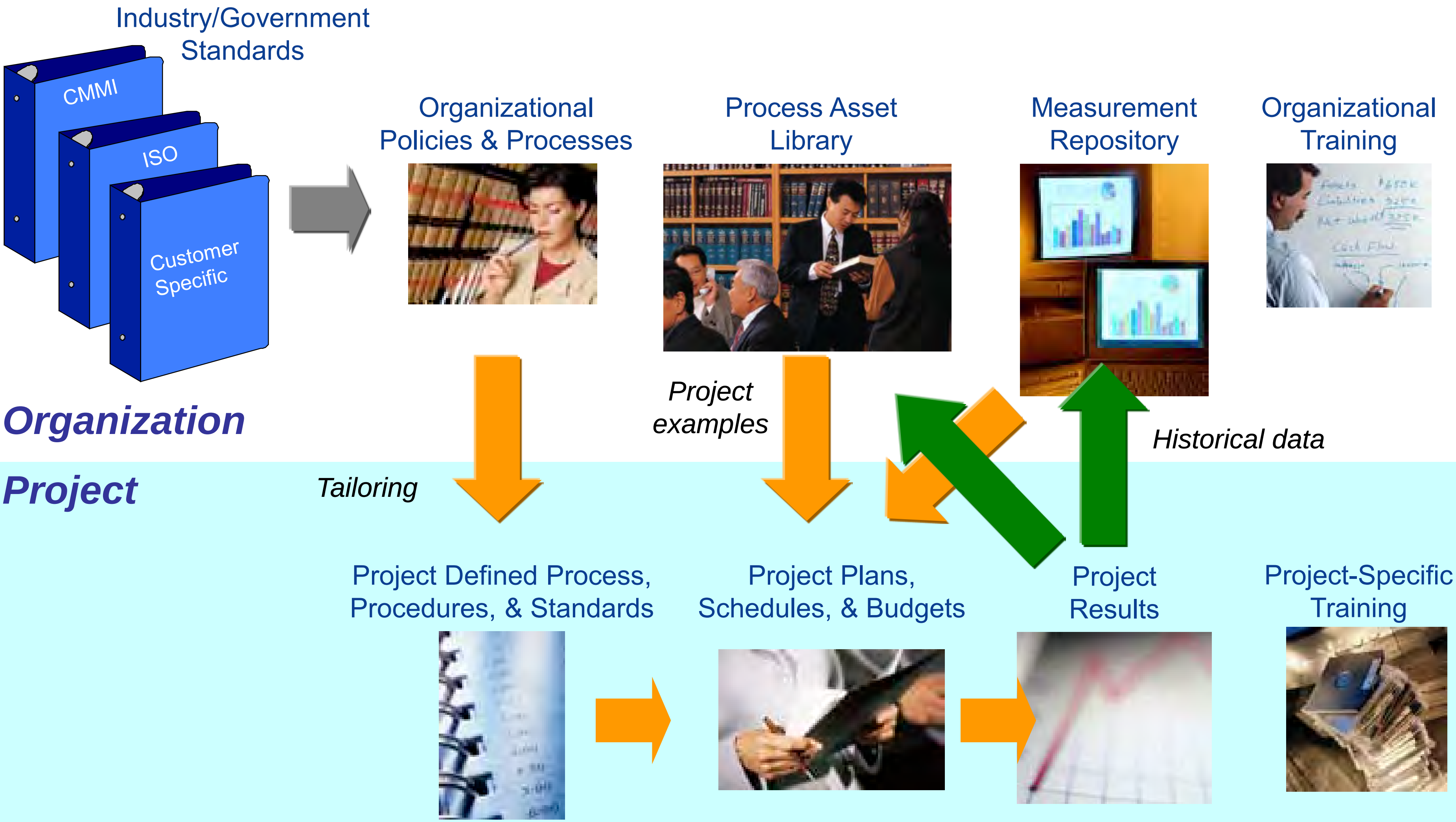
Exercise

- **What choices should (has) your organization make (made) about CMMI adoption?**
  - Organizational scope
  - Model scope
- **What information is needed to make the choices (or ensure the choices were correct)?**

Topics

- **How decisions drive success**
- **Scope decisions**
  - Organizational scope
  - Model scope
- **Infrastructure decisions**
  - Policies, processes, and procedures
  - Process asset library
  - Measures and measurement repository
  - Training

Project Use of Organizational Process Assets



Industry/Government Standards

Organizational Policies & Processes

Process Asset Library

Measurement Repository

Organizational Training

Organization

Project

Tailoring

Project examples

Historical data

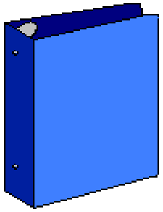
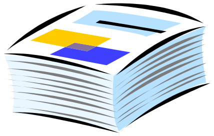
Project Defined Process, Procedures, & Standards

Project Plans, Schedules, & Budgets

Project Results

Project-Specific Training

A Top-Level Comparison

	**Policy**	**High-level “what” to do (organizational guidance)**
	**Process**	**High-level “how” to do (organizational standard, tailored by projects)**
	**Procedure**	**Low-level “how” to do (details needed to follow a strategy)**
	**Plan**	**Instantiation of the process (how often, when, etc.)**

(Organizational) Policies

> "A guiding principle typically established by senior management that is adopted by an organization to influence and determine decisions."
>
> \- *Glossary, CMMI-DEV v1.2*

- **Policies provide guidance, to <u>Project Managers and other functional groups</u>, on required activities (what to do)**
- **Example:**
  - "All projects shall establish and maintain a Risk Management Plan"
- **Performers follow their plans, processes, and procedures, which must reflect the policies**
  - Need not be familiar with the policies

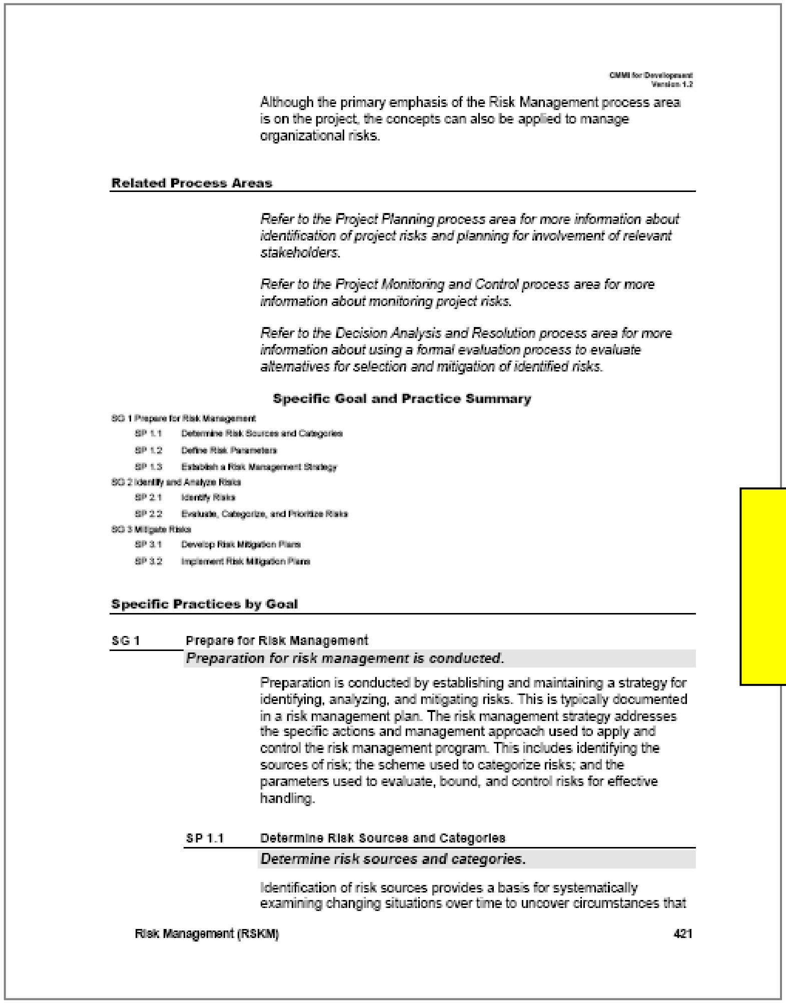
Using Policies

GP 2.1 Establish an Organizational Policy

Establish and maintain an organizational policy for planning and performing the process.

- **“Establish and maintain” includes usage (see Glossary), suggests someone must audit for compliance with policies**
  - Both projects and functional groups

Constructing Policies – Option 1



CMMI for Development
Version 1.2

Although the primary emphasis of the Risk Management process area is on the project, the concepts can also be applied to manage organizational risks.

Related Process Areas

Refer to the Project Planning process area for more information about identification of project risks and planning for involvement of relevant stakeholders.

Refer to the Project Monitoring and Control process area for more information about monitoring project risks.

Refer to the Decision Analysis and Resolution process area for more information about using a formal evaluation process to evaluate alternatives for selection and mitigation of identified risks.

Specific Goal and Practice Summary

SG 1 Prepare for Risk Management
  SP 1.1 Determine Risk Sources and Categories
  SP 1.2 Define Risk Parameters
  SP 1.3 Establish a Risk Management Strategy
SG 2 Identify and Analyze Risks
  SP 2.1 Identify Risks
  SP 2.2 Evaluate, Categorize, and Prioritize Risks
SG 3 Mitigate Risks
  SP 3.1 Develop Risk Mitigation Plans
  SP 3.2 Implement Risk Mitigation Plans

Specific Practices by Goal

SG 1 **Prepare for Risk Management**

Preparation for risk management is conducted.

Preparation is conducted by establishing and maintaining a strategy for identifying, analyzing, and mitigating risks. This is typically documented in a risk management plan. The risk management strategy addresses the specific actions and management approach used to apply and control the risk management program. This includes identifying the sources of risk; the scheme used to categorize risks; and the parameters used to evaluate, bound, and control risks for effective handling.

SP 1.1 **Determine Risk Sources and Categories**

Determine risk sources and categories.

Identification of risk sources provides a basis for systematically examining changing situations over time to uncover circumstances that

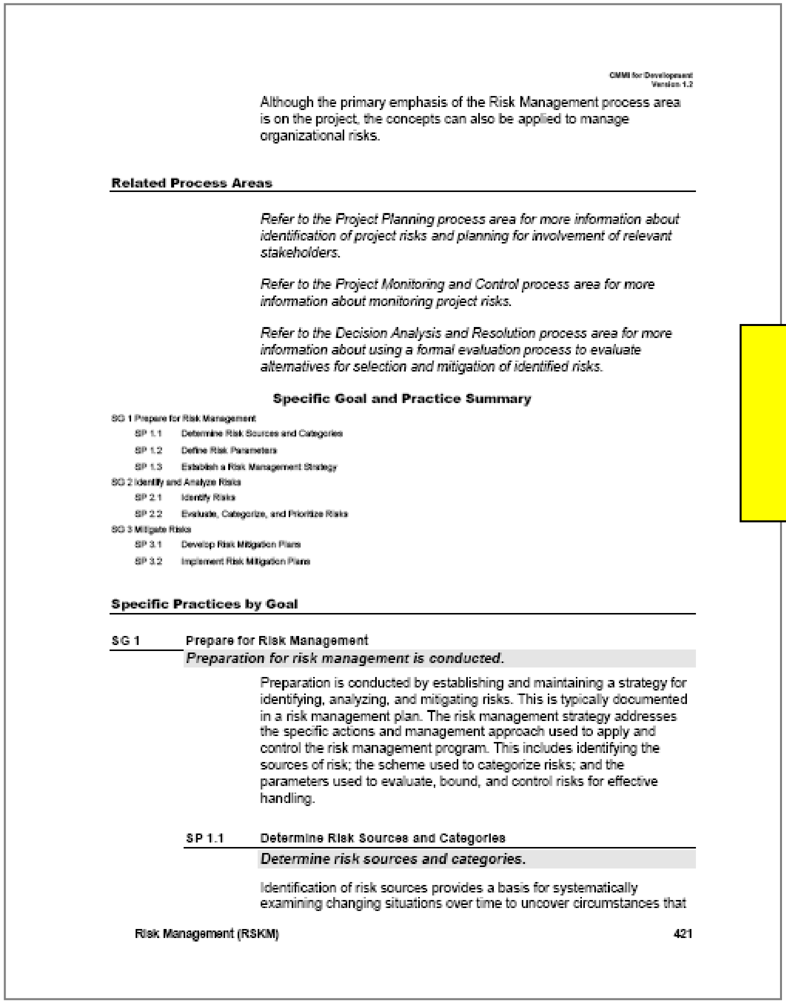
Risk Management (RSKM) 421

- **Goals are required, so…**
  Make each specific and generic goal in CMMI into a policy statement

Risk Management

Policy 1	Projects shall conduct preparation for risk management.
Policy 2	Projects shall identify and analyze r*isks to determine their relative importance.*
Policy 3	Projects shall handle and mitigate risks are handled and mitigated, where appropriate, to reduce adverse impacts on achieving objectives.
Policy 4	Projects shall institutionalize Risk Management as a defined process.

Constructing Policies – Option 2



CMMI for Development
Version 1.2

Although the primary emphasis of the Risk Management process area is on the project, the concepts can also be applied to manage organizational risks.

Related Process Areas

Refer to the Project Planning process area for more information about identification of project risks and planning for involvement of relevant stakeholders.

Refer to the Project Monitoring and Control process area for more information about monitoring project risks.

Refer to the Decision Analysis and Resolution process area for more information about using a formal evaluation process to evaluate alternatives for selection and mitigation of identified risks.

Specific Goal and Practice Summary

SG 1 Prepare for Risk Management
  SP 1.1 Determine Risk Sources and Categories
  SP 1.2 Define Risk Parameters
  SP 1.3 Establish a Risk Management Strategy
SG 2 Identify and Analyze Risks
  SP 2.1 Identify Risks
  SP 2.2 Evaluate, Categorize, and Prioritize Risks
SG 3 Mitigate Risks
  SP 3.1 Develop Risk Mitigation Plans
  SP 3.2 Implement Risk Mitigation Plans

Specific Practices by Goal

SG 1 Prepare for Risk Management

Preparation for risk management is conducted.

Preparation is conducted by establishing and maintaining a strategy for identifying, analyzing, and mitigating risks. This is typically documented in a risk management plan. The risk management strategy addresses the specific actions and management approach used to apply and control the risk management program. This includes identifying the sources of risk; the scheme used to categorize risks; and the parameters used to evaluate, bound, and control risks for effective handling.

SP 1.1 Determine Risk Sources and Categories

Determine risk sources and categories.

Identification of risk sources provides a basis for systematically examining changing situations over time to uncover circumstances that

Risk Management (RSKM) 421

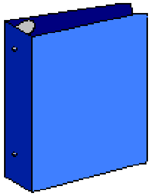
- **Practices are expected, so… Make each specific and generic practice in CMMI into a policy statement**

Risk Management

Policy 1	Projects shall determine risk sources and categories.
Policy 2	Projects shall define the parameters used to analyze and categorize risks,
Etc.	

- **Since practices are only expected, must create an opportunity for the unexpected – a deviation!**
  - Does the approach still meet the CMMI goal?

Process (Description)



> “A documented expression of a set of activities performed to achieve a given purpose. A process description provides an operational definition of the major components of a process. The description specifies, in a complete, precise, and verifiable manner, the requirements, design, behavior, or other characteristics of a process.”
>
> **-** *Glossary, CMMI-DEV v1.2*

- **Processes describe the steps to be taken**
  - Typical process established in the organizational standard process
  - Tailored by the project to fit their needs

Using Processes

GP 3.1 Establish a Defined Process

Establish and maintain the description of a defined process.

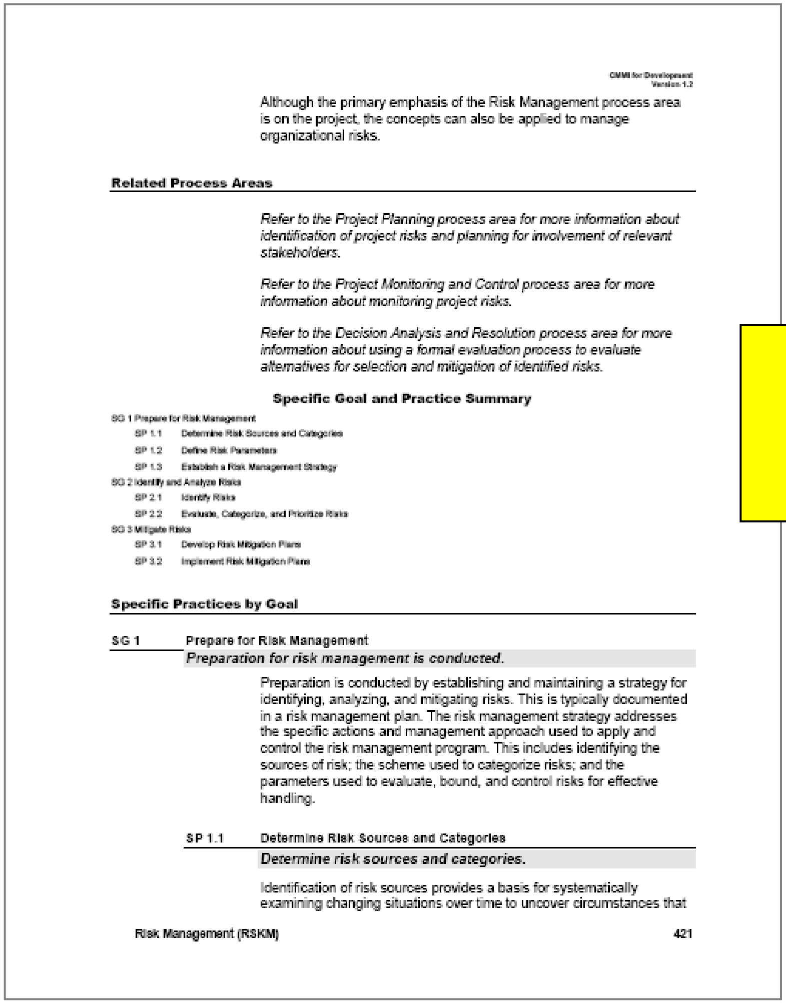
- **"Defined process" means tailored from an organizational standard process**
  - Both projects and functional groups must tailor
- **The detail of the processes is driven by the similarities between project needs**
  - If projects are similar, one size fits all
  - The more your project is different than the typical project in the organization, you more tailoring you need
- **Tailoring does not require approval**
  - Policies already define the acceptable limits (i.e., tailor as much as desired as long as you don't violate policy)

Constructing Processes

Typical attributes of each process element (per CMMI)

- Process roles
- Applicable standards
- Applicable procedures, methods, tools, and resources
- Process-performance objectives
- Entry criteria
- Inputs
- Product and process measures to be collected and used
- Verification points (e.g., peer reviews)
- Outputs
- Interfaces
- Exit criteria

Constructing Processes – Option 1



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Risk Management (RSKM) 421

- **Practices are expected, so… Make each specific and generic practice in CMMI into a process description step**

Risk Management

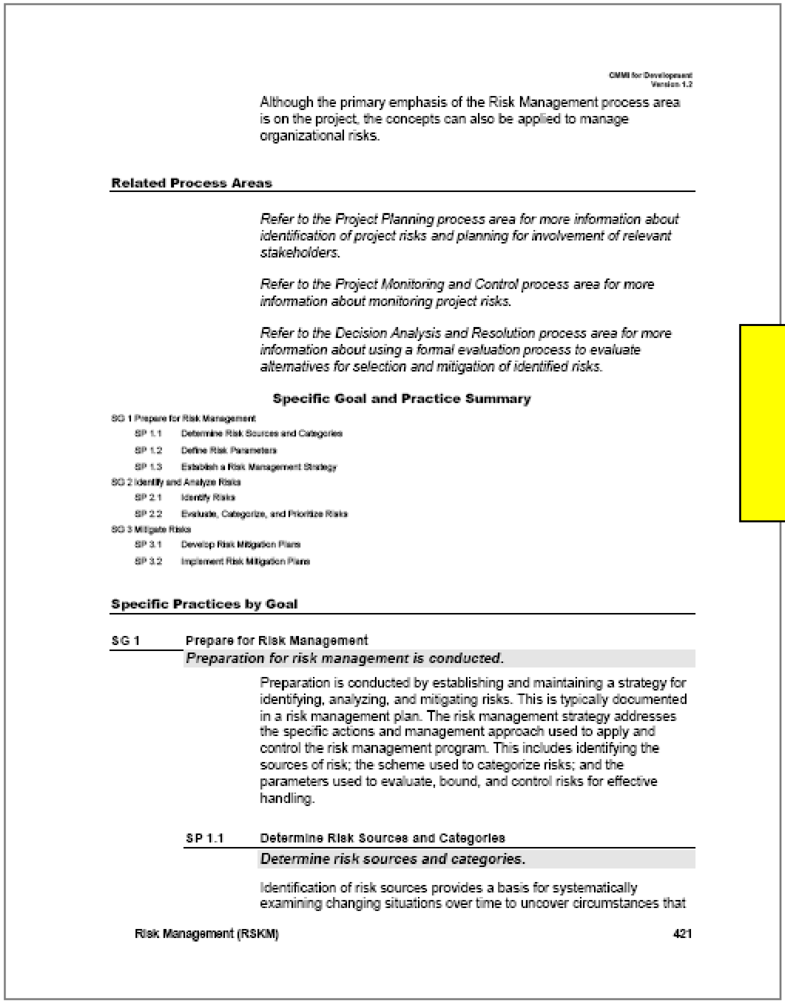
Step 1 Project determines risk sources and categories.

Step 2 Project defines the parameters used to analyze and categorize risks,

Etc.

- **Tailoring may create a problem in meeting the goal**

Constructing Processes – Option 2



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Identification of risk sources provides a basis for systematically examining changing situations over time to uncover circumstances that

Risk Management (RSKM) 421

- **If more detail is desired, add subpractices**

Risk Management

Step 1	Project determines risk sources.
Step 2	Project determines risk categories.
Step 3	Project defines consistent criteria for evaluating and quantifying risk likelihood and severity risks.
Step 4	Project defines thresholds for each risk category.
Step 5	Project defines bounds on the extend to which thresholds are applied against or within a category.
Etc.	

- **Note: subpractices only represent one way practices might be met**

Constructing Processes – Considerations

Typical attributes of each process element (per CMMI)

- Process roles
- Applicable standards
- Applicable procedures, methods, tools, and resources
- Process-performance objectives
- Entry criteria
- Inputs
- Product and process measures to be collected and used
- Verification points (e.g., peer reviews)
- Outputs
- Interfaces
- Exit criteria

Risk Management

Step 1	Project manager determines risk sources.
Step 2	Project will use the XXX risk categories.
Step 3	Project defines consistent criteria for evaluating and quantifying risk likelihood and severity risks in the Risk Management Plan.
Step 4	Project defines thresholds for each risk category.
Step 5	Project defines bounds on the extend to which thresholds are applied against or within a category as per procedure YYY.
Etc.	

GP 2.2

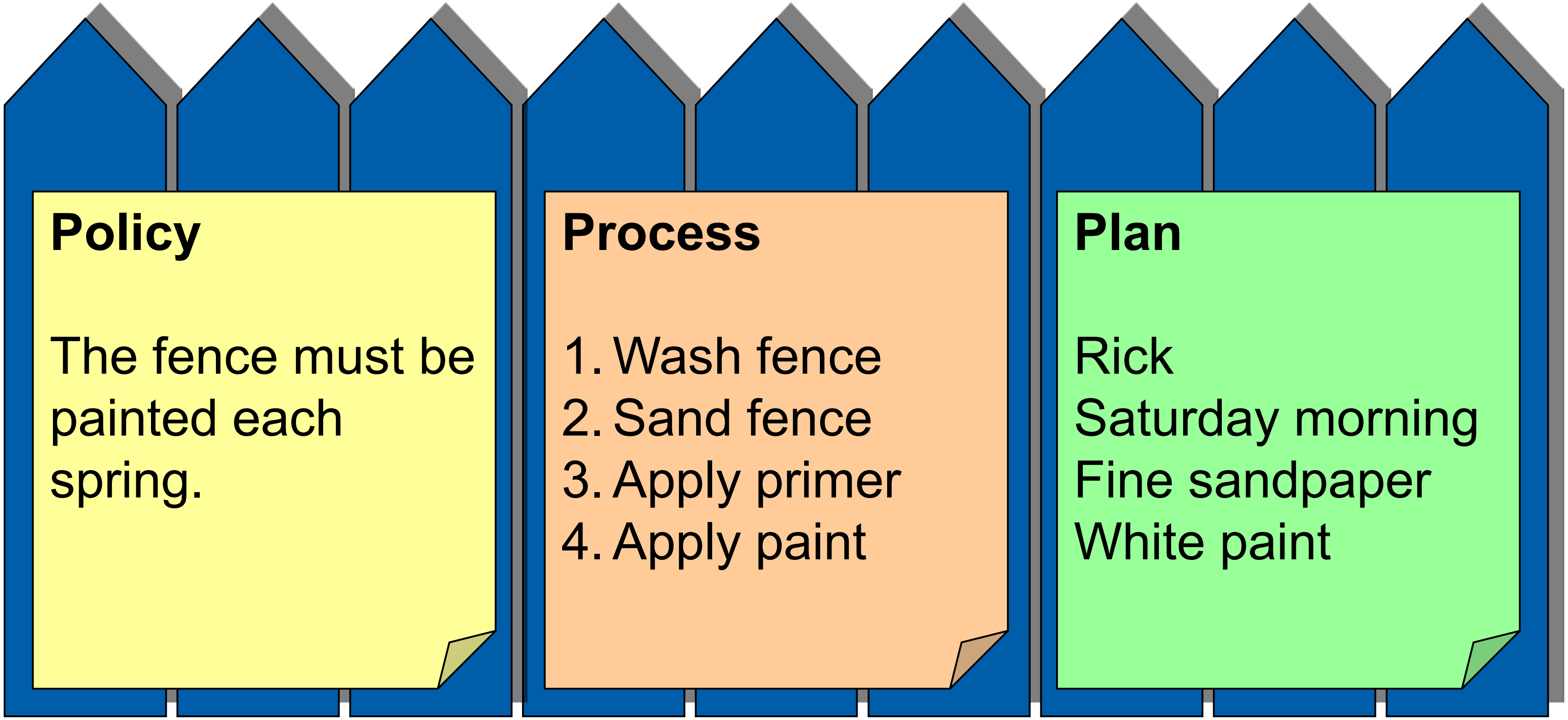
GP 2.2 Plan the Process

Establish and maintain the plan for performing the process.

- **Plan = description of activities + budget + schedule**
  - Description of activities is addressed in GP 3.1 (process description)
  - Budget is addressed in GP 2.3; resources in GP 2.4
- **Schedules for some process areas may be tied to program events**
  - E.g., DAR events may not be separately shown on a schedule, but plans should make clear the conditions under which a DAR is to be conducted

Documenting Choices in Plans

- **Policies identify what must happen**
- **Process descriptions and procedures describe the steps to be performed**
- **Plans describe how the process is instantiated**



Policy

The fence must be painted each spring.

Process

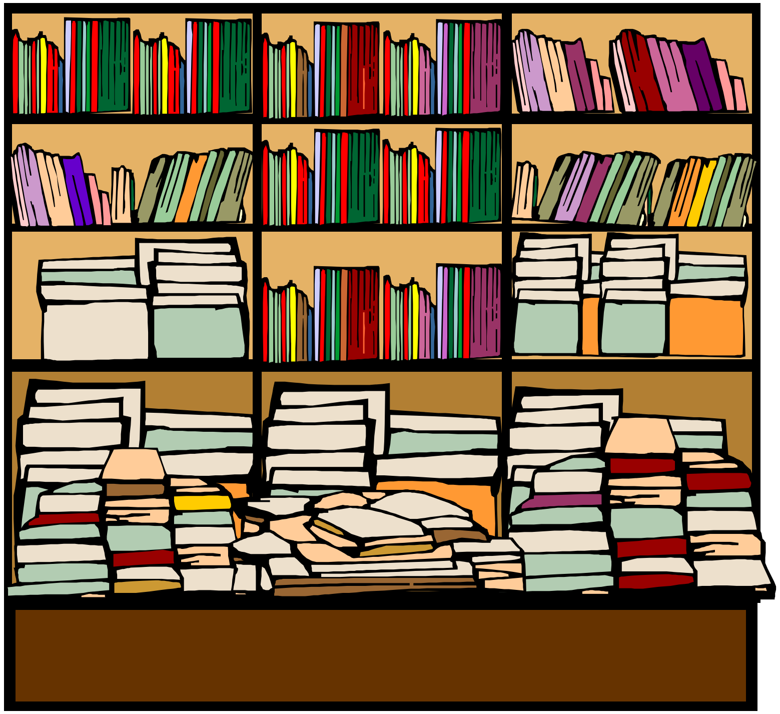
1. Wash fence
2. Sand fence
3. Apply primer
4. Apply paint

Plan

Rick
Saturday morning
Fine sandpaper
White paint

Process Asset Library

- **The organization’s process asset library is a collection of items maintained by the organization for use by the people and projects of the organization**
  - Organizational policies
  - Defined process descriptions
  - Procedures
  - Development plans
  - Acquisition plans
  - Quality assurance plans
  - Training materials
  - Process aids (e.g., checklists)
  - Lessons-learned reports



Keys to Quickly Establishing an Effective PAL

- **Section 1 – Organizational materials**
  - Policies, processes, procedures, templates, tools, etc.
  - Provides central access to all projects
  - “Blessed” by the process group
- **Section 2 – Project examples**
  - Plans, tailored processes, specs, etc.
  - Provides examples – helps some visual the desired state
  - Submitted by the projects at their own discretion, or as identified by the process group
- **Eventually…**
  - Process group can “bless” best-in-class examples
  - Good examples can be turned into templates

Measures

- **The CMMI discusses measures in several ways**
  - PMC SP 1.1: Monitor the actual values of the project planning parameters against the project plan.
    (estimates of Work Product and Task Attributes, effort, cost)
  - GP 2.8: Monitor and control the process against the plan for performing the process and take appropriate corrective action.
    (activities vs. plan, achievements vs. schedule, effort vs. budget)
- **The Measurement & Analysis process area suggests that measurement system be defined, but does not specify measures which must be used**

SG 1 Align Measurement and Analysis Activities	**SG 2 Provide Measurement Results**
SP 1.1 Establish Measurement Objectives	SP 2.1 Collect Measurement Data
SP 1.2 Specify Measures	SP 2.2 Analyze Measurement Data
SP 1.3 Specify Data Collection and Storage Procedures	SP 2.3 Store Data and Results
SP 1.4 Specify Analysis Procedures	SP 2.4 Communicate Results

Keys to Quickly Establishing an Measures

- **Section 1 – Organizational-wide measures**
  - – Focus on enabling future projects to estimate based on past projects
  - – Common Work Breakdown Structure (or mapping to one)
  - – Effort expended, by WBS element (all time accounting)
  - – Size, characteristics of the project, product
  - – Clear operational definitions of the base measures
  - – Capture the measures in an organizational measurement repository
- **Section 2 – Project-specific measures**
  - – Identify (but don't collect) the project-specific measures used (e.g., customer dictated metrics)
- **Eventually…**
  - – Add organizational-wide metrics as you see the need or opportunity
  - – Consider collecting metrics to allow the organization to calibrate a cost estimation model (e.g., COCOMO, COSYSMO)
  - – Be patient!

Measurement Repository

organization's measurement repository - A repository used to collect and make available measurement data on processes and work products, particularly as they relate to the organization's set of standard processes. This repository contains or references actual measurement data and related information needed to understand and analyze the measurement data.

- Glossary, CMMI-DEV

- **Initial focus in on supporting estimation**
  - Effort expended
  - Product size and other attributes
  - Project characteristics
- **Later…**
  - Quality measures
  - Statistical management data, causal analysis data

Training

- **Purpose**
  - Develop the skills and knowledge of people so they can perform their roles effectively and efficiently
- **Key actions**
  - Identifying the training needed by the organization
  - Obtaining and providing training to address those needs
  - Establishing and maintaining training materials
  - Establishing and maintaining training records
  - Assessing training effectiveness

Training Scope

- **Skills and knowledge may be:**
  - Technical – ability to use the equipment, tools, materials, data, and processes
  - Organizational – behavior within and according to the employee's organization structure, role and responsibilities, and general operating principles and methods
  - Contextual – self management, communication, and interpersonal abilities needed to successfully perform in the organizational and social context of the project and support groups
- **Training options**
  - Classroom training
  - Web-based training
  - Guided self study
  - Formalized on-the-job mentoring

Is the Staff Qualified to Do Their Work?

- **What are the minimum skills and knowledge needed to perform their job function?**
- **Does each individual possess these skills?**
  - If not, training is expected to address the gaps

An organizational responsibility!

How does the organization maintain
a skilled and knowledgeable workforce?

Strategies for Organizational Training – 1 of 2

- **Start by defining the key job functions in the organization**
  - – E.g., project manager, software engineer, quality assurance specialist
- **Identify the requisite knowledge associated with each function**
- **Define a set of course modules that impart this knowledge**
  - – Map modules to job functions
  - – Some modules will be common to multiple job functions
- **Acquire training materials and trainers**
  - – Should reflect the organization's policies and processes
  - – Unlikely that standard vendor/university courses will fit
- **Ensure all the CMMI process areas are addressed**
  - – Knowledge needed to perform the process, NOT a course about the CMMI requirements for that process area
  - – Include performers of the process, and those supporting

Strategies for Organizational Training – 2 of 2

- **Identify each employee by their job function(s), map to required courses**
  - – If the employee already has the identified minimum knowledge, they do not need to take the course
- **Establish student records**
  - – Who has completed what course, waivers
- **Review required training with employees**
  - – Career-planning, promotions, new hires
- **Where additional project-specific training is required (e.g., tools, methods), adopt a similar approach at the project level**
  - – Project Planning SP 2.5 addresses project specific training

Summary

- **An organization adopting the CMMI model has to make numerous decisions:**
  - Scope of the improvement effort
  - Model representation
  - IPPD extension
  - Structure of the policies and processes
  - Training program
  - Measurement repository
  - Etc.
- **These choices made have a profound effect on the value of the improvements, buy-in of the organization, and the ultimate success of the CMMI effort**

Achieving Quality QPPO via Effective Usage of PPBs and PPMs

Dr. Bin Cong
SEI Certified High Maturity Lead Appraiser
SEI Certified Intro to CMMI Instructor
CRS Tech

Professor and Director
Master of Software Engineering
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Outline

- PPBs and PPMs’ usage in quality goal setting
- PPMs and PPBs’ usage in quality goal management
- Controllable factors

Improvement Observed

- Some lessons learnt

The Context of the Case Studies

- Org is serving one customer
- High quality is the most Important Product Requirement
- Business goals are set up by the client

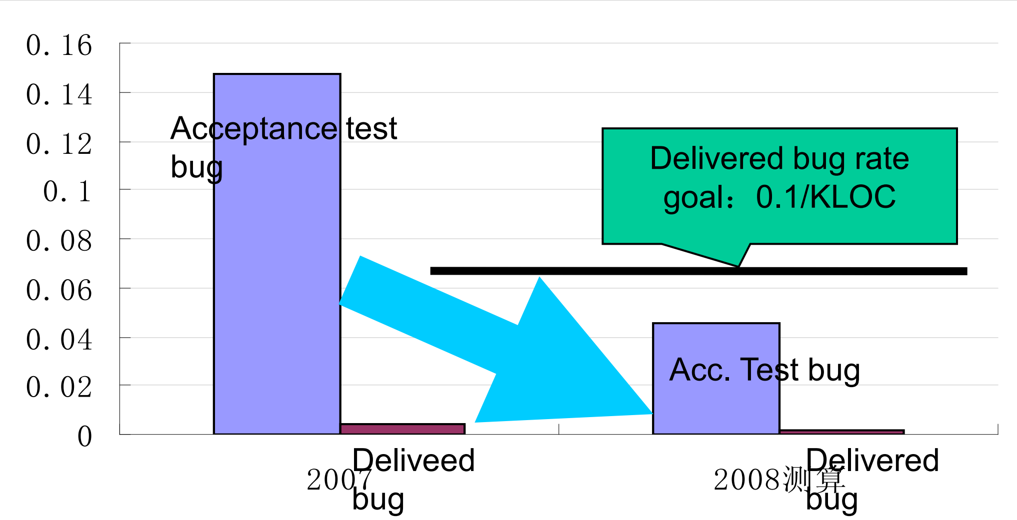
Customer’s Product Quality Requirement

- **4 Nines - 99.99%:**

  Escaped defects < 0.1 per KLOC

Org’s Quality Objective

- **Defects density identified in acceptance test is less than 0.11/KLOC which is based on the AT performance baseline.**



  - Historical data shows that the lower bug rate identified by acceptance test，the lower of delivered bug rate. With 95% confidence, it has been show that **if the acceptance test bug rate lower than 0.11个/KLOC， delivered bug rate will be lower than 0.1个/KLOC.**

The Rationale for Choosing the Quality Objective

- It meets clients’ quality requirement.
- Org’s baseline supports it.
- The org’s metrics support it.
- It can be easily used by project team.

Setting up the Interim Quality Objectives

- **The following quality control activities are conducted before the acceptance test is performed by the independent Testing Center:**

  - Requirement Peer Review

  - System Design Peer Review

  -Detailed Design Peer Review

  - Code Inspection + Unit Test

  - System Test

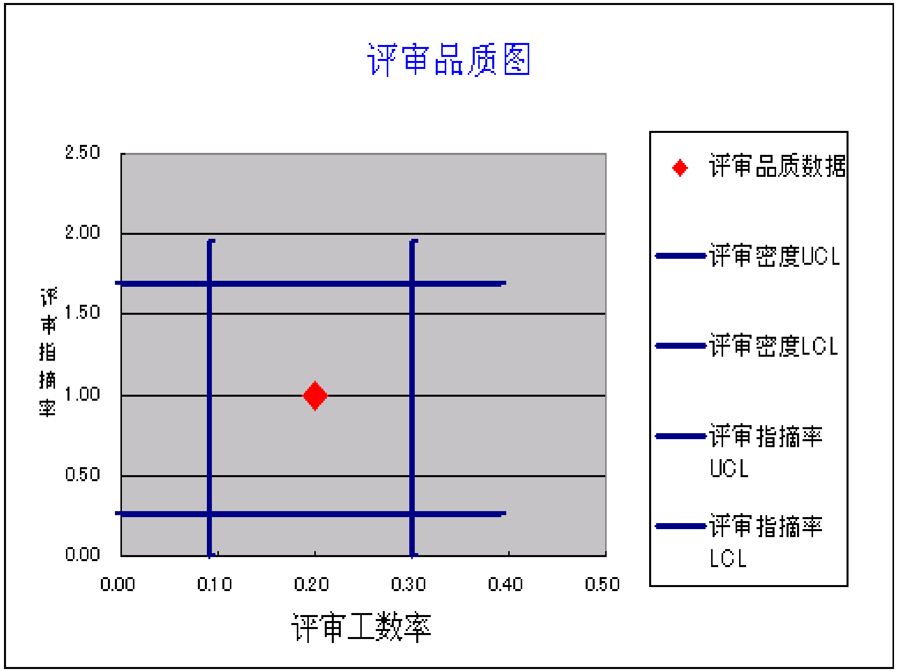
  The related interim goals need to be developed to ensure achieving the Quality Objective, thus the goal becomes a manageable one.

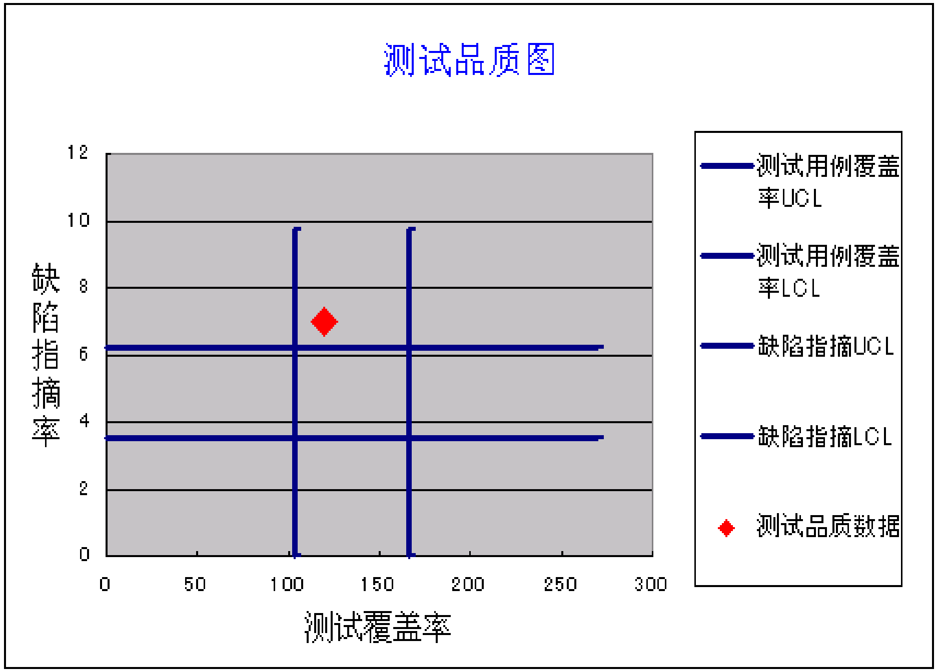
PPBs Needed to Support the Interim Goals

- **Defect injection distribution**
- **Defect removal rate in requirement/design/code review + UT and system test**
- **Efforts devoted to these quality control activities**

Abnormal Analysis

Effort baselines is needed to support this analysis





图示

⑧	⑤	⑥
⑦	①	②
⑨	③	④

图示

⑧	⑤	⑥
⑦	①	②
⑨	③	④

Quality Related Baselines – Measured by defect removal rate

组织级缺陷清除密度基线

序号	QC 活动		中值	下限	平均值	上限	标准差
B115	验收测试缺陷密度一工程升级	（单位：个/百功能点）	8.11	3.82	8.09	12.35	2.13
B116	验收测试缺陷密度一工程新开发		11.13	8.47	10.73	12.98	1.13
B117	验收测试缺陷密度一研发升级		5.14	2.11	4.76	7.42	1.33
B118	验收测试缺陷密度一研发新开发		4.47	0.45	5.49	10.53	2.52
B119	需求评审效率	（单位：个/人时）	1.44	0.76	1.39	2.03	0.316
B120	设计评审效率		1.25	0.62	1.28	1.93	0.327
B121	走查效率		9.86	6.24	8.74	11.23	1.248
B122	系统测试效率		0.50	0.22	0.52	0.81	0.148
B123	系统测试用例密度_工程升	（单位：用例个数/百功能点）	168.32	93.41	159.31	225.21	32.95
B124	系统测试用例密度_工程新		182.95	150.20	181.55	212.90	10.45
B125	系统测试用例密度_研发升		131.30	87.06	142.60	198.14	27.77
B126	系统测试用例密度_研发新		174.40	119.90	171.50	223.10	25.80
B127	需求评审_清除率	（%）	63.60%	36.34%	61.50%	99.24%	0.252
B128	设计评审_清除率	（%）	55.62%	23.23%	50.72%	91.96%	0.275
B129	代码走查_工程清除率	（%）	19.04%	12.91%	18.27%	34.35%	0.054
B130	代码走查_研发清除率	（%）	25.64%	13.93%	27.61%	68.65%	0.137
B131	系统测试清除率	（%）	86.10%	81.98%	86.30%	94.94%	0.043
B132	需求阶段植入率	（%）	11.58%	6.38%	11.56%	16.74%	0.026
B133	设计阶段植入率	（%）	8.98%	3.58%	9.81%	16.05%	0.031
B134	代码阶段植入率	（%）	78.49%	69.66%	78.33%	87.01%	0.043

Quality Related QPPOs

Acceptance test bug rate lower than 0.11 defects/KLOC:

①Requirement review identifies at least 0.09* total number of estimated defects；

②System design review identifies at least 0.1* total number of estimated defects；

③Detail design review identifies at least 0.02* total number of estimated defects；

④Code Review and UT identifies at least 0.36* total number of estimated defects；

⑤System test identifies at least 0.41* total number of estimated defects.

Another Example

- Requirement Peer Review should at least identify 80% of defects introduced so far
- Design Peer Review should at least identify 70% of remaining defects introduced so far
- Code Inspection should at least identified 40% of remaining defects introduced so far
- System Testing should at least identify 90% remaining defects introduced so far

Interim Goals and Overall Quality Objective

- **Statistical studies show that if the Interim Goals are achieved, the overall goal will be achieved too.**
- **QPM is all about managing the goal achievement.**

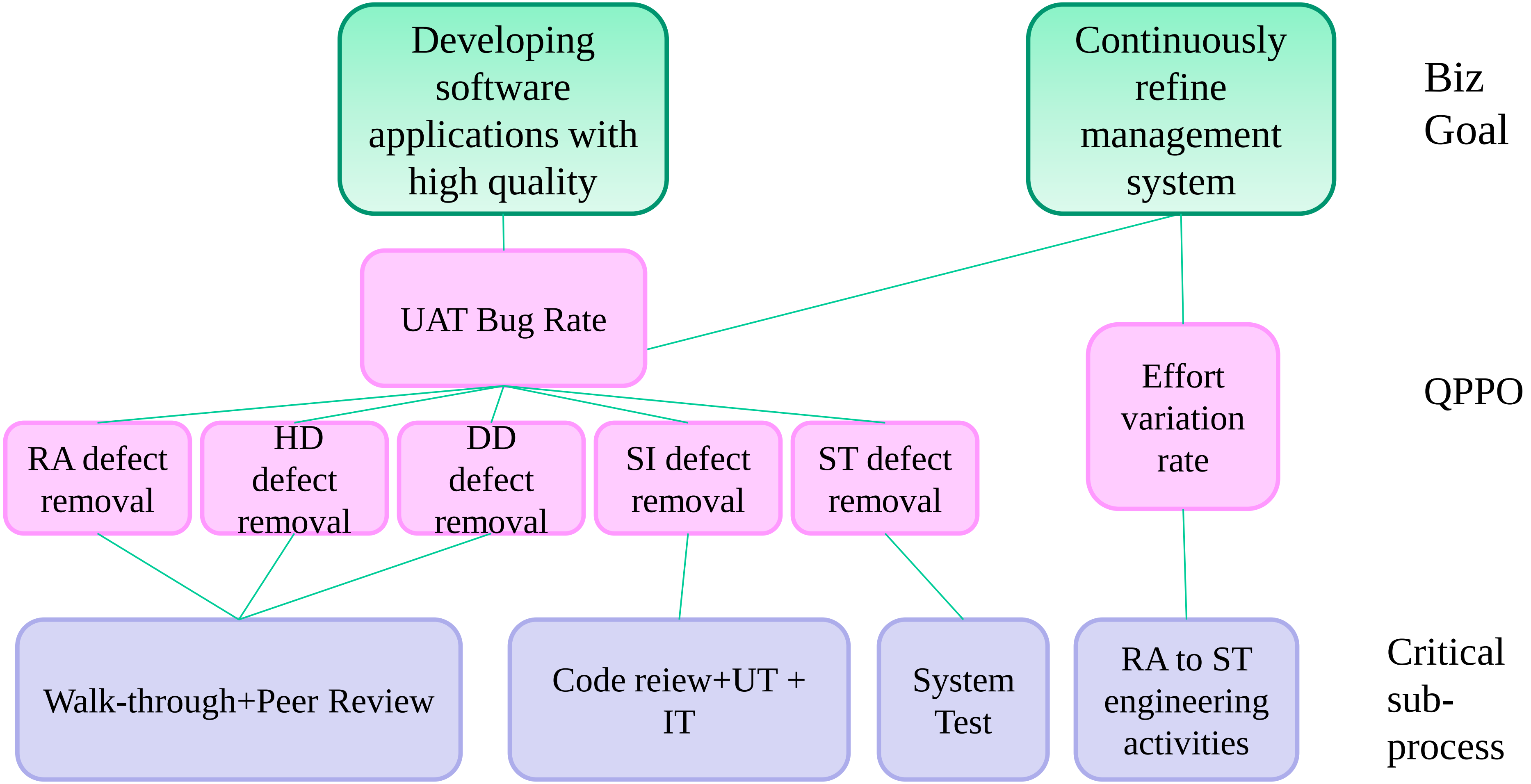
Prediction models needed for quality goal management

- **Number of defects introduced in Requirement Phase**
- **Number of defects introduced in Design Phase**
- **Number of defects introduced in Coding Phase**
- **Number of defects removed by Requirement Peer Review**
- **Number of defects removed by Design Peer Review**
- **Number of defects removed by Code Review for Java and .Net**
- **Number of defects removed by Code Review for C and C++**
- **Number of defects removed by System Test**
- **Gompertz Model – a Reliability Growth Model**

Risk Management

Monte Carlo is used for managing risks in obtaining Quality Goals during the planning phase and throughout the LC.

Relationship between Goals and Key Subprocesses



Developing software applications with high quality

Continuously refine management system

Biz Goal

UAT Bug Rate

Effort variation rate

QPPO

RA defect removal

HD defect removal

DD defect removal

SI defect removal

ST defect removal

Walk-through+Peer Review

Code reiew+UT + IT

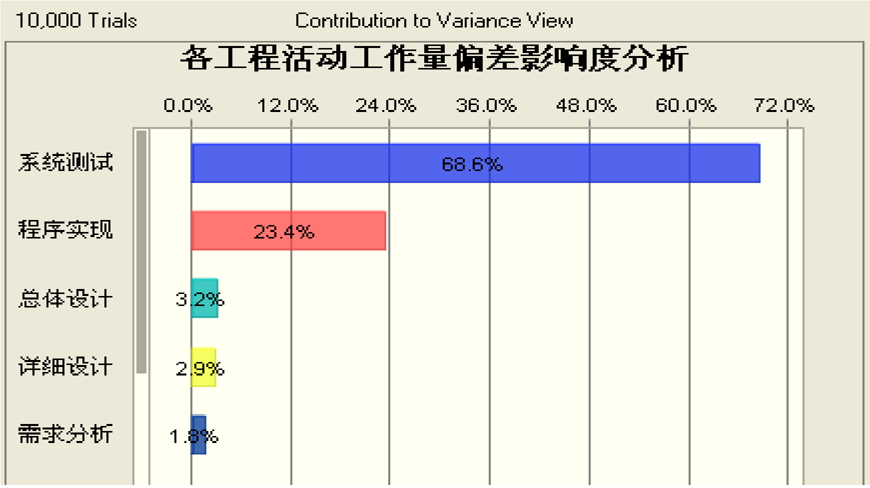
System Test

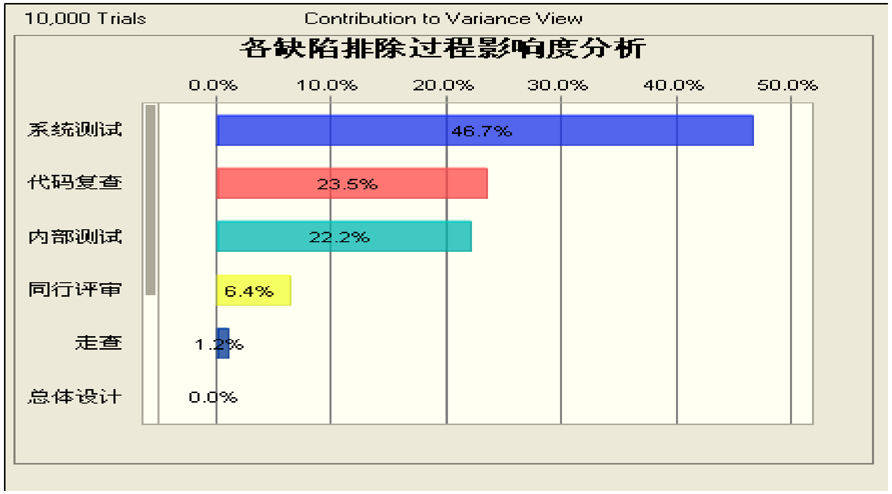
RA to ST engineering activities

Critical sub-process

Critical Key Sub-process Selection Criteria

- Customer’s concerns
- The Impact to the QPPOs
- Statistical impact analysis





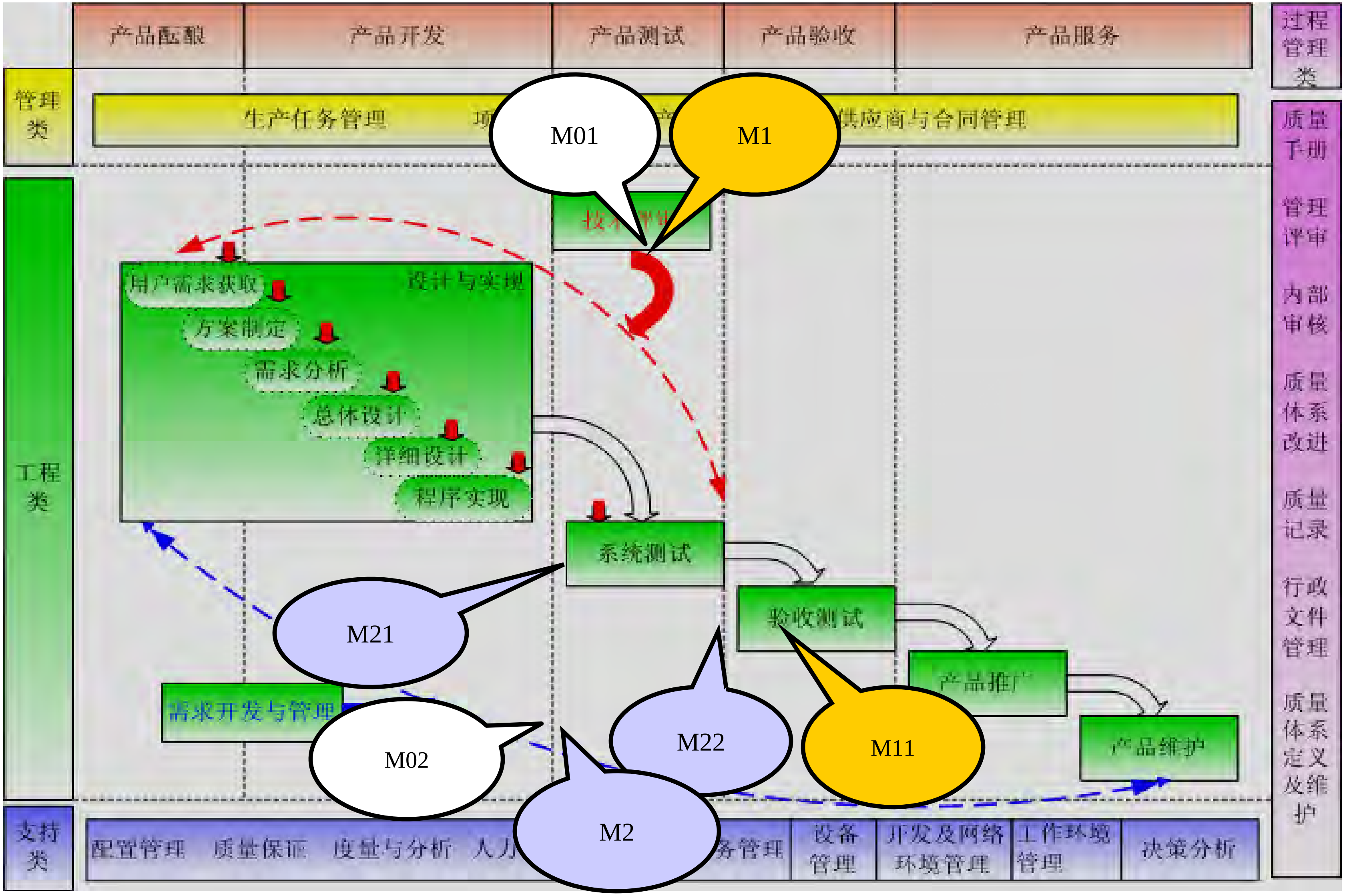
Largest impact occurs in system test 70.3%

The impact of system test and code review are 47.3%、22.7%。

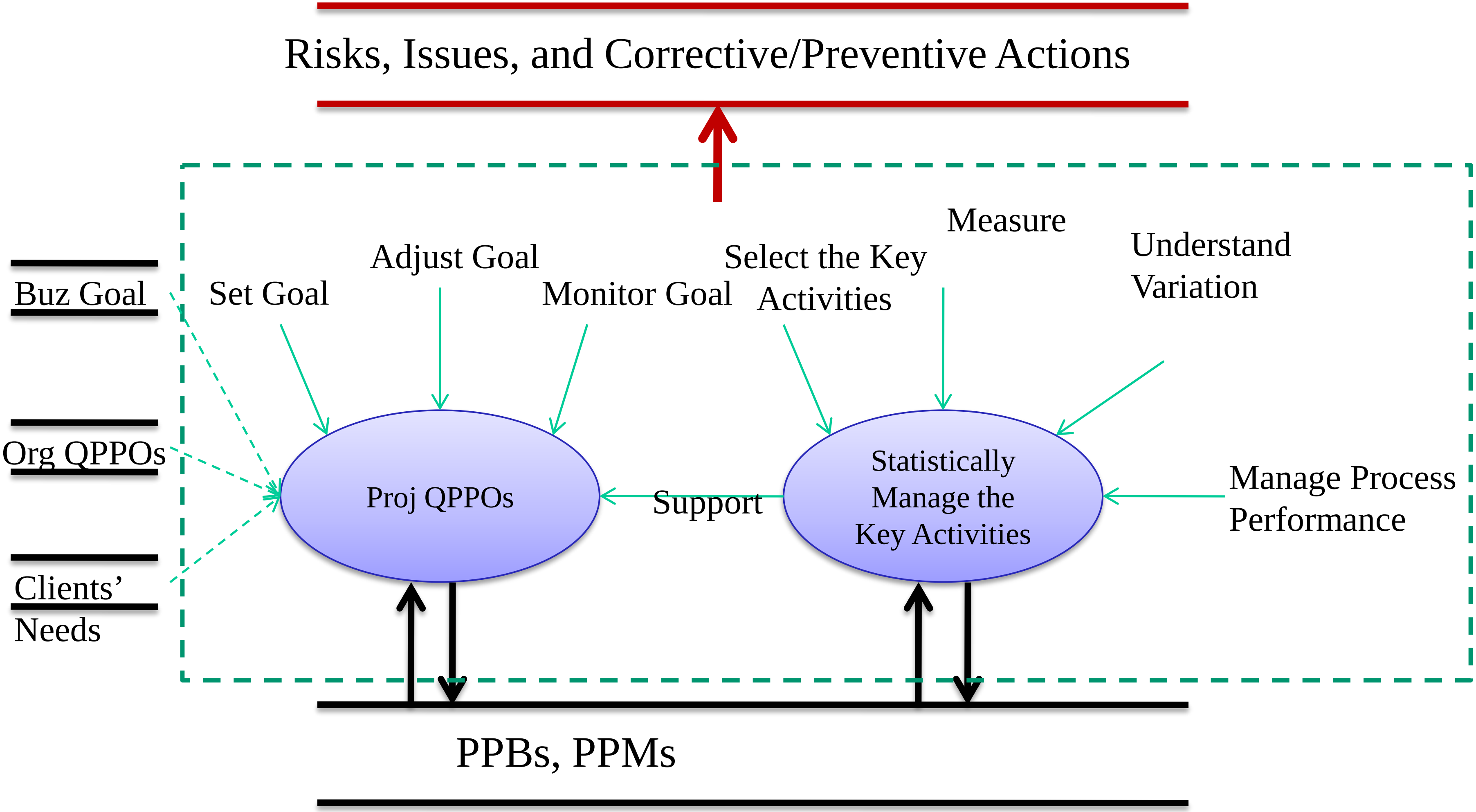
The Goal-Model-Baseline Matrix

质量和过程性能目标		关键子过程	度量指标	基本测量	统计方法	相关模型	相关基线
1、项目验收测试 bug 率不高于 0.11 个/KLOC，且截止系统测试阶段结束，项目 数不低于项目		所有工程活动	验收测试 bug 率	验收测试发现的缺陷数 代码	XMR、	项目缺陷发现分布及预测模型 发现数估算模型	（1）验收测试 bug 率 （2）各阶段缺陷发现占比
（1）	需	走查+同行评审	每规模问题数	评审发现问题数 文档规模		项目缺陷数估	（1）各阶段缺陷发现占比（%）–需求分析 评审每规模问题数（个/页）
（2）	总体设计阶段缺陷排除				XMR	项目缺陷数估算模型	缺陷发现占比（%）–总设计 （2）技术评审每规模问题数（个/页）–总体设计
（3）	详细设计阶段缺陷排除	走 行评审	每规模问题数			算模型	各阶段缺陷发现占比（%）–详细设计
（4）	程序实现阶段缺陷排除	代码复查	代码复查缺陷发现率	代码复查发 的缺陷数 代码行数	XMR U 图 假设检验	（1）项目 （2）代码复查	陷发现占比（%）–程 陷发现占比（%）–代复查 （3）代码复查缺陷发现率（个/KLOC）
		单元测试+组装测试		测试			
（5）	系统测试阶段缺陷排除	系统测试	陷率	发现 的缺陷数	Gompertz	（1）项目缺陷数估算模型 （2）系统测试缺陷预测模型	各阶段缺陷发现占比（%）–系统测试
2、项目工作量偏差率不高于 21.14%		需求分析至系统测试工程活	工作量偏差率	实际工作量 预算工作量	Monte Carlo 仿真方法、	（1）工作量偏差预测模型 （2）系统测试工作量偏差估算模型	（1）工作量偏差率（%） (2)各工程活动工作量偏差率（%）（需求分析一系统测试）

How Models fit in the Quality Goal Mgt



It is all about achieve the goals!



Risks, Issues, and Corrective/Preventive Actions

Buz Goal

Org QPPOs

Clients' Needs

Set Goal

Adjust Goal

Monitor Goal

Select the Key Activities

Measure

Understand Variation

Proj QPPOs

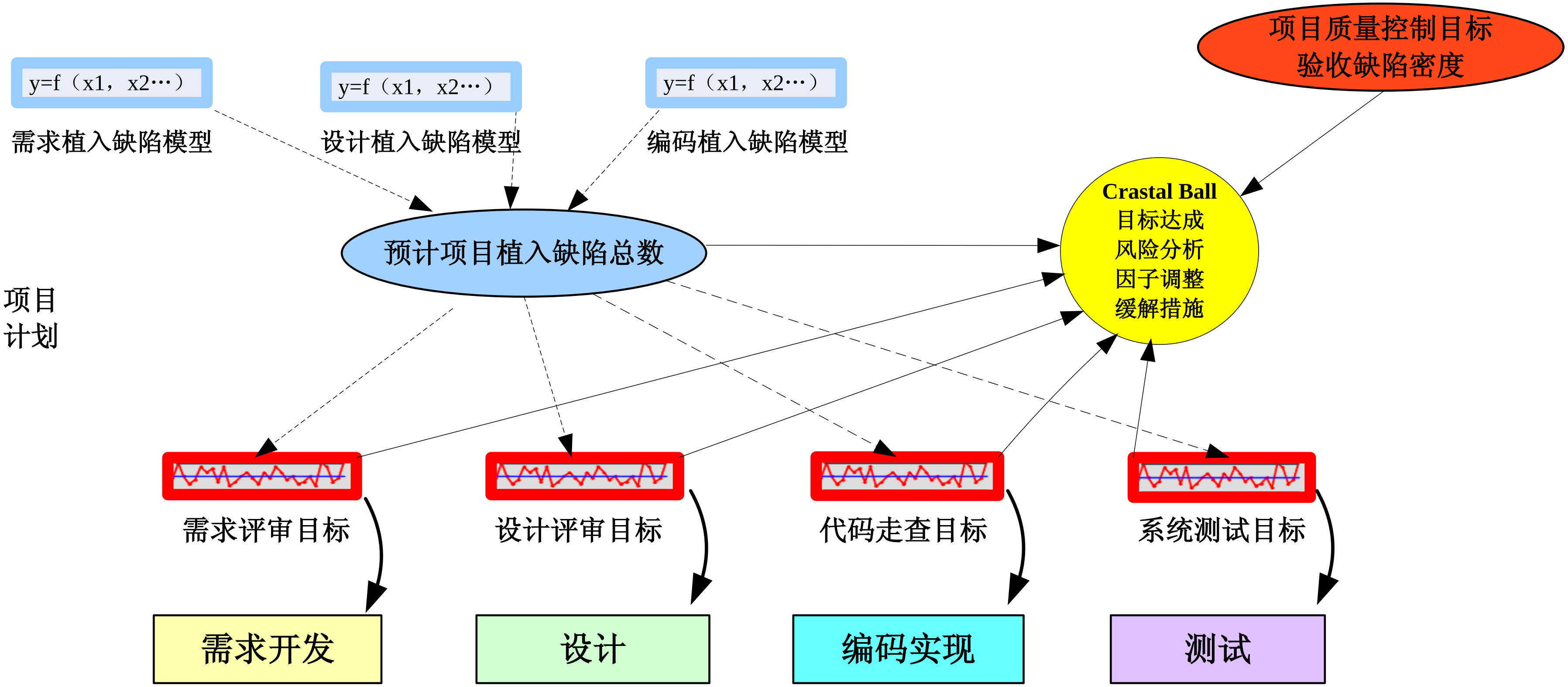
Support

Statistically Manage the Key Activities

Manage Process Performance

PPBs, PPMs

Overview on How PPBs and PPMs are Used



y=f（x1，x2…）

需求植入缺陷模型

y=f（x1，x2…）

设计植入缺陷模型

y=f（x1，x2…）

编码植入缺陷模型

项目质量控制目标
验收缺陷密度

Crastal Ball
目标达成
风险分析
因子调整
缓解措施

预计项目植入缺陷总数

项目
计划

需求评审目标

设计评审目标

代码走查目标

系统测试目标

需求开发

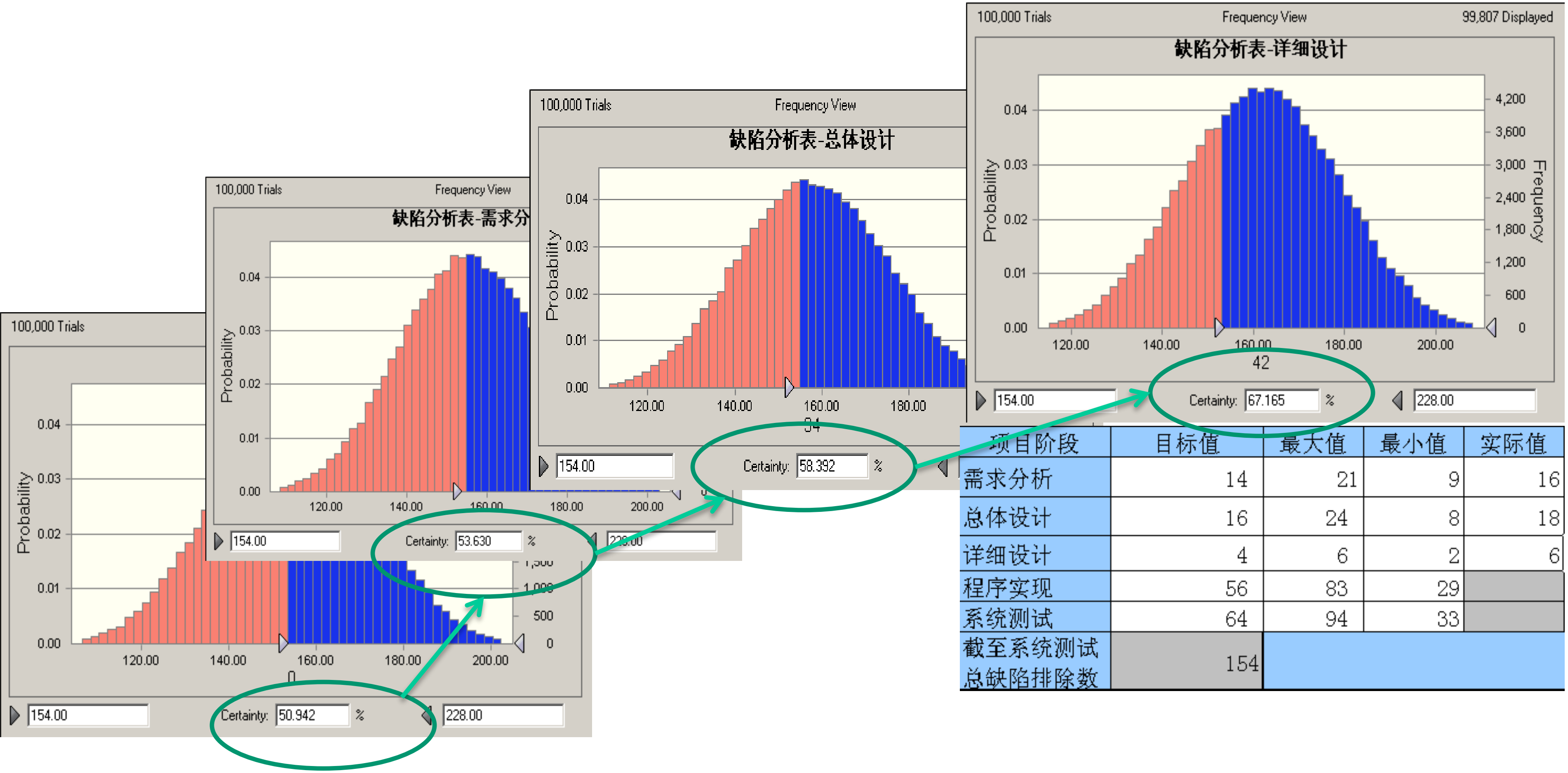
设计

编码实现

测试

2009-11-18

Monte Carlo Simulation on Goal Achievement



项目阶段	目标值	最大值	最小值	实际值
需求分析	14	21	9	16
总体设计	16	24	8	18
详细设计	4	6	2	6
程序实现	56	83	29	
系统测试	64	94	33	
截至系统测试总缺陷排除数	154			

Controllable Factors

- Sources of variation

- HM means you truly understand your critical processes.

- Where you might make adjustments
- Key areas to improve your process

Which model allows you to adjust?

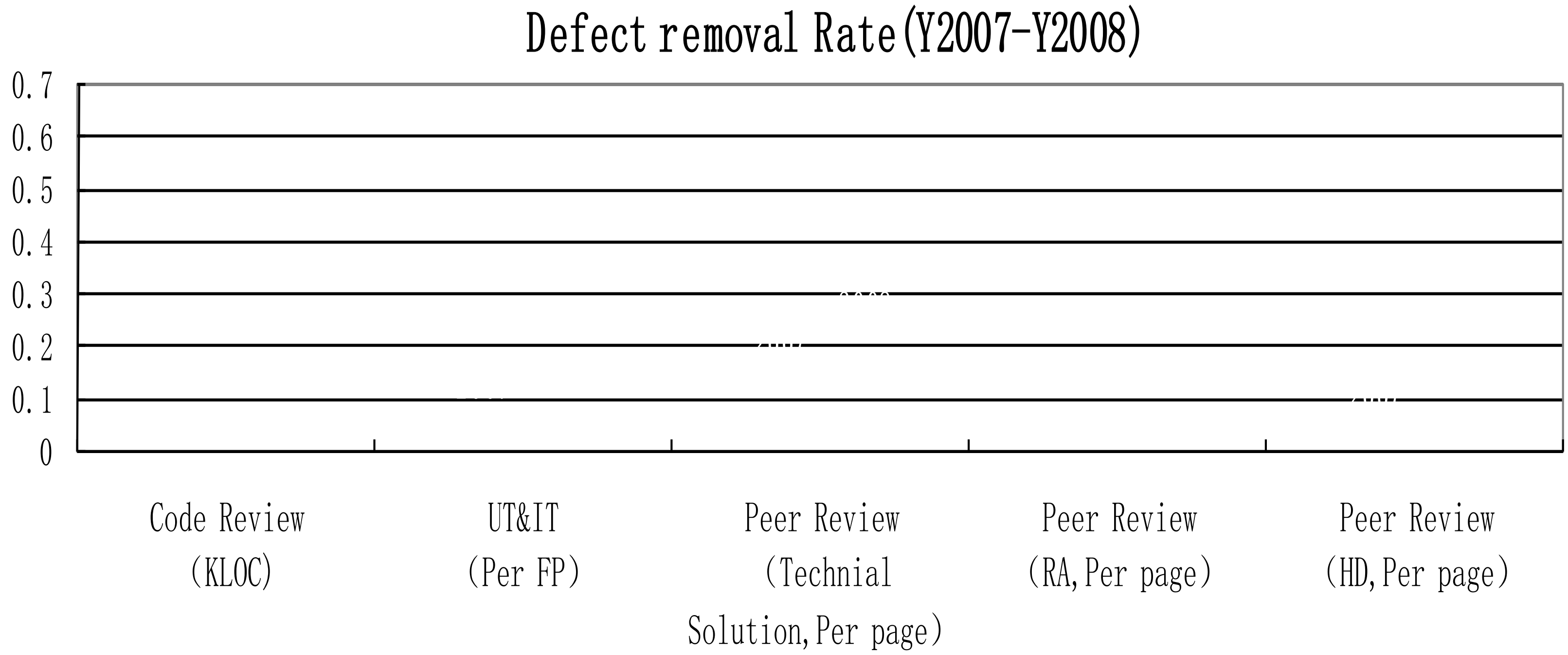
- **Defect Removal Predictive Model for Requirement Peer Review:**

f (Size, Type, Complexity)

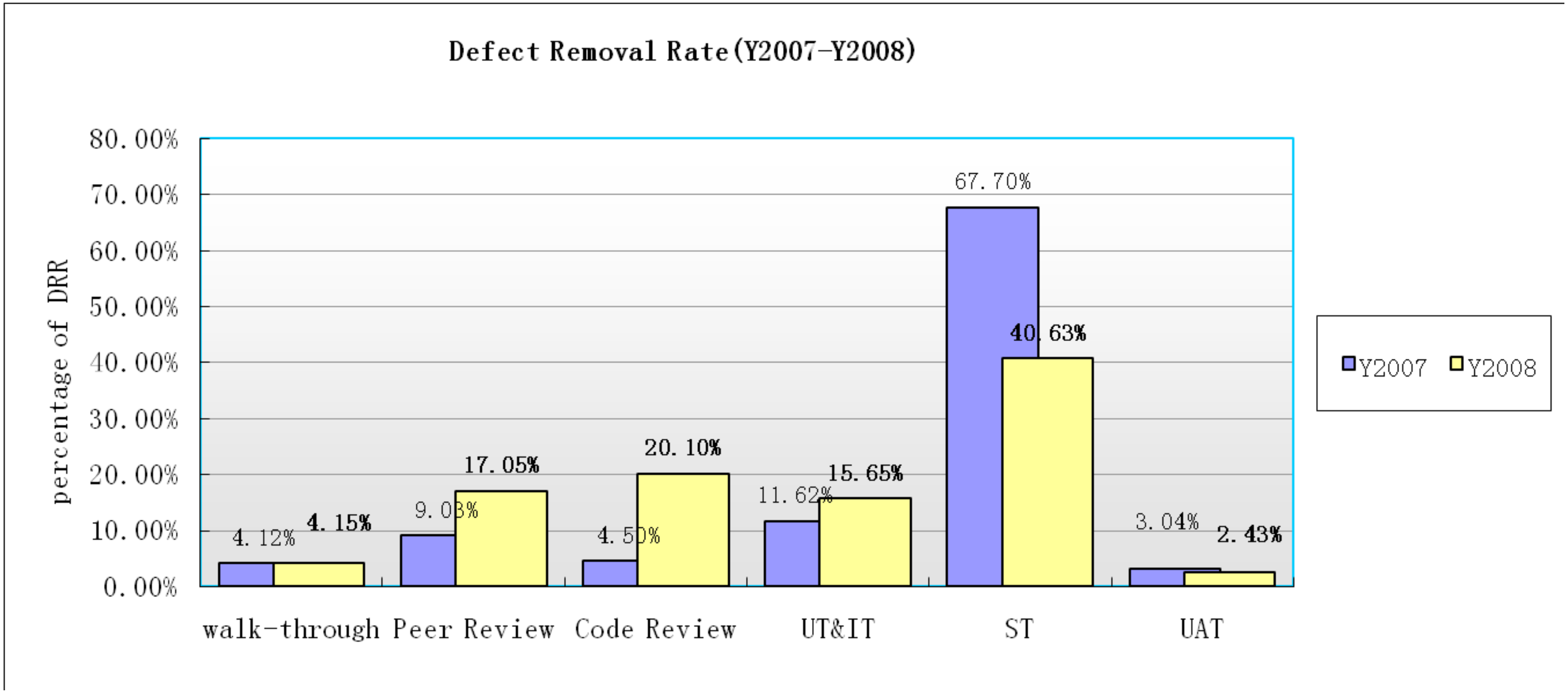
f(Size, Review Effort, Review Team Ability Index, Type)

Improvements Observed

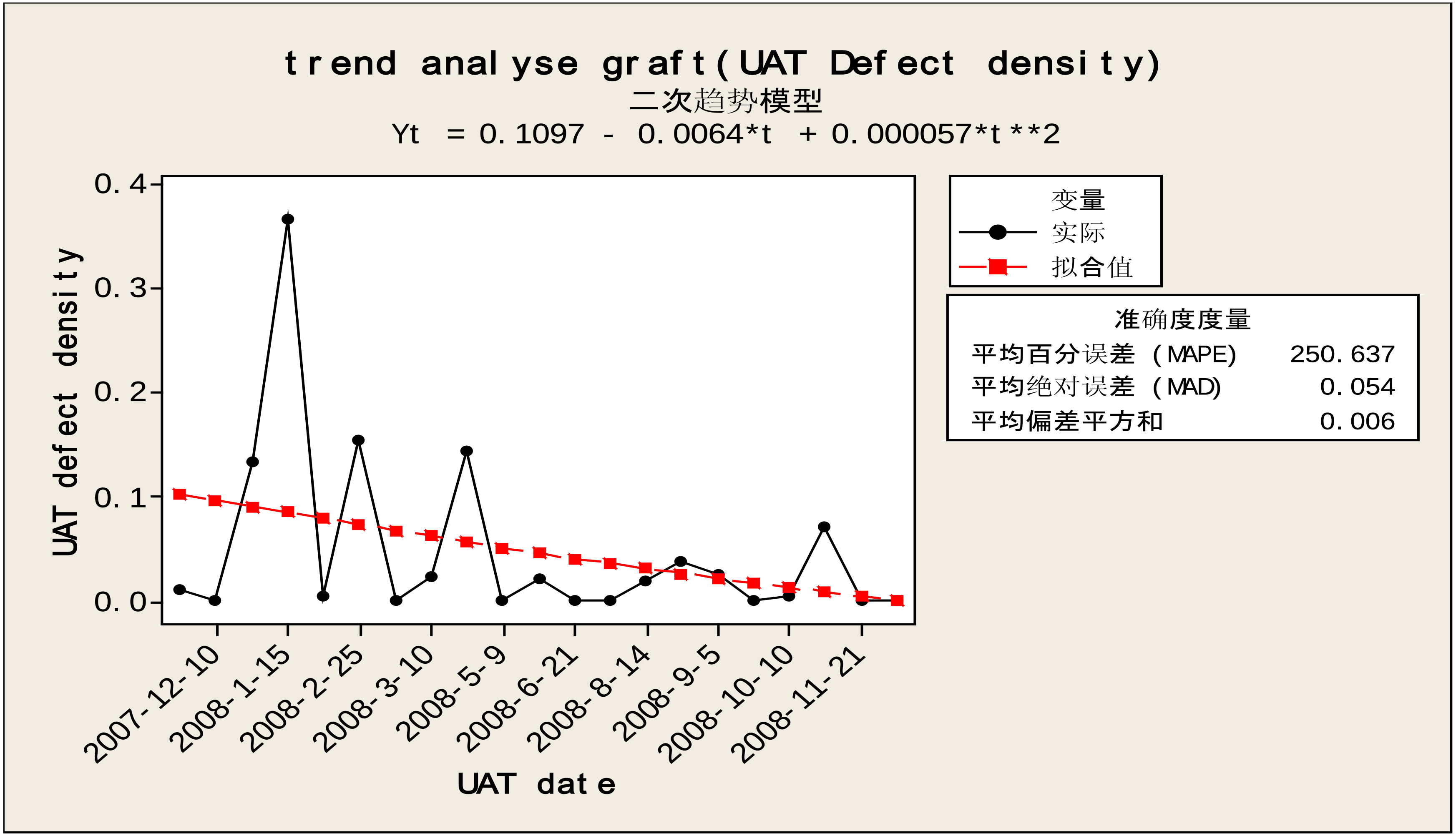
Defect removal rate improved in code review and UT&IT.



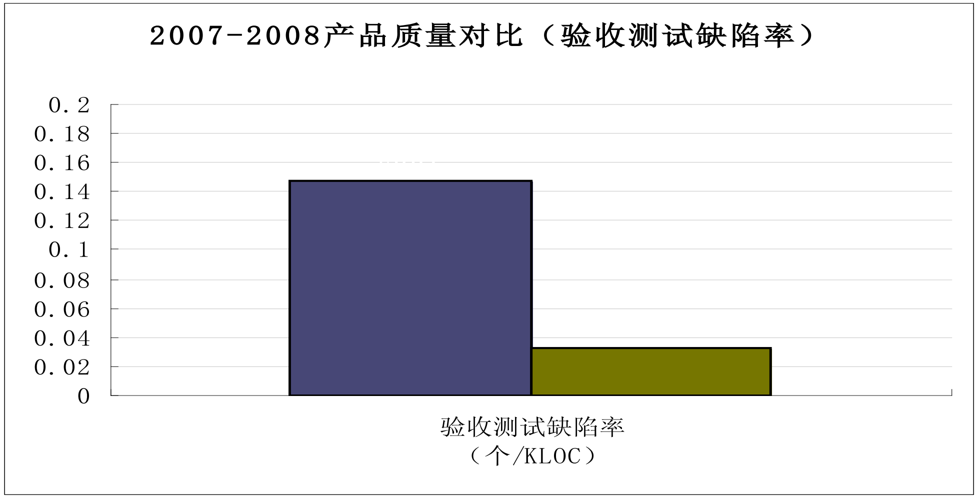
Defect Removal Pattern Moves to Front

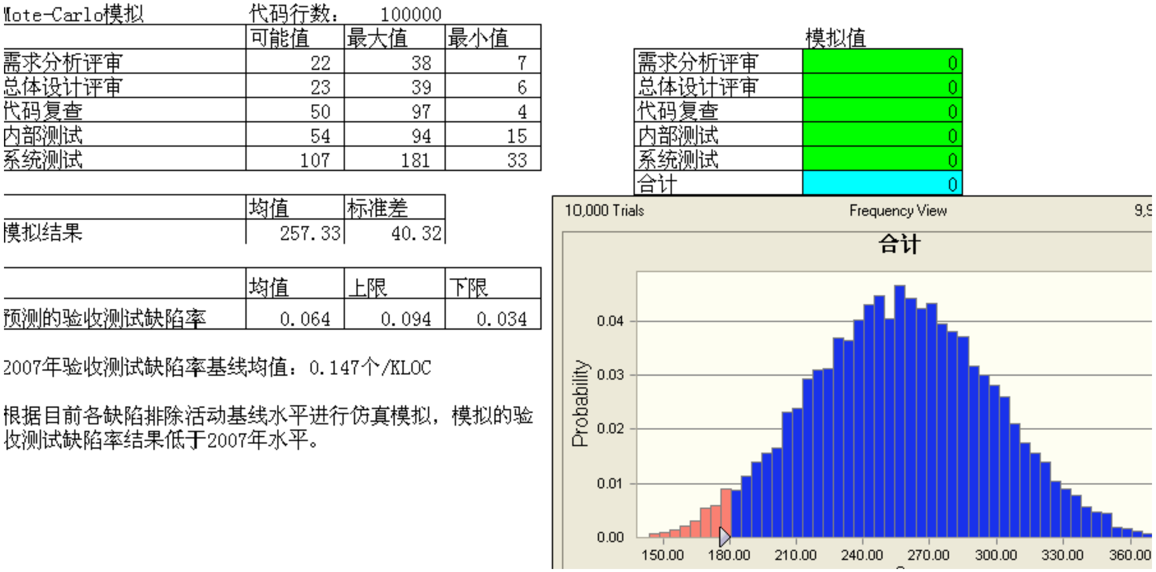


Less Number of Defects Fund at UAT



Quality is Improved





Mote-Carlo模拟　代码行数：　100000

	可能值	最大值	最小值
需求分析评审	22	38	7
总体设计评审	23	39	6
代码复查	50	97	4
内部测试	54	94	15
系统测试	107	181	33

	均值	标准差
模拟结果	257.33	40.32

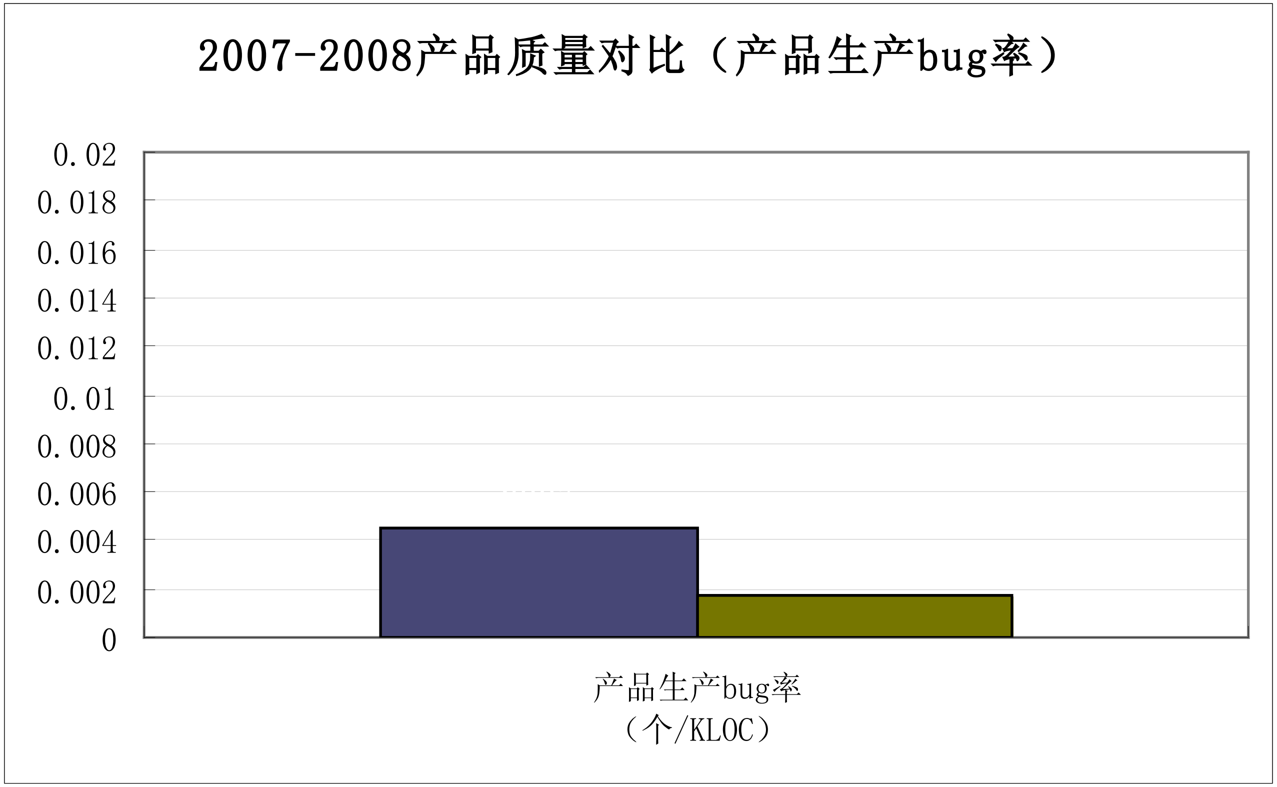
	均值	上限	下限
预测的验收测试缺陷率	0.064	0.094	0.034

2007年验收测试缺陷率基线均值：0.147个/KLOC

根据目前各缺陷排除活动基线水平进行仿真模拟，模拟的验收测试缺陷率结果低于2007年水平。

	模拟值
需求分析评审	0
总体设计评审	0
代码复查	0
内部测试	0
系统测试	0
合计	0

Clients’ Quality Goal is Met



Some Lessons Learnt - I

- Set up the big picture first with clearly defined overall goals and interim goals.
- Clearly think through how the PPBs and PPMs will be used. You may want to write the PPBs and PPMs' User Guidelines before actually developing them. The PPBs and PPMs will be refined from time to time but how they are used will change much less frequently.
- Model development process is to really get to know your process: factors in the model – sources of variations. It is not enough if you only master the statistical techniques and know how to use Minitab.
- Model development process can also help you to identify areas to improve.

Some Lessons Learnt - II

- **When conducting regression analysis, do not just look at R square but also think “will the model allow you do What-If analysis?”**
- **Benchmarking a process does not make it a key process. A key process should also be the focus of your improvement. The factors in a good process performance model are the candidate areas to improve.**
- **PPBs can support the use of Monte Carlo simulation.**
- **Spec limits and control limits can get people confused.**
- **QPPOs and Controllable Factors!!!**

Thank you ！

Army ERP Center of Expertise

Tailoring CMMI for an Enterprise Resource Planning COTS Software Environment

Director, Business Transformation and E-Systems Directorate,
Weapons & Software Engineering Center
Alison L. Schwier

Malcolm Baldrige
National
Quality
Award
2007 Award
Recipient

Director, Army COE
Mr. George Albinson

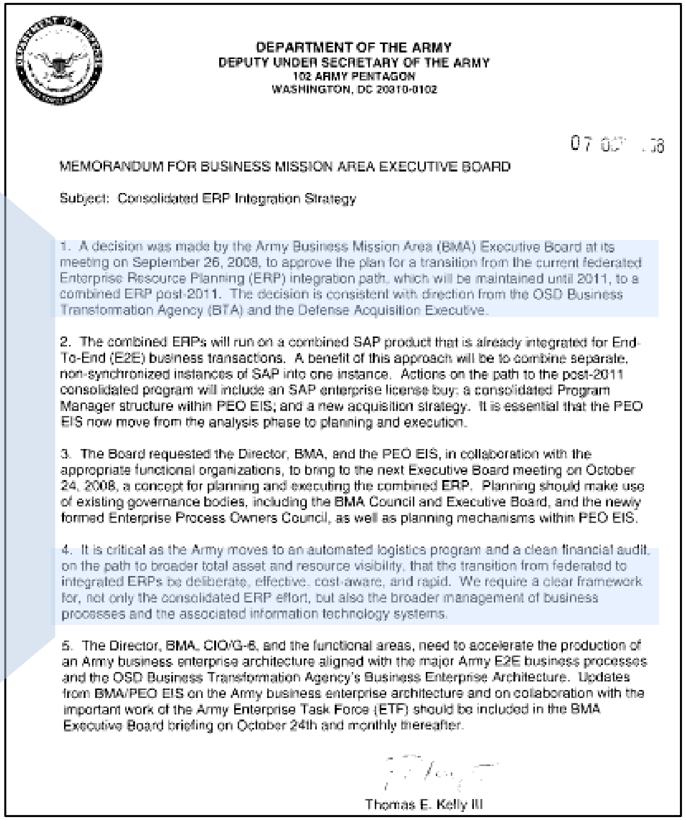
Agenda

- Background
- SEI CMMI models
- COE Decision to use CMMI for Development
- Tailoring Armament Software Engineering Center Policies/Procedures
- Lessons Learned

Consolidated ERP Integration Strategy Memo
Dated 7 Oct 08

1. A decision was made by the Army Business Mission Area (BMA) Executive Board at its meeting on September 26, 2008 to approve the plan for a transition from the current federated ERP integration path, to a combined ERP post-2011. The decision is consistent with direction from the OSD BTA and the Defense Acquisition Executive.

4. It is critical as the Army moves to an automated logistics program and a clean financial audit, on the path to broader total asset and resource visibility, that the transition from federated to integrated ERPs be deliberate, effective, cost-aware and rapid. We require a clear framework for, not only the consolidated ERP effort, but also the broader management of business processes and the associated information technology systems.



DEPARTMENT OF THE ARMY
DEPUTY UNDER SECRETARY OF THE ARMY
102 ARMY PENTAGON
WASHINGTON, DC 20310-0102

07 OCT 08

MEMORANDUM FOR BUSINESS MISSION AREA EXECUTIVE BOARD

Subject: Consolidated ERP Integration Strategy

1. A decision was made by the Army Business Mission Area (BMA) Executive Board at its meeting on September 26, 2008, to approve the plan for a transition from the current federated Enterprise Resource Planning (ERP) integration path, which will be maintained until 2011, to a combined ERP post-2011. The decision is consistent with direction from the OSD Business Transformation Agency (BTA) and the Defense Acquisition Executive.

2. The combined ERPs will run on a combined SAP product that is already integrated for End-To-End (E2E) business transactions. A benefit of this approach will be to combine separate, non-synchronized instances of SAP into one instance. Actions on the path to the post-2011 consolidated program will include an SAP enterprise license buy; a consolidated Program Manager structure within PEO EIS; and a new acquisition strategy. It is essential that the PEO EIS now move from the analysis phase to planning and execution.

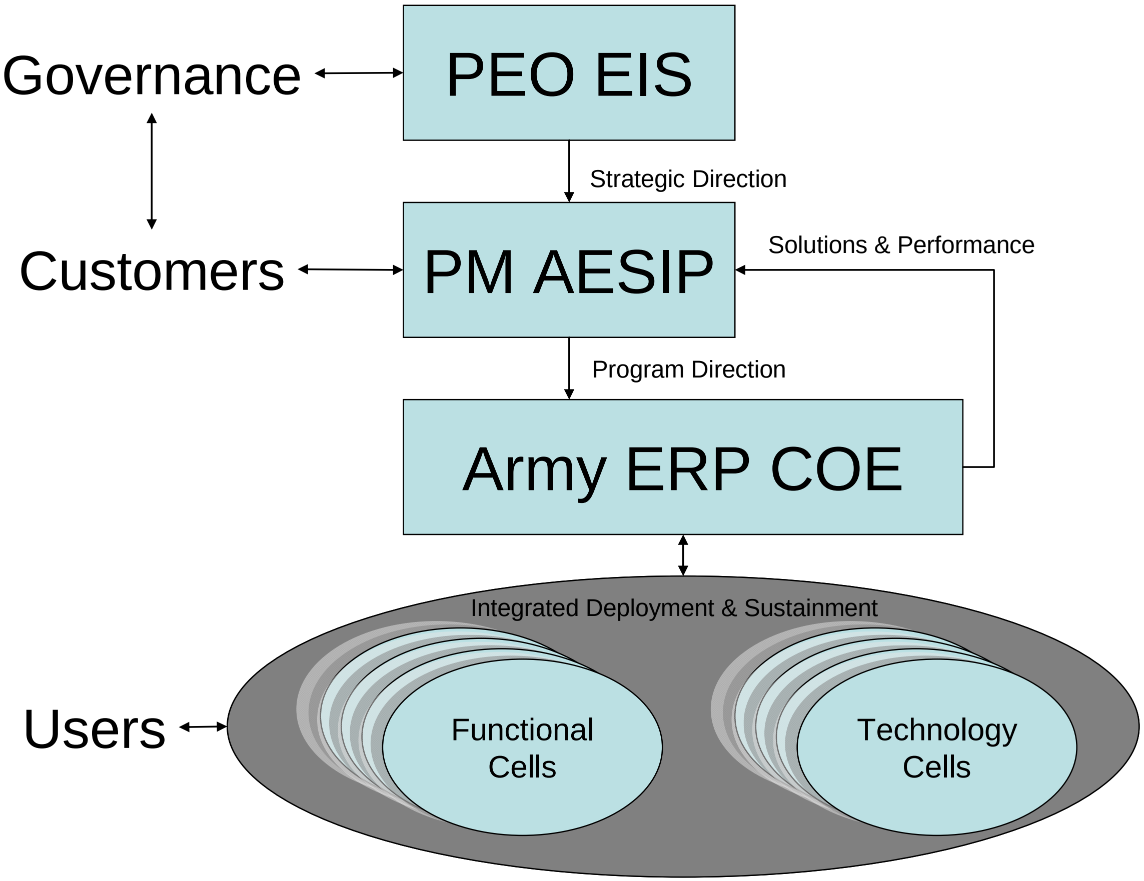
3. The Board requested the Director, BMA, and the PEO EIS, in collaboration with the appropriate functional organizations, to bring to the next Executive Board meeting on October 24, 2008, a concept for planning and executing the combined ERP. Planning should make use of existing governance bodies, including the BMA Council and Executive Board, and the newly formed Enterprise Process Owners Council, as well as planning mechanisms within PEO EIS.

4. It is critical as the Army moves to an automated logistics program and a clean financial audit, on the path to broader total asset and resource visibility, that the transition from federated to integrated ERPs be deliberate, effective, cost-aware, and rapid. We require a clear framework for, not only the consolidated ERP effort, but also the broader management of business processes and the associated information technology systems.

5. The Director, BMA, CIO/G-6, and the functional areas, need to accelerate the production of an Army business enterprise architecture aligned with the major Army E2E business processes and the OSD Business Transformation Agency's Business Enterprise Architecture. Updates from BMA/PEO EIS on the Army business enterprise architecture and on collaboration with the important work of the Army Enterprise Task Force (ETF) should be included in the BMA Executive Board briefing on October 24th and monthly thereafter.

Thomas E. Kelly III

Governance – Org Chart



Governance

Customers

Users

PEO EIS

Strategic Direction

PM AESIP

Solutions & Performance

Program Direction

Army ERP COE

Integrated Deployment & Sustainment

Functional Cells

Technology Cells

Army ERP COE Concepts

- An Army in-house system integrator
  - “true” ERP with full cross-Domain business processes using SAP ERP based on Business Process Reengineering
  - full scale in-production platform with landscapes capable of launching COTS prototypes with vetted best practices & lessons learned
  - technical risk reduction & cost mitigation capabilities & techniques for rapid, effective & efficient implementations
  - value added stakeholder relationships
    - Strong ERP vendor relations
    - ❖ ARDEC SEC CMMI Level 5 center of excellence using in-house resources & lean tools
    - Defense Ammunition Center Trainers
    - OSD Business Transformation Agency ESG Member
    - Other Service ERP PM’s in Navy & DLA

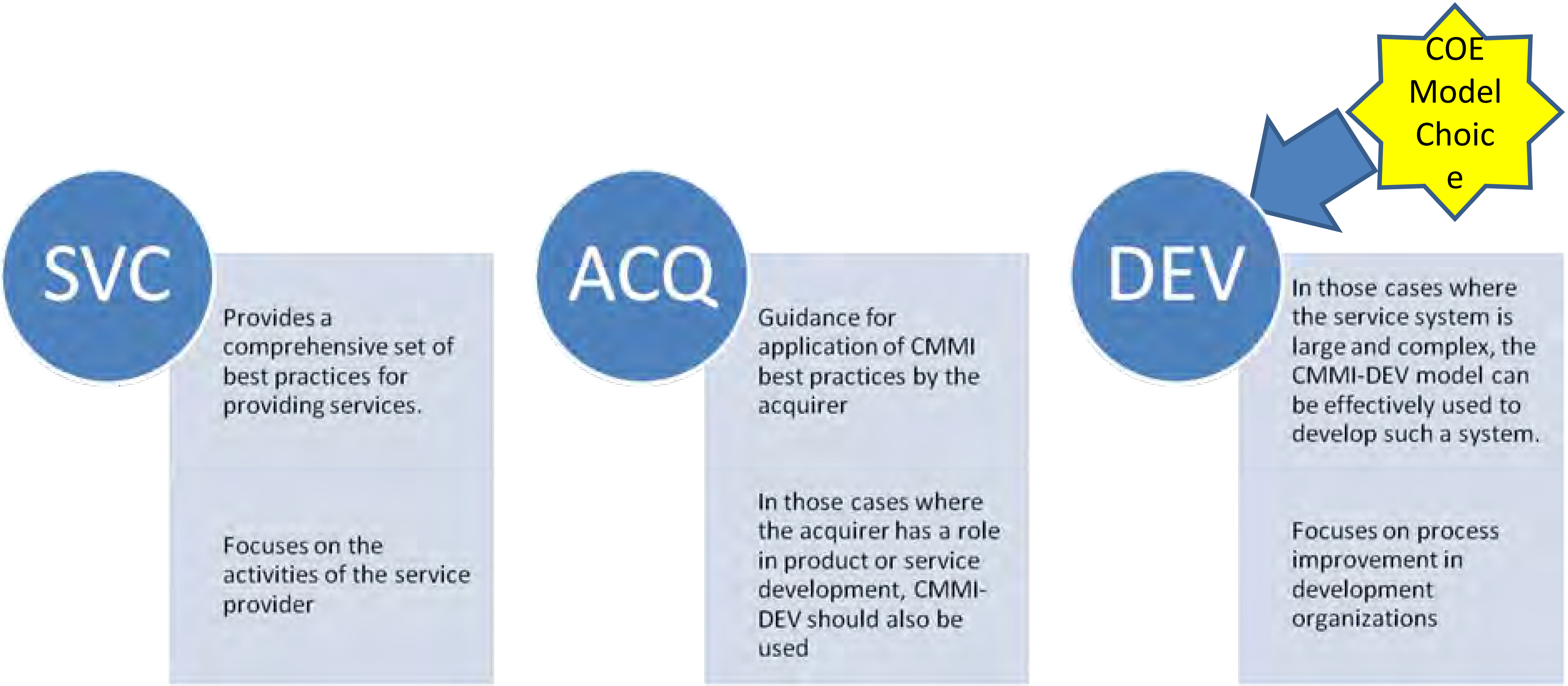
AMC Path Forward on Army ERP COE

Today's Realities

"The Americans will always do the right thing... after they've exhausted all the alternatives." -- Winston Churchill

- Large ERP Programs don't die
  - Sunk costs
  - Stakeholder resistance
  - System Integrator constituencies
  - Belief that government can't do the heavy lifting
- Army In-sourcing
  - Some view AMC as large inflexible lethargic bureaucracy
  - AMC has the SME talent
  - AMC has the base to start now & grow technology from SEC & eNOVA
  - PEO EIS has the acquisition capabilities
  - Strategic move from requirements analysis to conference room pilot approval
  - Move from DoD 5000 driven System Integrator contract milestones to moving at Commander's pace with latest technologies & latest strategies
    - Slices of end to end processes versus large monolithic stove pipe implementations
    - Build to holistic enterprise that matches strategy to transactions versus huge integration costs among internally focused stove pipes

Understand SEI’s CMMI-DEV and CMMI-SVC



COE Model Choice

SVC

Provides a comprehensive set of best practices for providing services.

Focuses on the activities of the service provider

ACQ

Guidance for application of CMMI best practices by the acquirer

In those cases where the acquirer has a role in product or service development, CMMI-DEV should also be used

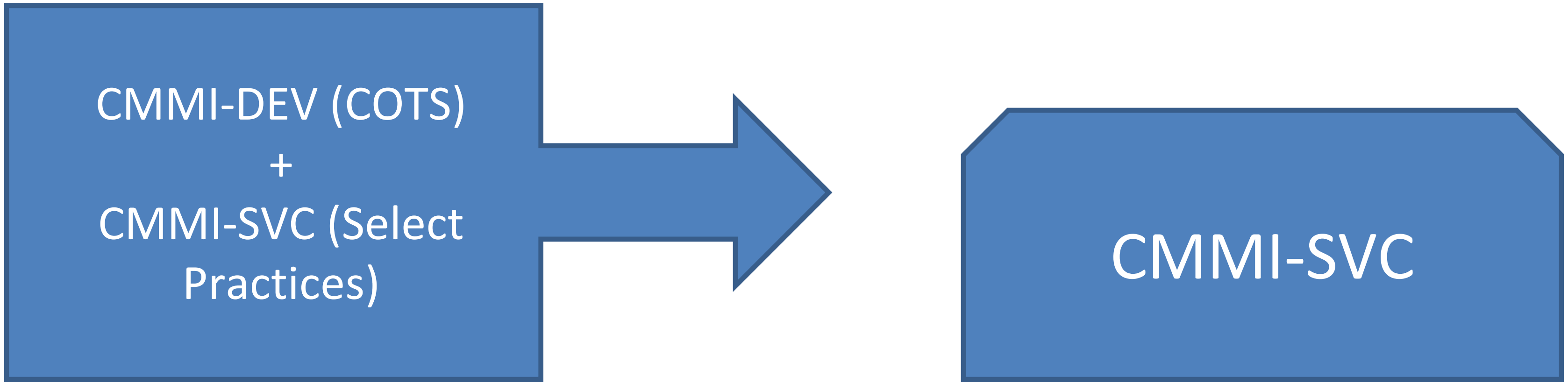
DEV

In those cases where the service system is large and complex, the CMMI-DEV model can be effectively used to develop such a system.

Focuses on process improvement in development organizations

The COE is following the **CMMI-DEV** model – to develop this large and complex ERP system

Hybrid CMMI Implementation for Army ERP



CMMI-DEV (COTS)
+
CMMI-SVC (Select Practices)

CMMI-SVC

Initial large and complex development effort; augment with CMMI-SVC constellation

Eventually: Maintain a high-quality service-providing organization

Appraise to CMMI-DEV

Goals:
- Implement a hybrid CMMI Model
- Share templates and Best Practices

CMMI Model Comparison

		CMMI-SVC	CMMI-DEV	CMMI-ACQ
Process Areas	CMMI Model Foundation	✓	✓	✓
	Services Specific	✓[2]		
	Engineering		✓[1]	
	Acquisition			✓[3]

[2] Change Management added by COE to cover this crucial COTS function

[1] 9 CMMI-DEV Model Foundation Process Areas have demands specific to COTS:

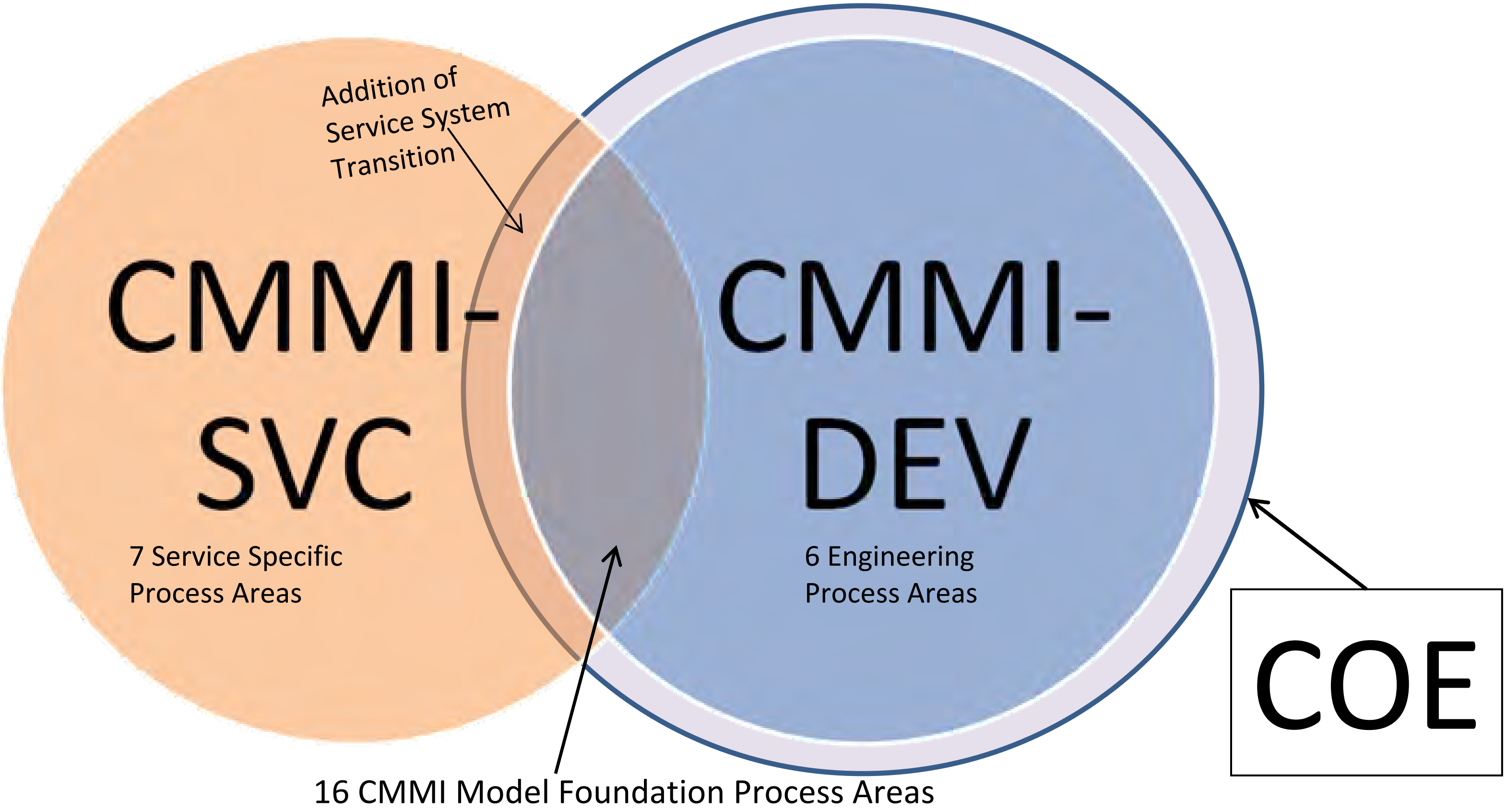
- Project Planning
- Risk Mgmt
- Requirement Mgmt
- Decision Analysis & Resolution
- Supplier Agreement Mgmt
- Process and Product Quality Assurance
- Integrated Project Management
- Configuration Mgmt
- Measurement and Analysis

The 7 Services Specific Process Areas:

- Service Delivery (SD)
- [2] Service System Transition (SST) (Change Management)
- Strategic Service Management (STSM)
- Capacity and Availability Management (CAM)
- Service Continuity (SCON)
- Incident Resolution and Prevention (IRP)
- Service System Development (SSD)

[3] Acquisition constellation is a resource when acquiring COTS software (SAP) and services (contractors with SAP skills).

Which process areas are covered by each model?



COE’s COTS Implementation Process Areas

Continuous Representation

CMMI-DEV process areas

Process Management	
OPF	Organizational Process Focus
OPD	Organizational Process Definition + IPPD
OT	Organizational Training
OPP	Organizational Process Performance
OID	Organizational Innovation and Deployment
Project Management	
PP	Project Planning
PMC	Project Monitoring and Control
SAM	Supplier Agreement Management
IPM	Integrated Project Management + IPPD
RSKM	Risk Management
QPM	Quantitative Project Management
Engineering	
REQM	Requirements Management
RD	Requirements Development
TS	Technical Solution
PI	Product Integration
VER	Verification
VAL	Validation
Support	
CM	**Configuration Management ****
PPQA	Process and Product Quality Assurance
MA	Measurement and Analysis
DAR	Decision Analysis and Resolution
CAR	Causal Analysis and Resolution

+

Addition of 1 CMMI-SVC process area

Service Specific	
SST	Service System Transition

**** Tailor CM Policy & Procedures**

—Version control and numbering

—Product release and delivery

Relevant CMMI-ACQ Process Areas

Process Area	COE Examples
Agreement Management (AM) The purpose of Agreement Management (AM) is to ensure that the supplier and the acquirer perform according to the terms of the supplier agreement.	•At the highest level, the agreement between the Army and SAP. •Each services contract for SAP contractor assignments.
Acquisition Validation (AVAL) The purpose of Acquisition Validation (AVAL) is to demonstrate that an acquired product or service fulfills its intended use when placed in its intended environment.	•Audits and reviews of base SAP software against Army goals and vision. •Functional and Physical audits of various existing Army systems the COE acquires.
Acquisition Verification (AVER) The purpose of Acquisition Verification (AVER) is to ensure that selected work products meet their specified requirements.	•Verification that the skills and output artifacts from each contract are as expected. •Verification that the base SAP software performs as expected and support levels are maintained.

Decision Analysis and Resolution for CMMI-DEV Model Choice

Our team considered:

Credibility
“Proven Product”

“Applying CMMI to a COTS adaptation is a new effort. We will be most successful by using Armament Software Engineering Center’s Level-5 Organizational Framework”

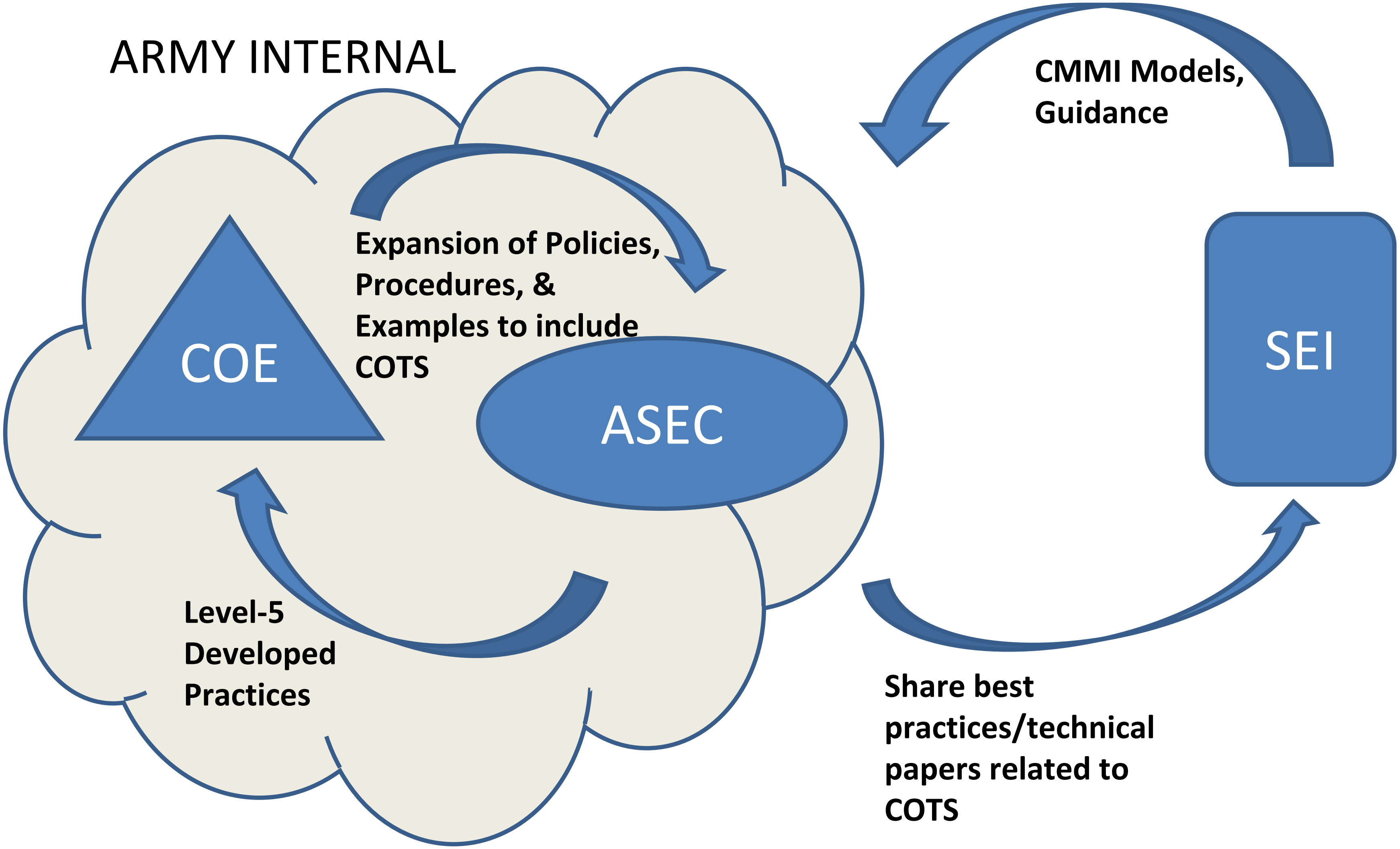
Ease and Speed of Implementation
“Leverage”

“Armament Software Engineering Center Level-5 policies, procedures and templates are based on CMMI-DEV”

Cost

“Costs include staffing and training a new process engineering group for CMMI-SVC model”

Strengthen internal and external relationships



ARMY INTERNAL

COE

ASEC

SEI

Expansion of Policies, Procedures, & Examples to include COTS

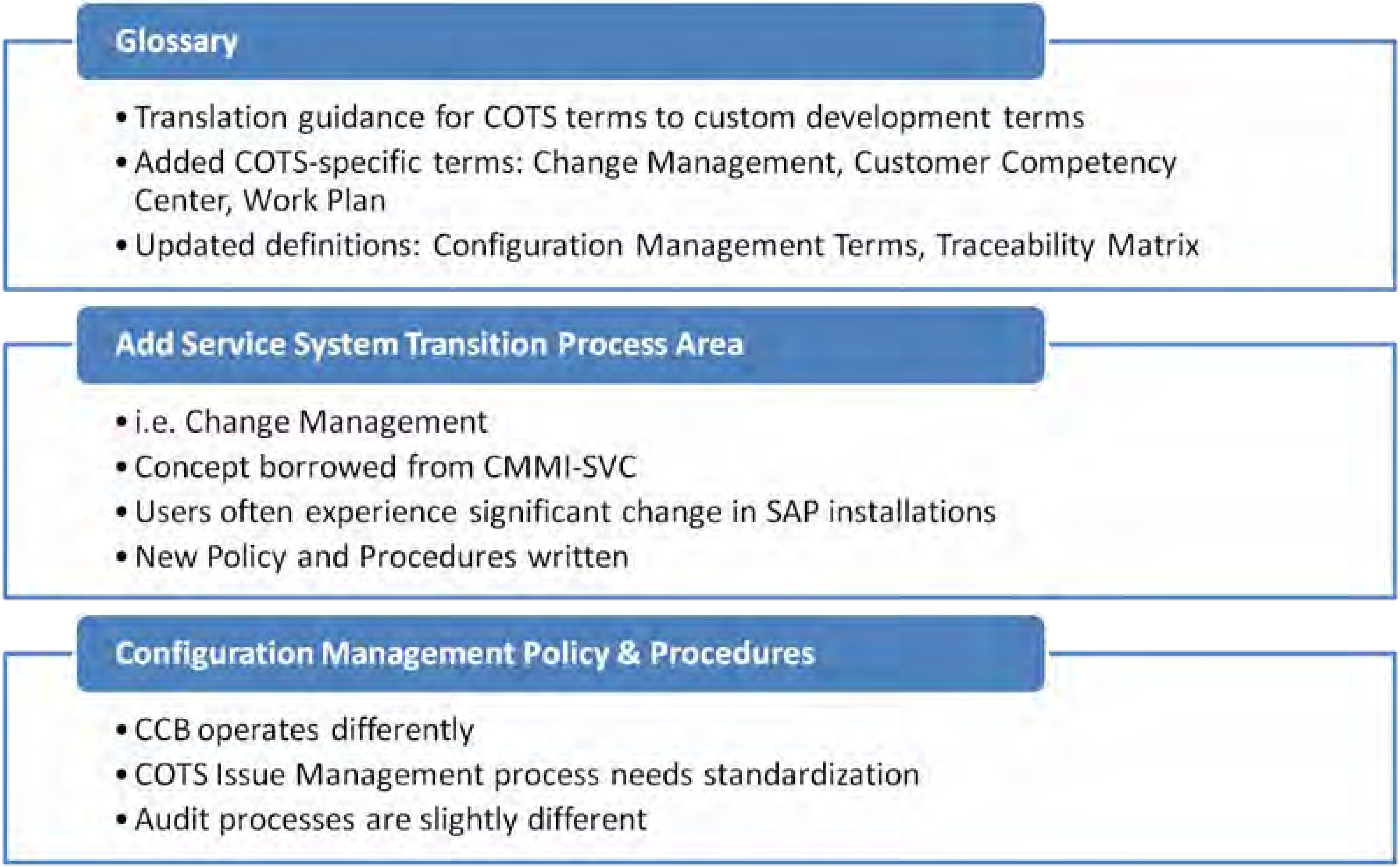
Level-5 Developed Practices

CMMI Models, Guidance

Share best practices/technical papers related to COTS

Armament SEC’s processes are robust enough to handle this COTS effort

What Organizational Standard Processes did we tailor?



Glossary

- Translation guidance for COTS terms to custom development terms
- Added COTS-specific terms: Change Management, Customer Competency Center, Work Plan
- Updated definitions: Configuration Management Terms, Traceability Matrix

Add Service System Transition Process Area

- i.e. Change Management
- Concept borrowed from CMMI-SVC
- Users often experience significant change in SAP installations
- New Policy and Procedures written

Configuration Management Policy & Procedures

- CCB operates differently
- COTS Issue Management process needs standardization
- Audit processes are slightly different

Tailor Armament SEC Policies and Procedures for COTS Implementation

Translate SAP terms in the glossary

Update CM policy, including: versioning product delivery

Armament SEC Organizational Processes

POLICIES (All Currently Common)

File Name	Title	Status
CMMI-Dev v1.2 Common Policies Trace Matrix.xls	CMMI-Dev v1.2 Common Policies Trace Matrix	Approved
Common Policy Glossary - 11 Mar 08.doc	Common Policy Glossary, 11 Mar 08	Approved
Policy AM-05 - 11 Mar 08.doc	Policy AM-05, Acquisition Management	Approved
Policy CM-05 - 30 Dec 2005.doc	Policy CM-05, Configuration Management	Approved
Policy DI-03 - 11 Mar 08.doc	Policy DI-03, Development and Integration	Approved
Policy OPM-05 - 11 Mar 08.doc	Policy OPM-05, Organizational Process Management	Approved
Policy PA-06 - 11 Mar 08.doc	Policy PA-06, Process Assurance	Approved
Policy PE-05 - 11 Mar 08.doc	Policy PE-05, Product Evaluation	Approved
Policy PFM-04 - 11 Mar 08.doc	Policy PFM-04, Performance Management	Approved
Policy PM-06 - 11 Mar 08.doc	Policy PM-06, Project Management	Approved
Policy RM-05 - 11 Mar 08.doc	Policy RM-05, Requirements Management	Approved
Policy SR-05 - 11 Mar 08.doc	Policy SR-05, Status Review	Approved

Policy SST-01 – 25 Sep 09.doc Policy SST-01, Service System Transition

Add new policy for Change Mgmt

Procedures: Organizational Level

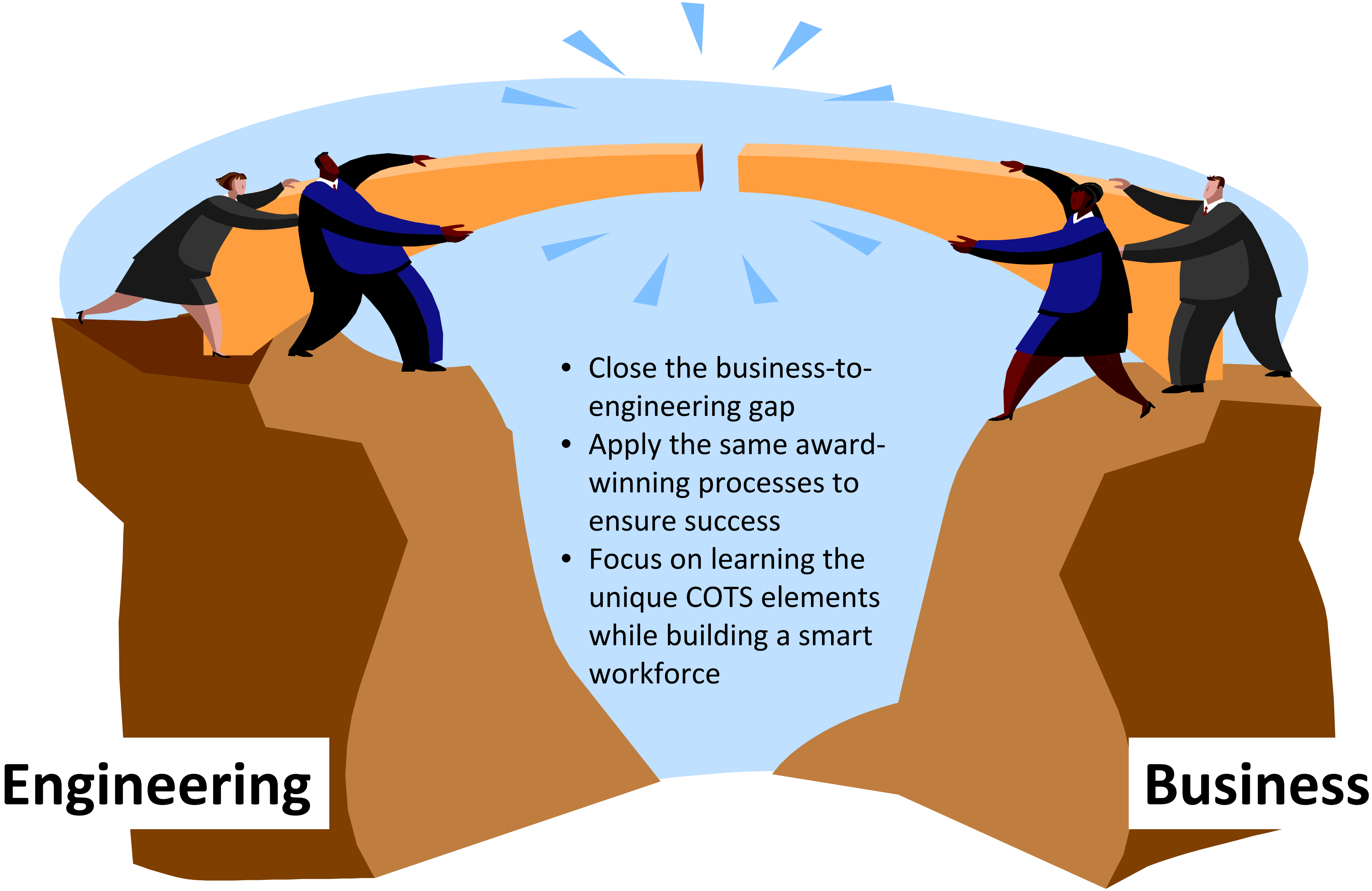
File Name	Title	Status
CP001 Organiz Process Mgmt - 11 Mar 2008.doc	CP001 Organiz Process Mgmt - 11 Mar 2008	Approved
CP002 Policy Dev - 11 Mar 08.doc	CP002 Policy Development - 11 Mar 08	Approved
CP003 Procedure Dev - 11 Mar 08.doc	CP003 Procedure Development - 11 Mar 08	Approved
CP004 Lifecycle Model Dev - 11 Mar 08.doc	CP004 Lifecycle Model Development - 11 Mar 08	Approved
CP005 Lessons Learned - 11 Mar 08.doc	CP005 Lessons Learned - 11 Mar 08	Approved
CP006 Organiz & Project Training - 11 Mar 08.doc	CP006 Org & Project Training - 11 Mar 08	Approved
CP007 Acquisition Management - 11 Mar 08.doc	CP007 Acquisition Management - 11 Mar 08	Approved
CP CM002 Change Requests Problem Rpts - 30 Dec 05.doc	CP-CM002, Change Requests Problem Rpts	Approved
CP-CM003 Processing Baseline Changes -07 April 09.doc	CP-CM003 Processing Baseline Changes -07 April 09	Approved
CP-CM004 Creating & Releasing Products - 07 April 09.doc	CP-CM004 Creating & Releasing Products - 07 April 09	Approved
CP-CM006 Conducting FCA PCA - 07 April 09.doc	CP-CM006 Conducting FCA PCA - 07 April 09	Approved
CP-PA001 Auditing Projects Reporting Results - 11 Mar 08.doc	CP-PA001 Auditing Projects Reporting Results - 11 Mar 08	Approved
CP-CM001 Managing Software CCB Activities - 07 April 09.doc	Managing Software CCB Activities - 07 April 09	Approved

All CM procedures tailored

Add new procedure for Change Mgmt

CP008 Service System Transition – 25 Sep 2009.doc CP008 Service System Transition – 25 Sep 2009.doc

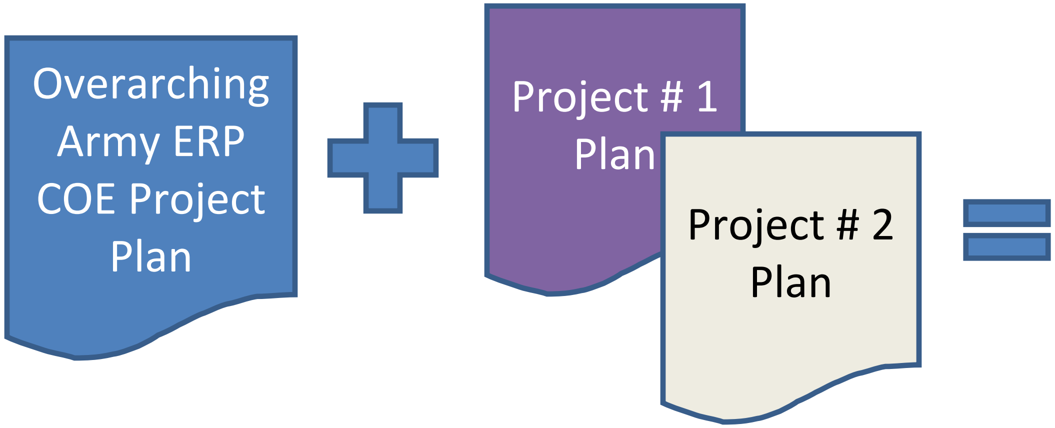
The Army ERP COE is bridging the gap



- Close the business-to-engineering gap
- Apply the same award-winning processes to ensure success
- Focus on learning the unique COTS elements while building a smart workforce

Backups

Overarching Project Plan Approach



Overarching Army ERP COE Project Plan

Project # 1 Plan

Project # 2 Plan

Streamlined common processes

Deltas to the overarching Project Plan

- Streamlined processes followed for every project iteration
- More efficient use of Project Members' Time
- Simpler to review and manage
- Less chance of error and missed sections

This is a tried-and-true approach followed by multiple current Armament SEC projects

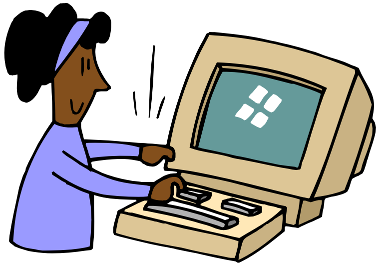
CMMI for Acquisition (CMMI-ACQ) Considerations

Acquisition of the core COTS product

- Continuous, indefinite partnership with software provider (SAP)
- Software development of the base product is managed by COTS company
- Insight into SAP software development practices is limited

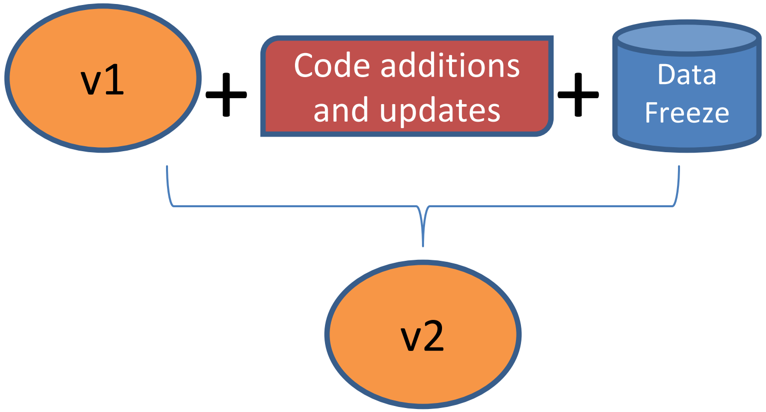
Acquisition of IT services specific to COTS development (SAP skills)

- Efforts towards an Organic base of skills start with a higher percentage of contractors
- Human Capital Plan goal is 70% government and 30% contractor COE resources thru hiring and conversion
- Best Practices from CMMI-ACQ will be referenced. These include managing supplier agreements, verifying and validating delivered solutions.



Configuration Management Tailoring: Versioning

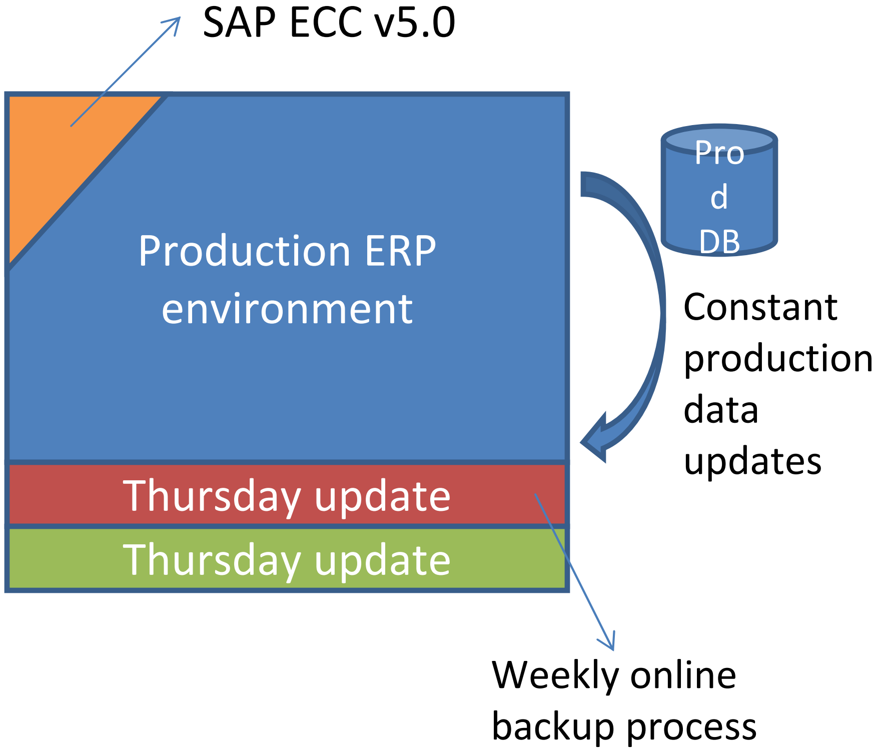
Traditional Custom Development Versioning



v1 + Code additions and updates + Data Freeze

v2

COTS Versioning



SAP ECC v5.0

Production ERP environment

Thursday update

Thursday update

Pro d DB

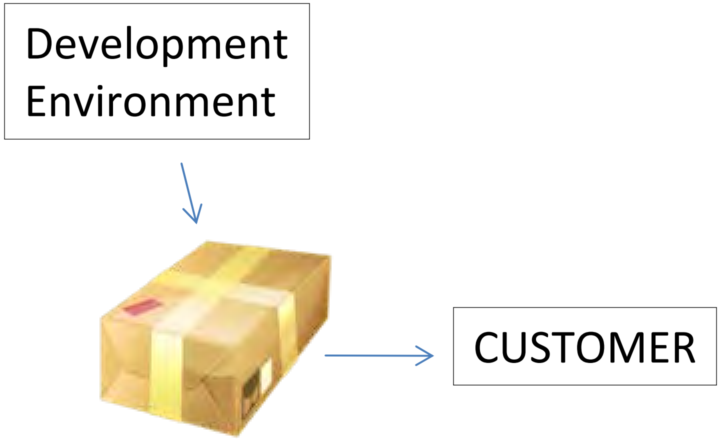
Constant production data updates

Weekly online backup process

Version numbers are assigned by the vendor to the out-of-the-box COTS product

Configuration Management Tailoring: Product Delivery

Traditional Software Delivery



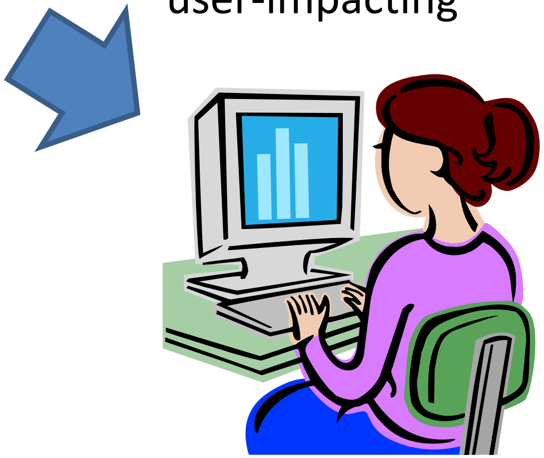
Development Environment

CUSTOMER

Packaged software delivered "fielded" to customer. Installation required.

COTS Software Delivery

- Seamless updates to the user
- Training provided for user-impacting



The ERP organization owns the development as well as production environments

Lessons learned while tailoring

☑Translation guide of SAP terms, roles and activities helped us all speak the same 'language'

☑Crosswalk of available CMMI models showed us that although this is a service-provider system with some acquisition pieces, it is also a complex development effort that will benefit most from CMMI-DEV

☑Configuration Management practices – versioning, delivery of the product and the communication to the customer - follow a completely different path than most ASEC projects. We've tailored the policy and procedures accordingly.

☑Large system integration efforts such as an ERP have huge user impacts. The Service System Transition (Change Management) process area from CMMI-SVC addresses these.

☑COE and ASEC have a mutually beneficial relationship: COE utilizes CMMI-Level 5 developed practices and ASEC expands their policies, procedures and examples to include COTS systems

☑An overarching Project Plan approach, with smaller plans for each project iteration, suits the COE ERP effort best. It embeds streamlined processes that line up with the goal of integration of multiple systems

☑We see a great opportunity for use of CMMI in a COTS product and will share our best practices with the SEI.

☑A big hurdle in our understanding of COTS development efforts is that a developer "configures" the software as opposed to traditional "coding" in software development

National
Defense
Industrial
Association

“The __Premier__ Defense Association!”

10/20/09

NDIA Heritage

- 1919 - Founded as Army Ordnance Association – AOA
- 1948 – Renamed American Ordnance Association – AOA
- 1973 – Renamed American Defense Preparedness Association - ADPA
- 1997 – NDIA created from merger of ADPA and National Security Industrial Association (NSIA)

NDIA
National Defense Industrial Association

Vision

America's leading Defense Industry association
promoting National Security

Mission

- ADVOCATE: **Cutting-edge technology and superior weapons, equipment, training, and support for the War-Fighter and First Responder**
- PROMOTE: **A vigorous, responsive, Government - Industry National Security Team**
- PROVIDE: **A forum for exchange of information between Industry and Government on National Security issues**

AFEI ntsa PSA WID

About Us……

- Non-profit, educational association
- Work with industry, government and all military Services
- 1,565 corporate members
- Over 73,600 individual members (22,000 Gov't)
- 52 Chapters
- 32 Divisions

*2/27/09

Activities

- Symposia - @ 70-80 per year – Policy, Warfighting, Logistics, Technical, Systems Acquisition, International Cooperation, Small Business, Homeland Security, etc. focus areas
- Exhibitions - @ 30 per year – the latest technology and defense related capabilities on display
- Advocacy in Washington on broad industrial base issues
- News – timely views from the Pentagon, the Administration, Congress and Industry via *National DEFENSE* magazine
- Studies, reports, assessments, reviews for government entities

Chapters

- Extend NDIA ‘reach’ across the U.S.
- Provide geographic focus for NDIA vision and mission
- Governed with By-Laws
- Conferences, social activities, award & scholarship programs, etc.

Divisions

- Provide ‘functional’ focus for NDIA mission
- Populated by corporate members
- ‘Mission Area’ oriented
- Governed by formal Charters
- Conferences, studies, workshops, seminars, awards, etc.

Divisions -- Technology

- Space
- Missile Defense
- Armaments
- Science & Engineering Tech
- Munitions Technology
- Chemical Biological Defense
- Bombs & Warheads
- Robotics
- Combat Vehicles
- Ballistics
- Tactical Wheeled Vehicles
- C4ISR
- Systems Engineering
- Technical Information
- Test & Evaluation
- Homeland Security
- Manufacturing

Divisions -- Warfare

- Expeditionary Warfare
- Undersea Warfare
- Strike, Land Attack & Air Defense
- Air Targets, UAVs & System Ranges
- Combat Survivability
- Special Operations/Low Intensity Conflict

Divisions -- Policy

- Environment & Energy
- International
- Health Affairs
- Logistics
- STEM Workforce
- Legislative Information
- Procurement
- Government Policy
- Small Business

Industrial Committees

Committee	**Sponsor**
Ammunition Producers	CG, JMC / PEO Ammo
Test & Evaluation	Dir, Test & Eval, OSD
Small Arms Producers	Vacant
Chem-Bio Defense Acquisition Initiative Forum	JPEO, Chem-Bio
Program Management	AT&L (A&T)
Biometrics	Dir, DoD BTF

Affiliates

Association for Enterprise Information

National Training & Simulation Association

Precision Strike Association

Women In Defense

National
Defense
Industrial
Association

"<u>Your</u> Premier Defense Association!"

Making the CMMI® Sing

-

A Framework for Performance Excellence

CMMI® Technology Conference and User Group

November 17th, 2009

Jeffrey L. Dutton
Chief Engineer
Jacobs Technology Inc. ITSS

This presentation spans

TWO sessions

Administrivia

- Trademarks and Service marks
  - ITIL® is a Registered Trade Mark, and a Registered Community Trade Mark of the Office of Government Commerce, and is Registered in the U.S. Patent and Trademark Office
  - IT Infrastructure Library® is a Registered Trademark of the Central Computer and Telecommunications Agency which is now part of the Office of Government Commerce
  - ® CMMI is registered in the U.S. Patent and Trademark Office by Carnegie Mellon University
  - SM SCAMPI is a Service mark of Carnegie Mellon University
- Who I am:
  - Chief Engineer, Jacobs Technology, Inc./ITSS
  - SCAMPI Lead Appraiser
  - (Lean) Six Sigma Black Belt
  - Certified Scrum Master
  - Member, NDIA Systems Engr Steering Committee
  - Member, NDIA CMMI Working Group
  - Member, CMMI-SVC Advisory Group
  - Visiting Scientist, SEI

Outline

- Goals of a performance improvement approach
- Discovering some driving principles
- Attributes of some performance improvement approaches
- Our journey
- Introducing the Framework for Performance Excellence
- Value propositions of framework components
- Making the Framework sing

Goals of a Performance Improvement Approach

- Respond to business objectives or solve problems
- Exhibit positive return on investment
- Produce sustainable improvements
- Be transferrable across projects and organizations
- Produce results fast enough to make business sense

Outline

- Goals of performance improvement
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Some Driving Principles

- Focus on performance and quality objectives
- Direct involvement of leadership
- Process ownership
- Improvement velocity

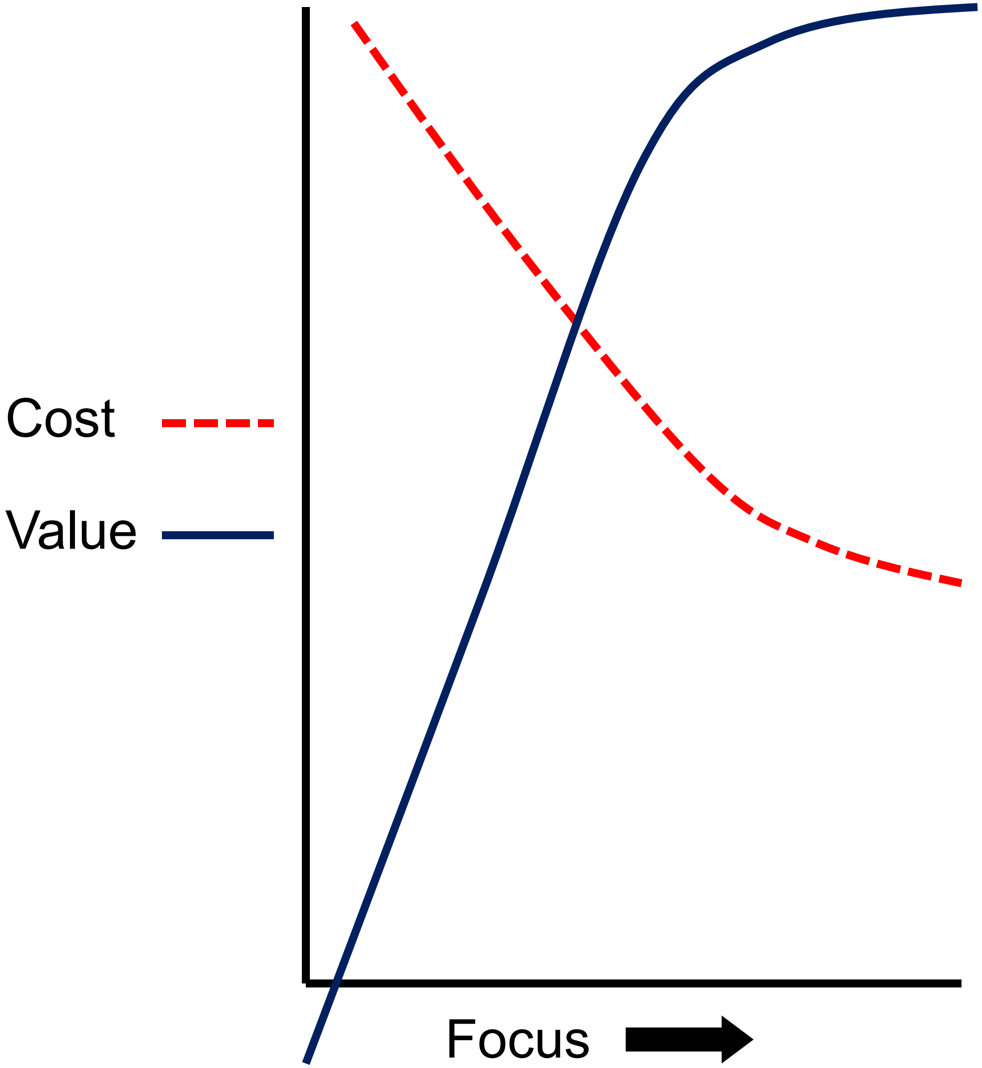
Focus on Performance/Quality Objectives

- Examples of performance objectives
  - Reduce software life cycle time frame
  - Increase level of service
  - Respond to changes in customer demand in three months or less
  - Reduce cost of development by 35%
- Examples of quality objectives
  - Meet service levels 99.9% of the time
  - Reduce delivered defects to less than 3 per 1,000,000 opportunities

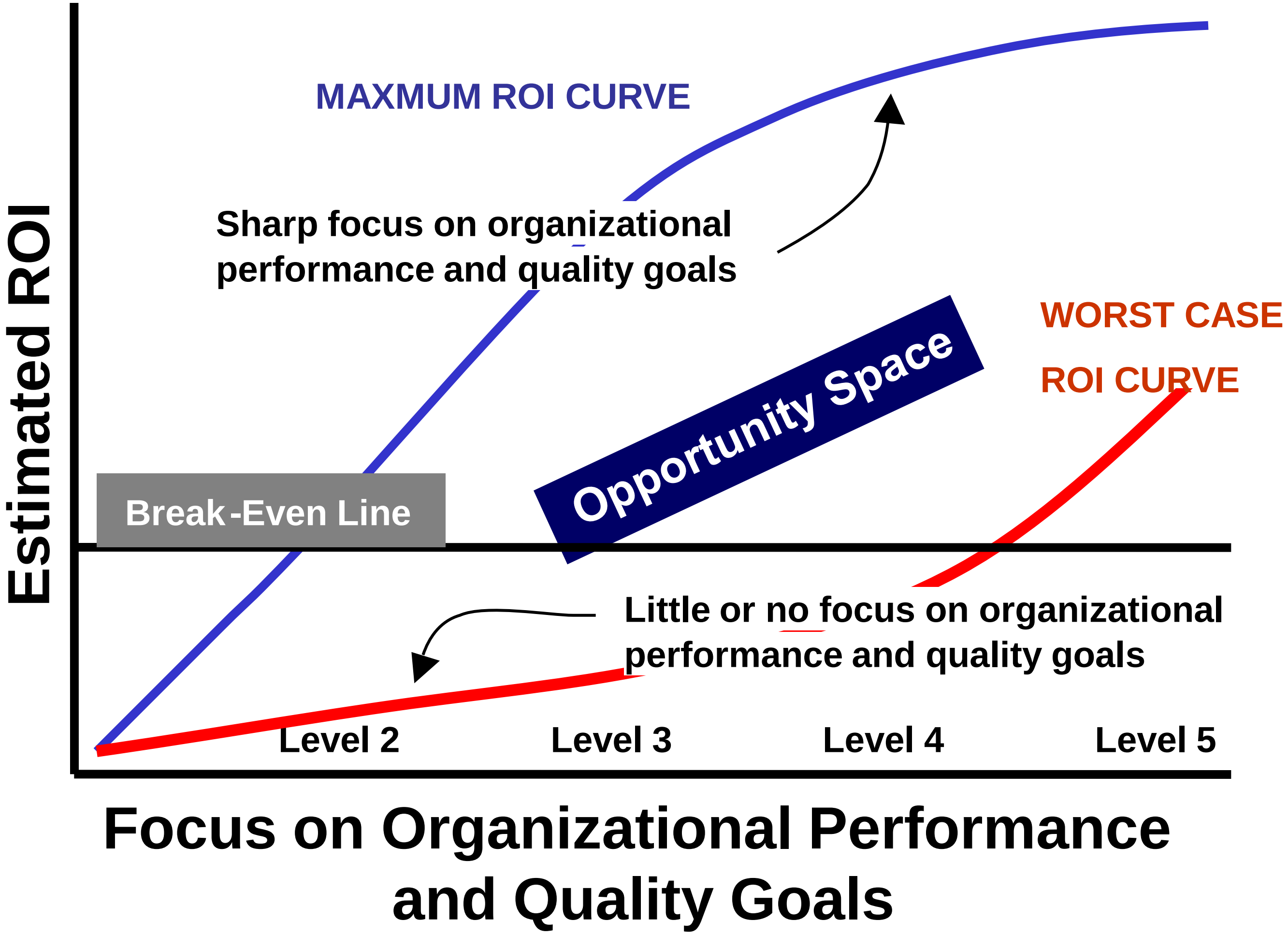
Why are Performance/Quality Objectives Important?

Because they change everything

- The improvement approaches chosen
- Interpretation of CMMI practices
- Workflow measures in Value Stream Mapping
- Measurement objectives
- Which CMMI Process Areas to implement
- What Maturity or Capability Levels to target
- What part of the organization to improve
- How much you're willing to invest


Cost
Value
Focus

Return on Investment Envelope



Direct Leadership Involvement

- “Allowing” the organization to improve is often not enough
  - Resources, personnel, money
  - Some level of process/work product review
  - Support for organizational change
  - Approval and support of process changes
- Direct, active involvement is key
  - Tie effort to real business objectives and issues
  - Be demanding of results in a meaningful time frame
  - Set high level performance and quality goals
  - Get “heroes” and key personnel directly and personally involved

LEADERSHIP is key….

Process Ownership

- Levels of removal from process ownership
  - Hire a professional to come in and write your processes (increasingly rare)
  - Form an SEPG of “process people”
    - Buy-in strategies
    - Dealing with “heroes”
    - Mandates for use of processes (!)
- Ownership by process “doers”
  - Charge the “heroes” with leading performance improvement
  - Exactly as intended by Lean Thinking
  - Make performance improvement <u>everyone’s</u> job

Improvement Velocity

- Velocity = speed in a specific direction
- Improvement “at the speed of business” is the key
- Barriers to high velocity:
  - Lack of focus (objectives, issues, scope, etc.)
  - Lack of leadership
  - Processes not owned by “doers”
  - Low process maturity
  - Misunderstanding of CMMI and other approaches

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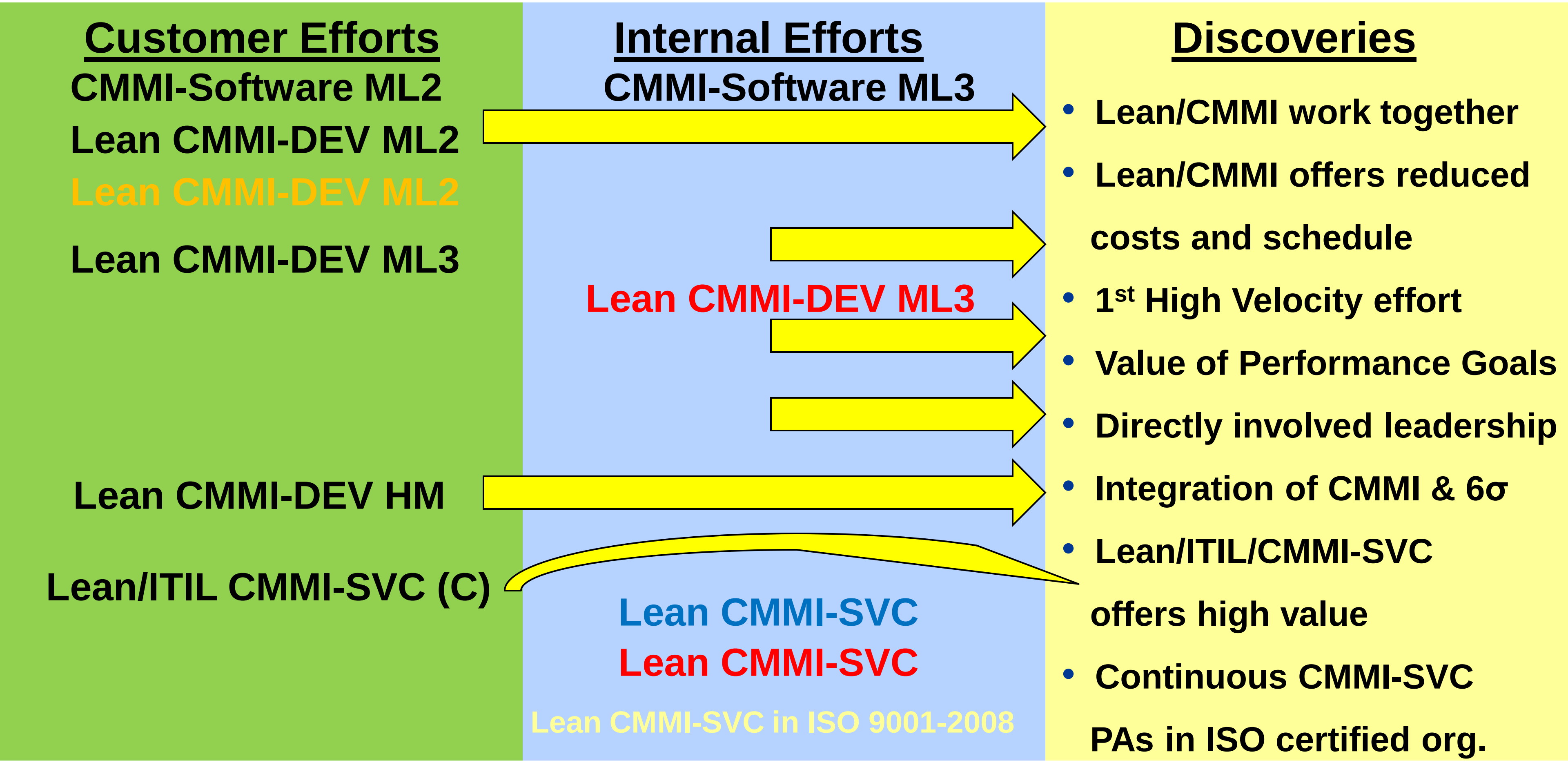
Attributes of Performance Improvement Approaches

- Lean Thinking:
  - Pros:
  - Cons:
- The CMMI:
  - Pros:
  - Cons:
- The Information Technology Infrastructure Library:
  - Pros:
  - Cons:
- Six Sigma:
  - Pros:
  - Cons:

Our Lean/CMMI/ITIL/Six Sigma Journey



Customer Efforts

CMMI-Software ML2

Lean CMMI-DEV ML2

Lean CMMI-DEV ML2

Lean CMMI-DEV ML3

Lean CMMI-DEV HM

Lean/ITIL CMMI-SVC (C)

Internal Efforts

CMMI-Software ML3

Lean CMMI-DEV ML3

Lean CMMI-SVC

Lean CMMI-SVC

Lean CMMI-SVC in ISO 9001-2008

Discoveries

- Lean/CMMI work together
- Lean/CMMI offers reduced costs and schedule
- 1st High Velocity effort
- Value of Performance Goals
- Directly involved leadership
- Integration of CMMI & 6σ
- Lean/ITIL/CMMI-SVC offers high value
- Continuous CMMI-SVC PAs in ISO certified org.

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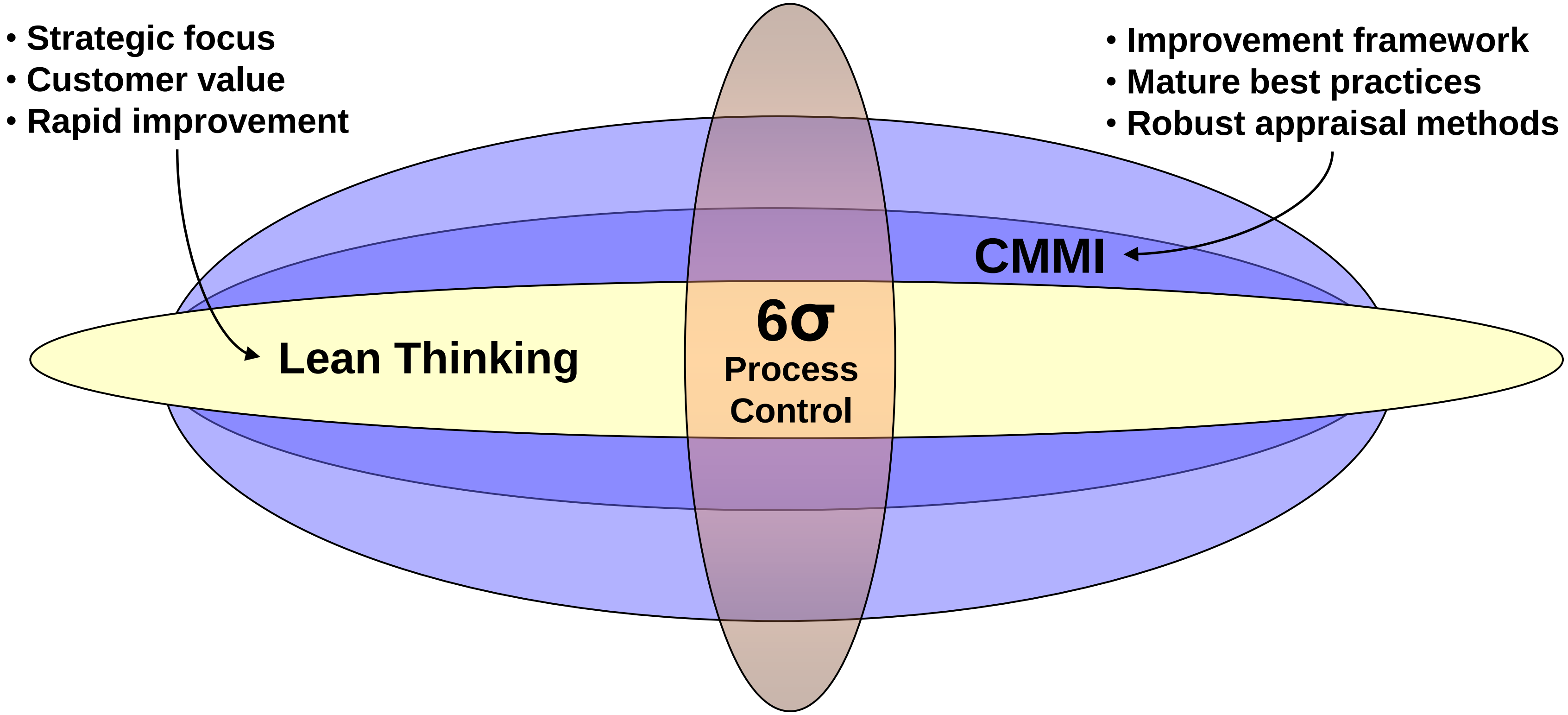
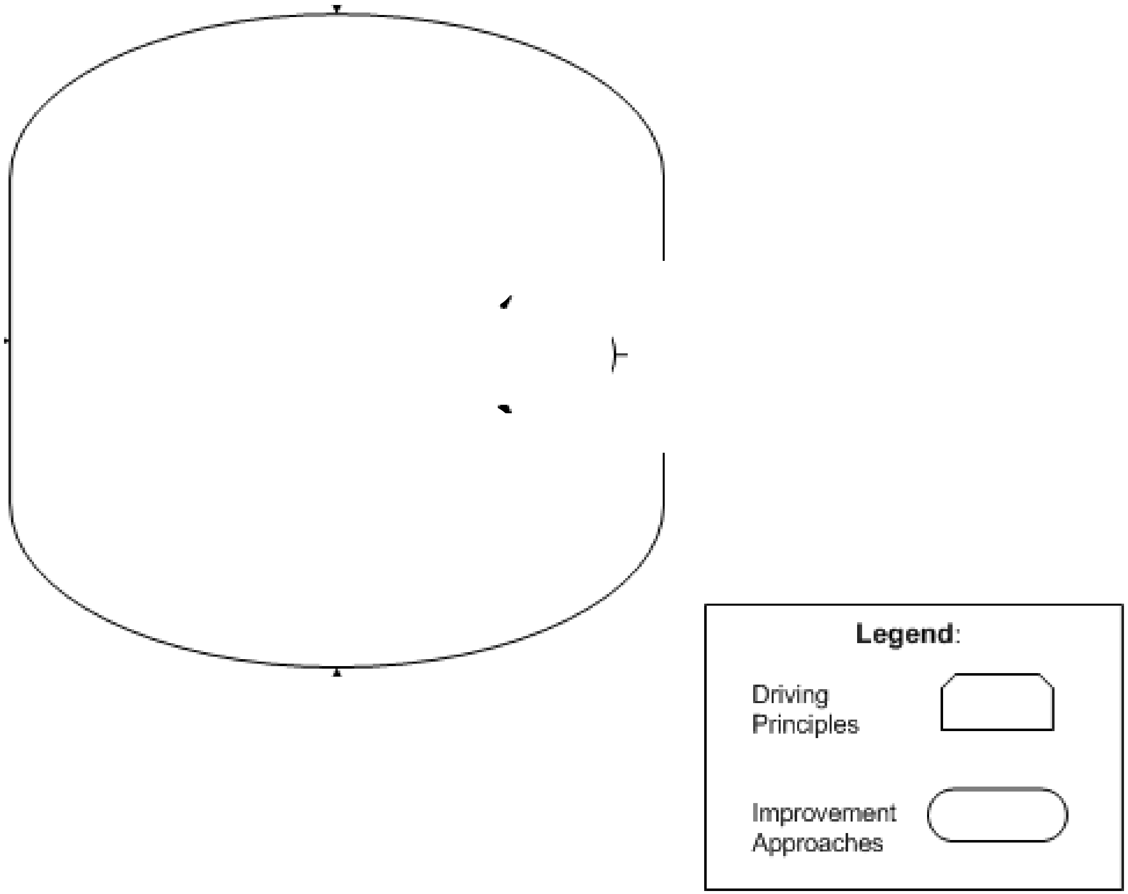
Lean/CMMI/Sixσ Venn Diagram



- Strategic focus
- Customer value
- Rapid improvement

- Improvement framework
- Mature best practices
- Robust appraisal methods

The Framework for Performance Excellence



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Value Propositions for Framework Components

- The CMMI
- Lean Thinking
- Six Sigma
- ITIL

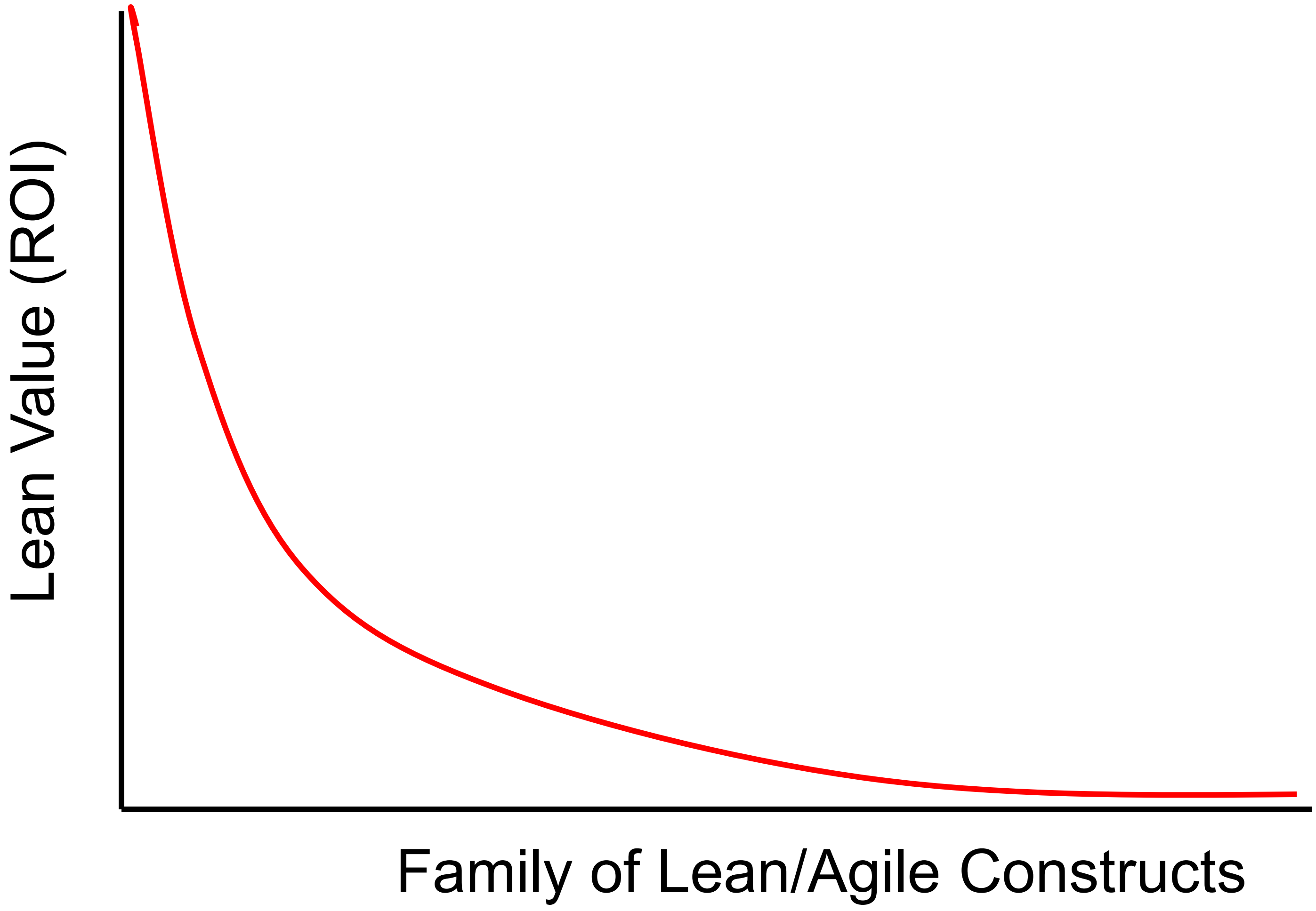
Capability Maturity Model Integration

- What is?
  - Models (goals, practices, informative material)
  - SCAMPI appraisal methods
  - Core training (SEI authorized)
- Value proposition:
  - Domain-specific best practices (development, services, and acquisition)
  - Practices for improvement infrastructure
  - Framework for continuous improvement
    - Maturity Levels
    - Process Area Capability Levels
  - Robust, extensible appraisal methods
    - Course correction
    - Learning mechanism
    - Benchmarking
- Downside:
  - No improvement approach or strategy
  - Needs focus and leaning
- Integration with other approaches:
  - Synergistic with Lean
  - Actualizes Six Sigma
  - Implements ITIL

Lean Thinking

- What is?
  - Focus on customer value
  - Value stream mapping (workflows)
  - Cadence and synchronization
  - Organizational rapid learning
  - Process doers are process owners
  - Reliance on tacit knowledge and skilled team members
  - Agile project management
- Value proposition:
  - High velocity (Presentation Wednesday 8AM)
  - Lean (smart) processes and process efficiency
  - Builds mature teams quickly
  - Rapid response to customer pressures
- Downside:
  - No improvement infrastructure
  - Suffers from lack of consistency and persistence
- Integration with other approaches:
  - Synergistic with CMMI models
  - Leverages Six Sigma
  - Sharpens business context of ITIL

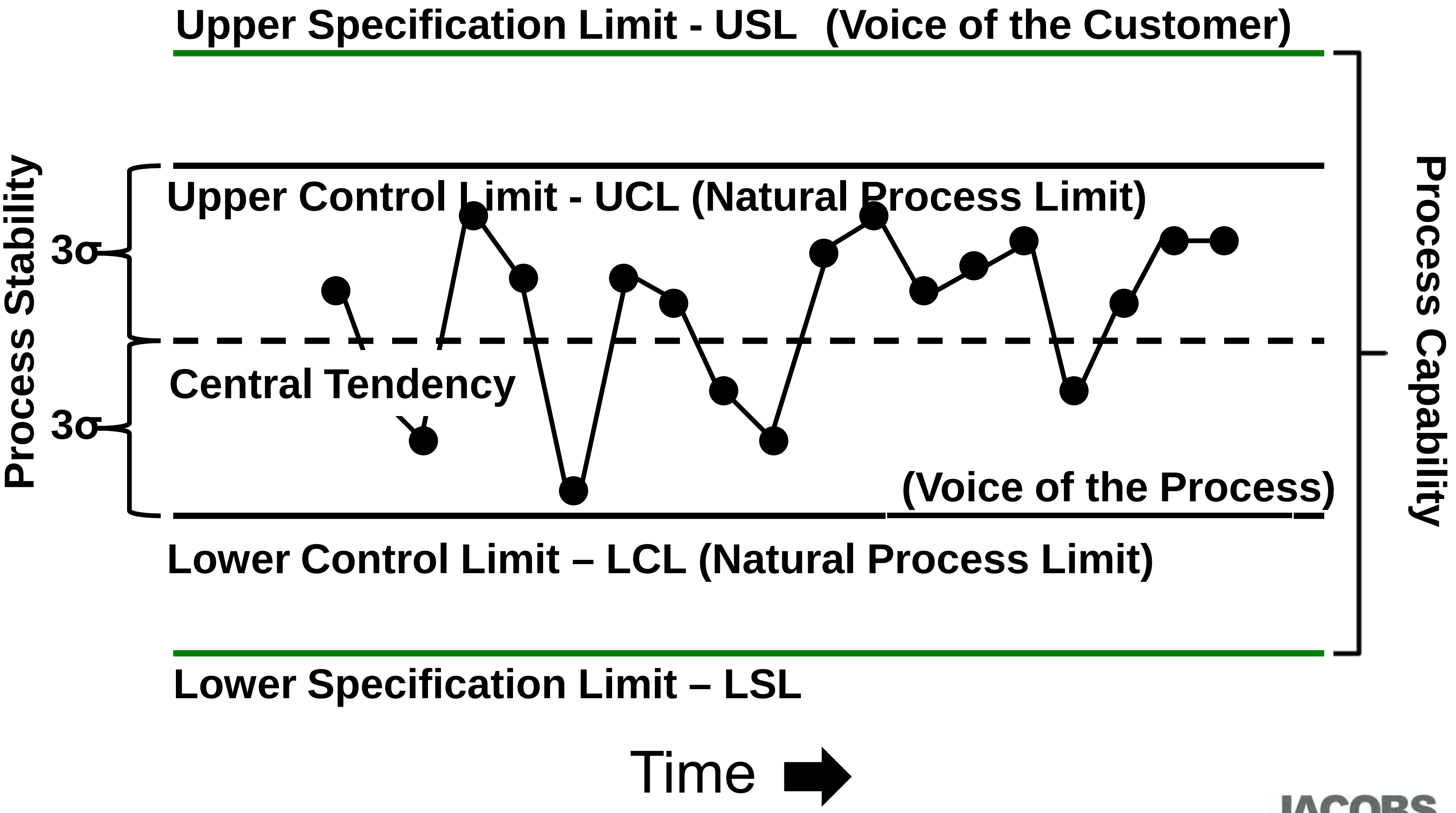
Degradation Curve for the Lean/Agile Value Proposition



Six Sigma

- What is?
  - Statistical mechanisms for process control
    - Process variability
    - Central tendency
  - Some mechanisms:
    - Regression and correlation
    - Tests of Hypothesis
    - Analysis of variance
    - Statistical process control
    - Experimental design
    - Process performance modeling and optimization
- Value proposition:
  - Allows prediction of project performance
  - Leading vs. lagging indicators
  - High degree of process control (e.g. six sigma)
- Downside:
  - High cost
  - Extensive timelines (improved by lean)
- Integration with other approaches:
  - Fully integrable with CMMI
  - Energized by lean (shorter cycles/more data)

Sample Process Control Chart



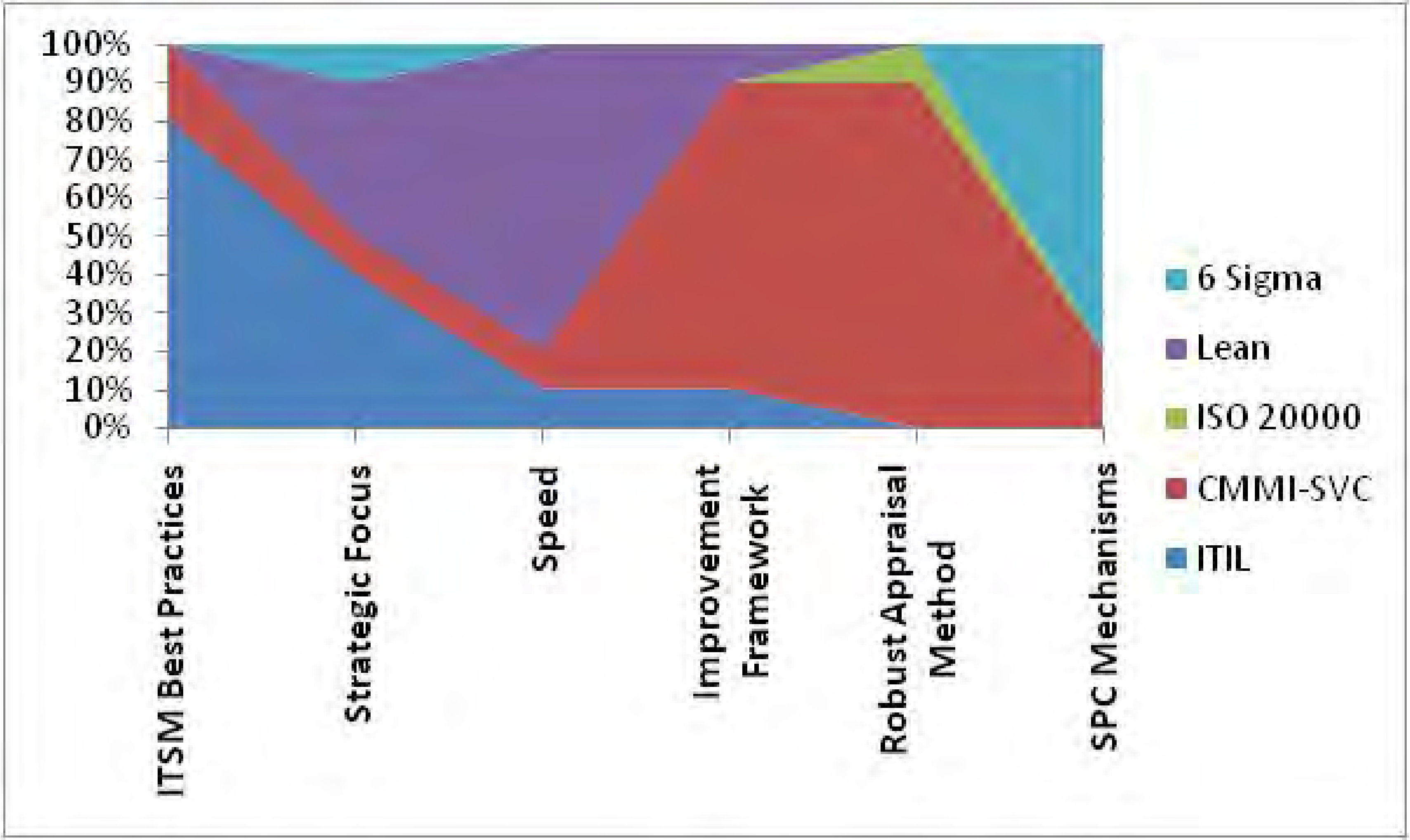
JACOBS

Information Technology Infrastructure Library

- What is?
  - Best practices for IT service operations
  - Fair implementation guidance
  - ITSM life cycle
    - (Strategy/Design/Transition/Operation/Continuous Improvement)
- Value proposition:
  - Excellent set of IT- specific practices
  - Several useable ITSM processes
  - Personal knowledge certifications
  - ISO 20000 registration
  - Some guidance for setting objectives and strategy
- Downside:
  - Little support for “organization for improvement”
  - No framework for benchmarking performance improvements
- Integration with other approaches:
  - Works well with CMMI-SVC
  - Can be benchmarked with CMMI SCAMPI A (presentation Wednesday 10AM)
  - Orthogonal to Six Sigma
  - Organizational context improved with Lean Thinking

Relative Contributions Fully Integrated Framework

(CMMI-SVC Example)



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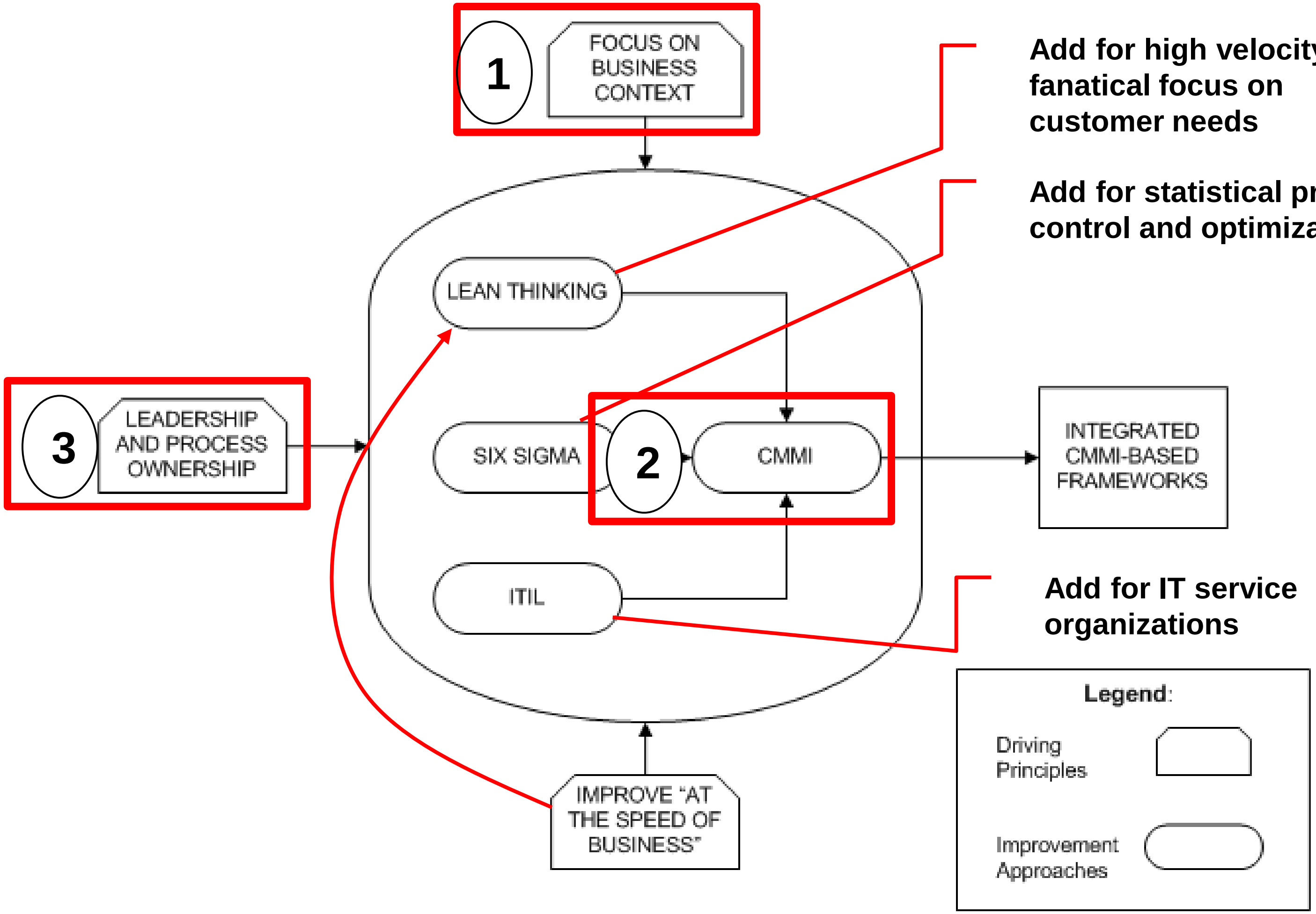
Making the Framework Sing

- Applying the Framework
- Driving principles
  - Focus on performance and quality objectives
  - Direct involvement of leadership
  - Process ownership
  - Improvement velocity
- Choosing the improvement approaches
- Tuning the Framework – some examples

Applying the Framework



Add for high velocity and fanatical focus on customer needs

Add for statistical process control and optimization

Add for IT service organizations

Example 1: Small SW Development Organization

- Performance Objectives:
  - Negotiated schedules are estimated and met with no more than a 10% variance
  - Financial costs within a 10% variance
  - Customer survey scores of 90+% satisfaction
  - Delivered product and development iterations meet or exceed committed requirements 100% of instances
  - Customer sign off occurring within 1 week after project completion
- 11 Months to achieve goals and ML3

Exa nization

- Performance Objectives:
  - Negotiated schedules are estimated and met with no more than a 10% variance
  - Financial costs within a 10% variance
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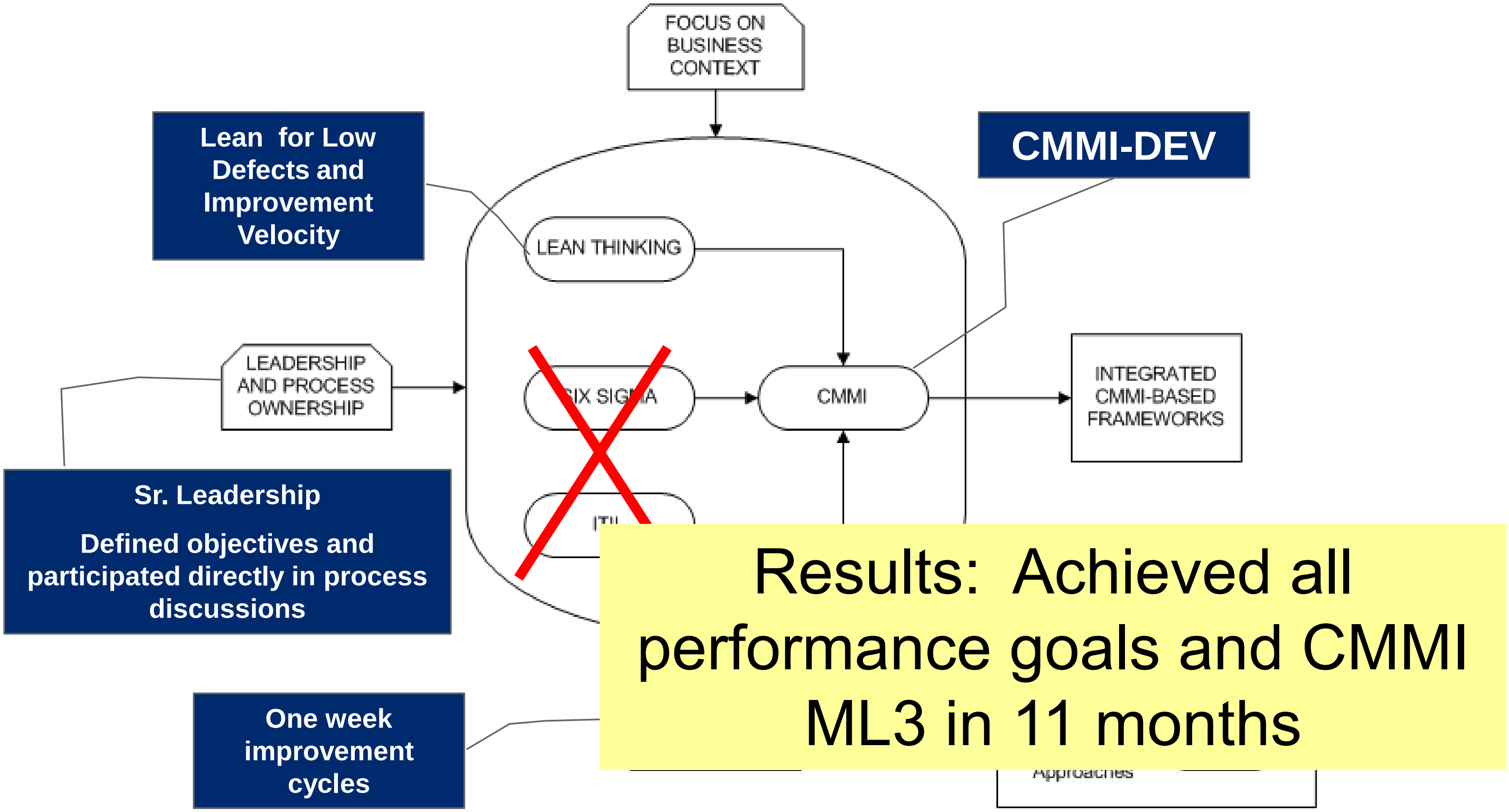


Lean for Low Defects and Improvement Velocity

CMMI-DEV

Sr. Leadership

Defined objectives and participated directly in process discussions

One week improvement cycles

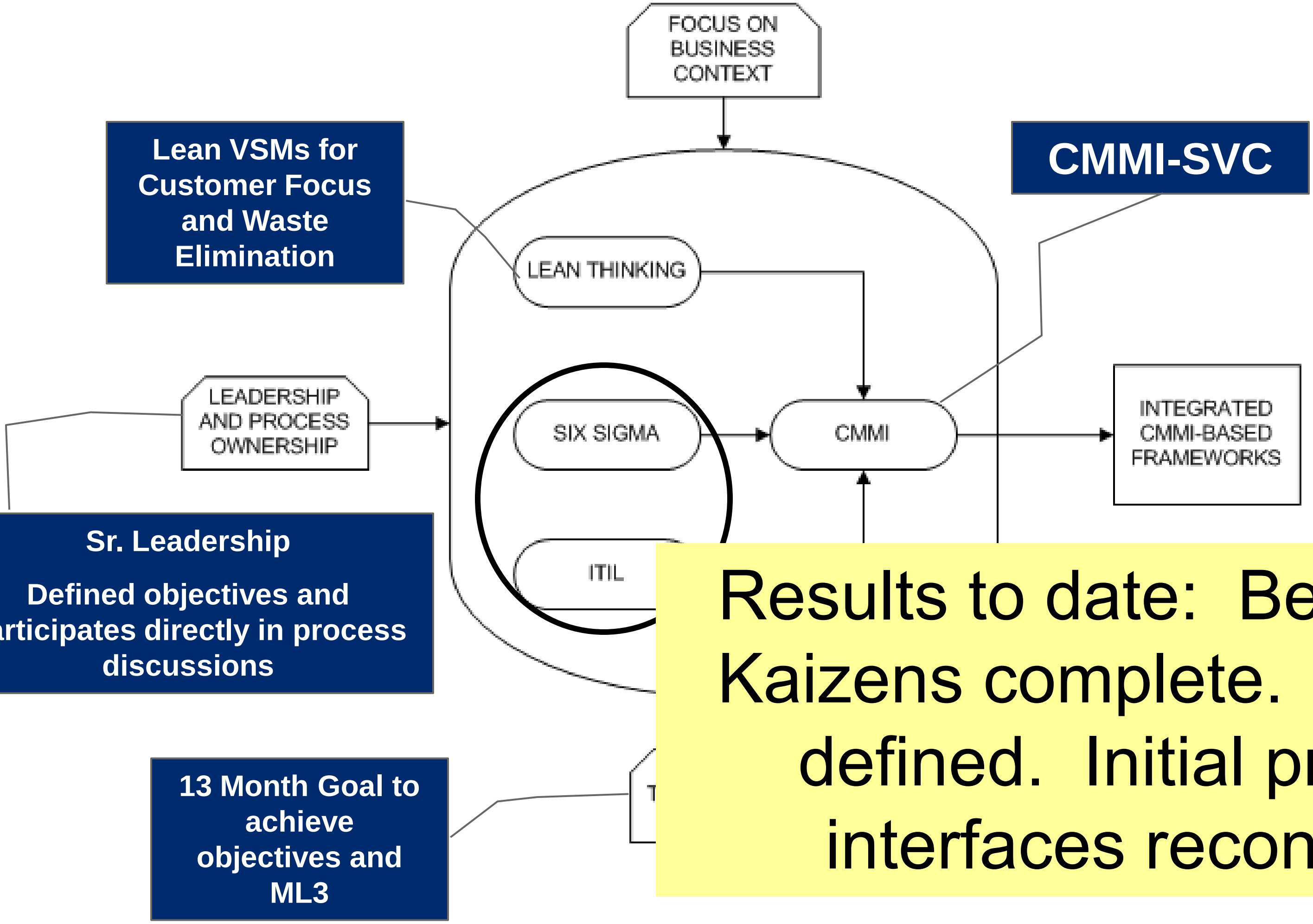
Results: Achieved all performance goals and CMMI ML3 in 11 months

Example 2: IT Service Organization

- Large IT commercial organization
- Internal (Lean) CMMI-DEV ML3 software dev. organization
- Performance Objectives:
  - Mistake-free processes and services
  - Seamless flow between business departments
  - Single ownership of services
  - Delivered services meet or exceed Service Level Agreement (SLA) 100% of instances
  - Develop credible proof of delivery capability and continuous improvement

Example rganization

- Performance Objectives:
  - Mistake-free processes and services
  - Seamless flow between business departments
  - Continuous improvement of defined services
  - Single entry of information/data
  - Single ownership of services
  - Delivered services meet or exceed Service Level Agreement (SLA) 100% of instances
  - Develop credible proof of delivery capability and continuous improvement



Lean VSMs for Customer Focus and Waste Elimination

CMMI-SVC

Sr. Leadership

Defined objectives and participates directly in process discussions

13 Month Goal to achieve objectives and ML3

Results to date: Benchmark Kaizens complete. Services defined. Initial process interfaces reconciled.

- See article in Jan/Feb 2010 issue of Crosstalk
- To discuss further, contact me at:

jeff.dutton@jacobs.com

QUESTIONS?

Process-Performance Based Reliability (PPBR)

Standardization of Organizational Data Analysis
via
CMMI-Causal Analysis and Resolution (CAR)

November 17-19, 2009

William B. Winkel

Agenda

- Why is a new process for reliability prediction needed
- How can a process be developed around CMMI-CAR
- What issues must the new process address relative to the organization's process health
- Summarize the process and provide one sample calculation

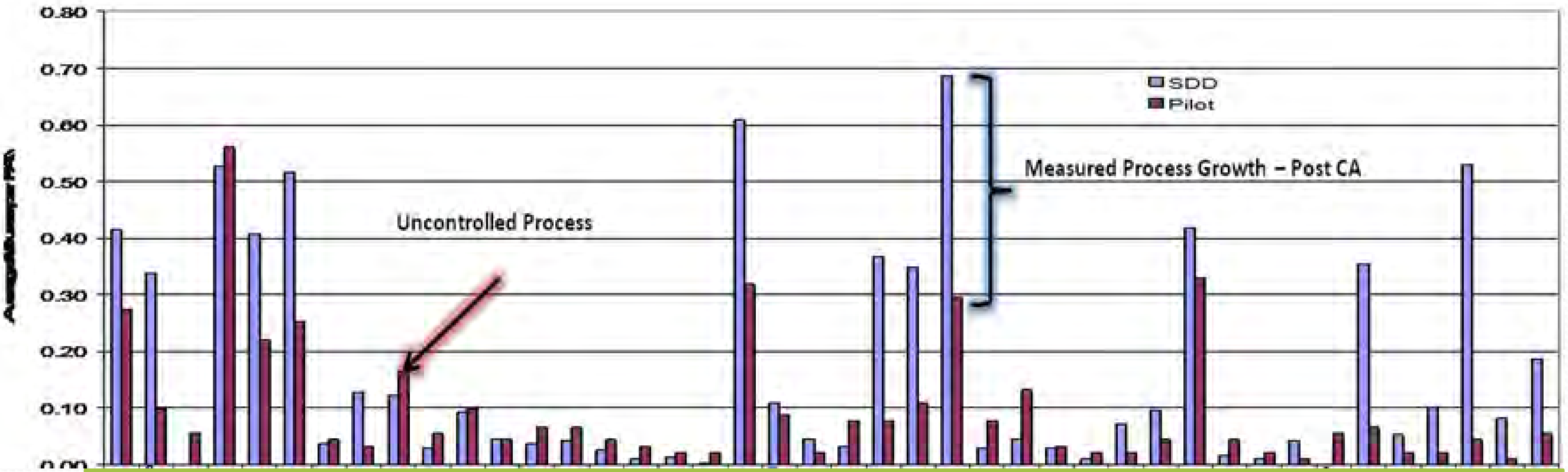
Industry Trends are Driving the Need for New Reliability Design and Analysis Methods

- Contractors must “build the case” for improving product reliability during product development cycle
  - *Ernest Seglie, Christopher Dipetto, Office of the Secretary of Defense, “Report of the Reliability Improvement Working Group”, September 4, 2008* [1]
  - Ministry of Defence Standard 00-42, Reliability and Maintainability (R&M) Assurance Guidance Part 3 R&M Case, Issue 2 Publication 6 June 2003 [2]
  - *SAE JA1000-1, “Reliability Program Standard Implementation Guide”, 1999-03-01* [3]
- Contractors will execute pay-for-performance contracts (PBL)
  - *DODD 5000.1, Department of Defense Directive, “The Defense Acquisition System”, May 12, 2003, paragraph E1.1.17* [4]
- Organizations must demonstrate continual process improvement via process performance models
  - CMMI® for Acquisition, Version 1.2, CMU/SEI-2007-TR-017, ESC-TR-2007-017, November 2007 [5]
  - CMMI® for Development, Version 1.2, CMU/SEI-2006-TR-008, ESC-TR-2006-008, August 2006 [6]
- Current Reliability prediction methods have deficiencies

Literature review has identified new direction for Reliability Engineering

The PPBR Objective is to Manage Process Reliability Growth Between Phases of Production

- Left unmanaged, organizations have limited visibility of reliability and cost growth between phases of development
  - Normalized defect counts are unavailable for between-phase comparisons
  - Defects are not uniformly categorized between development activities
  - Corrective action effectiveness is unknown
  - Unincorporated corrective action varies randomly from last phase performance
- A standard process and single web-based tool provides synergy across multiple functional groups within an organization
  - Normalized defects are continuously monitored and measured within and between phases
  - Correlations are established between categories of development and field defects

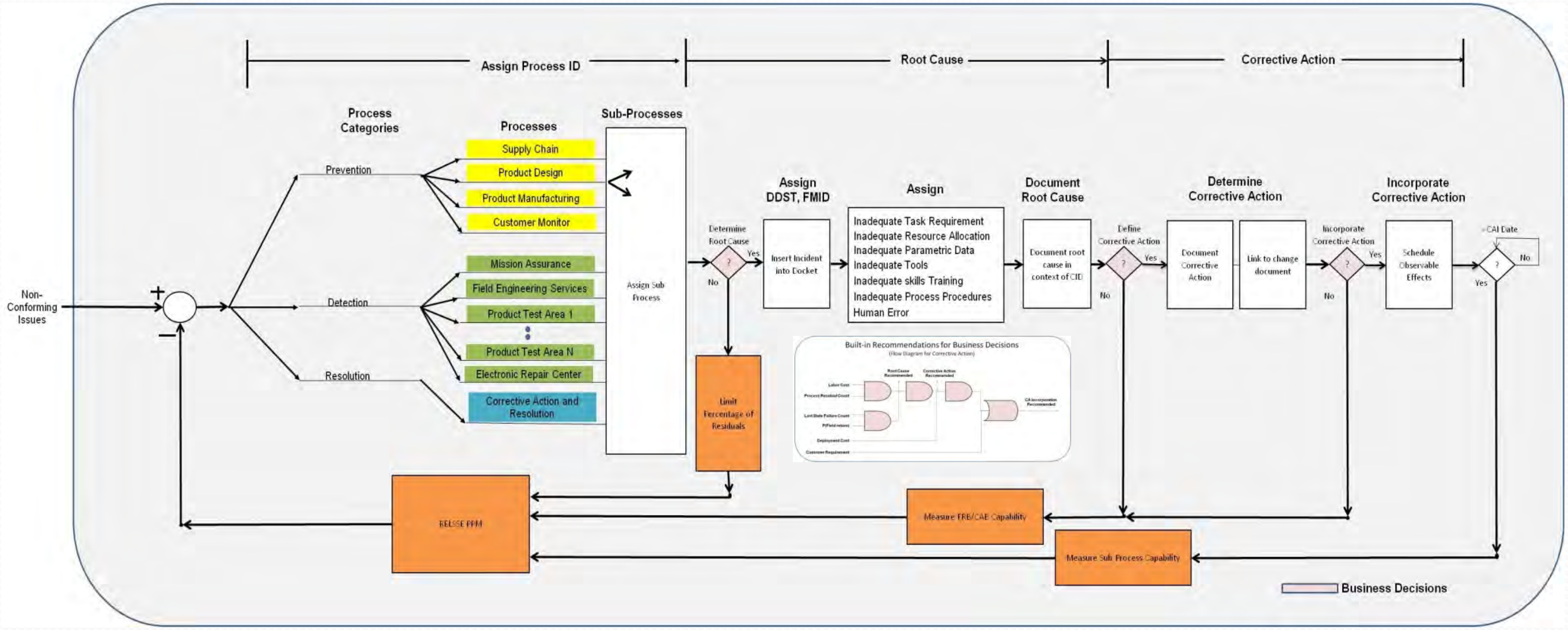


Individual Process Categories Between Two Phases of Development

Properly Defined Metrics Answer Five Critical Questions

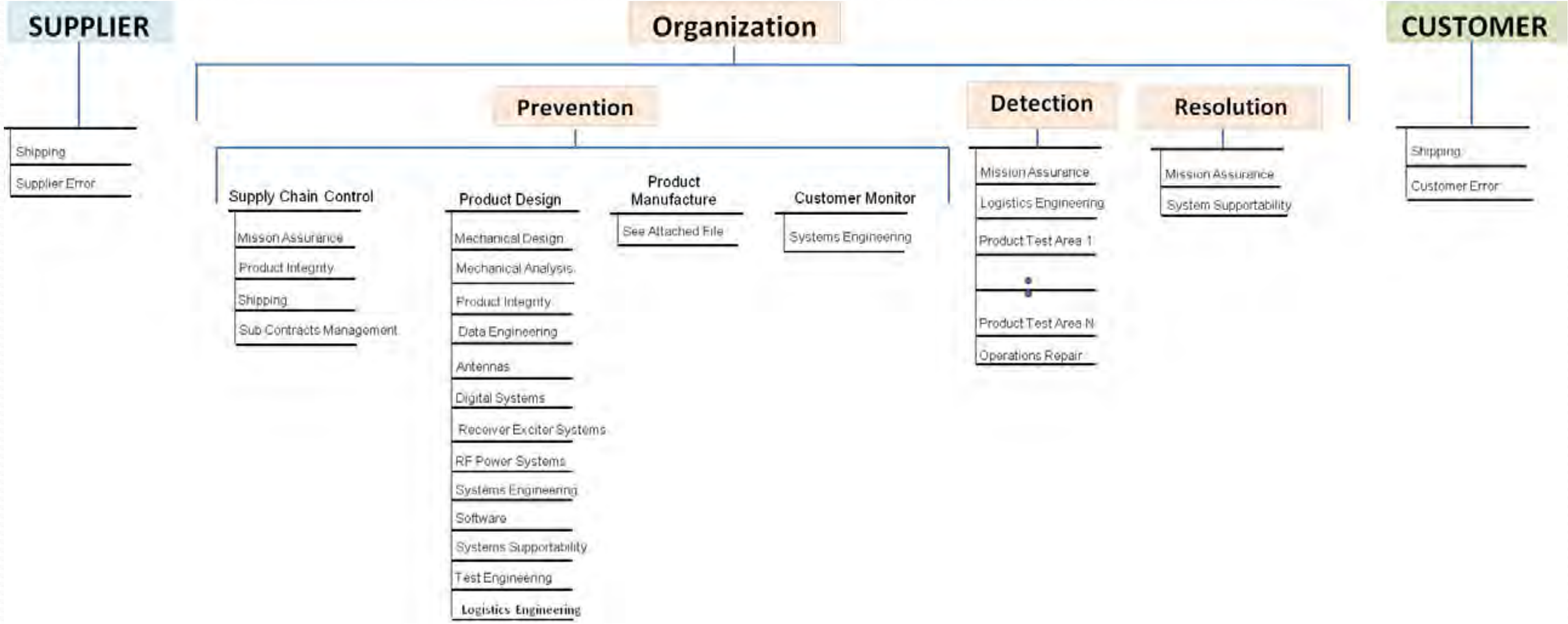
- Is the probability of a field defect warrant the cost of determining and incorporating corrective action?
- Are defects falling through the cracks?
- Are the separate FRB's within the organization performing satisfactorily?
- Is the correction capability of each organizational sub-process maintaining control?
- Has reliability growth occurred?

PPBR Introduces a CMMI-CAR Compliant Closed-Loop Corrective Action System



- Reliability activities are integrated systematically across an organization
- Measurement performance of analyst, Failure Review Board, sub-process, and organizational management
- 4-step process: Product reliability is not simply measured it is managed (via business decisions) to ensure growth between phases of program development

Step 1 –Define the Process Structure and Assign the Process ID (PID)



- SUPPLIER
  - Shipping
  - Supplier Error
- Organization
  - Prevention
    - Supply Chain Control
      - Misson Assurance
      - Product Integrity
      - Shipping
      - Sub Contracts Management
    - Product Design
      - Mechanical Design
      - Mechanical Analysis
      - Product Integrity
      - Data Engineering
      - Antennas
      - Digital Systems
      - Receiver Exciter Systems
      - RF Power Systems
      - Systems Engineering
      - Software
      - Systems Supportability
      - Test Engineering
      - Logistics Engineering
    - Product Manufacture
      - See Attached File
    - Customer Monitor
      - Systems Engineering
  - Detection
    - Mission Assurance
    - Logistics Engineering
    - Product Test Area 1
    - ⋮
    - Product Test Area N
    - Operations Repair
  - Resolution
    - Mission Assurance
    - System Supportability
- CUSTOMER
  - Shipping
  - Customer Error

- Not all defects are within the span of control of the organization

- Organizational processes are categorized as related to prevention, detection, and resolution

- PID defines the sub-process that the defect has escaped from

Steps 2 – Define the DDST/FMID and Identify the Root Cause

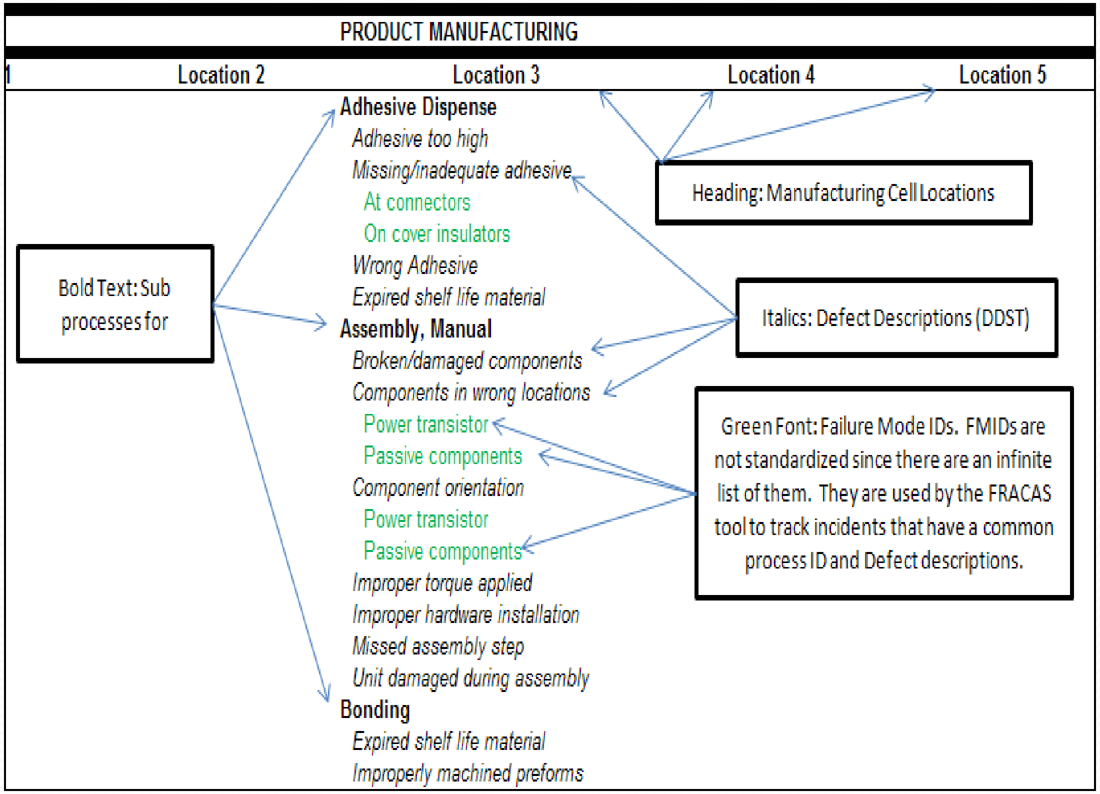
- Make decision to determine root cause for current PID
  - Assign PID to a new or existing docket
- Complete the path associating process to physical defect
  - Defect Description (DDST) and Failure Mode ID (FMID) are docket level attributes

Examples:

Failure Description: Solder joint is cracked on PLCC, MC68HC11F1FN.

PID Structure1: Prevention/Product Design/Mechanical Analysis/PoF/Insufficient solder height

PID Structure 2: Prevention/Product Manufacture/Assembly, Manual/Broken or damaged components



PRODUCT MANUFACTURING

1	Location 2	Location 3	Location 4	Location 5

Adhesive Dispense
- *Adhesive too high*
- *Missing/inadequate adhesive*
  - At connectors
  - On cover insulators
- *Wrong Adhesive*
- *Expired shelf life material*

Assembly, Manual
- *Broken/damaged components*
- *Components in wrong locations*
  - Power transistor
  - Passive components
- *Component orientation*
  - Power transistor
  - Passive components
- *Improper torque applied*
- *Improper hardware installation*
- *Missed assembly step*
- *Unit damaged during assembly*

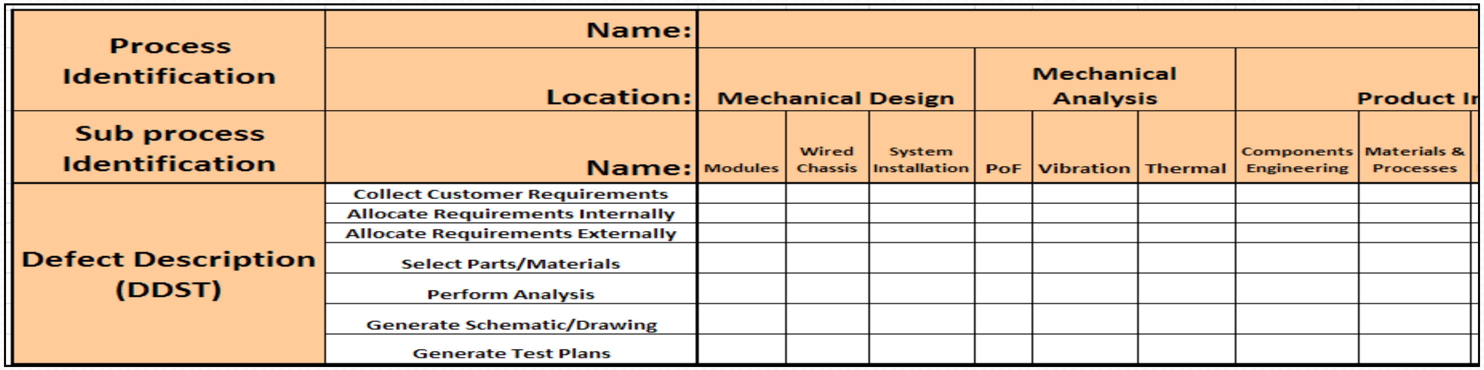
Bonding
- *Expired shelf life material*
- *Improperly machined preforms*

Bold Text: Sub processes for

Heading: Manufacturing Cell Locations

Italics: Defect Descriptions (DDST)

Green Font: Failure Mode IDs. FMIDs are not standardized since there are an infinite list of them. They are used by the FRACAS tool to track incidents that have a common process ID and Defect descriptions.



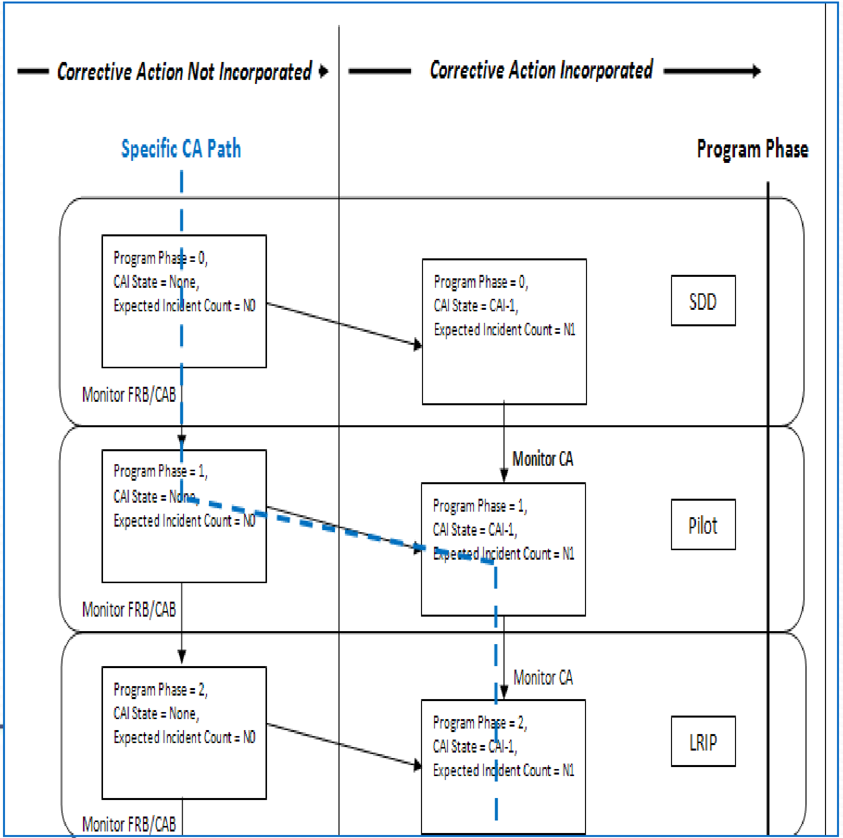
Process Identification	Name:								
	Location:	Mechanical Design			Mechanical Analysis			Product I	
Sub process Identification	Name:	Modules	Wired Chassis	System Installation	PoF	Vibration	Thermal	Components Engineering	Materials & Processes
Defect Description (DDST)	Collect Customer Requirements								
	Allocate Requirements Internally								
	Allocate Requirements Externally								
	Select Parts/Materials								
	Perform Analysis								
	Generate Schematic/Drawing								
	Generate Test Plans								

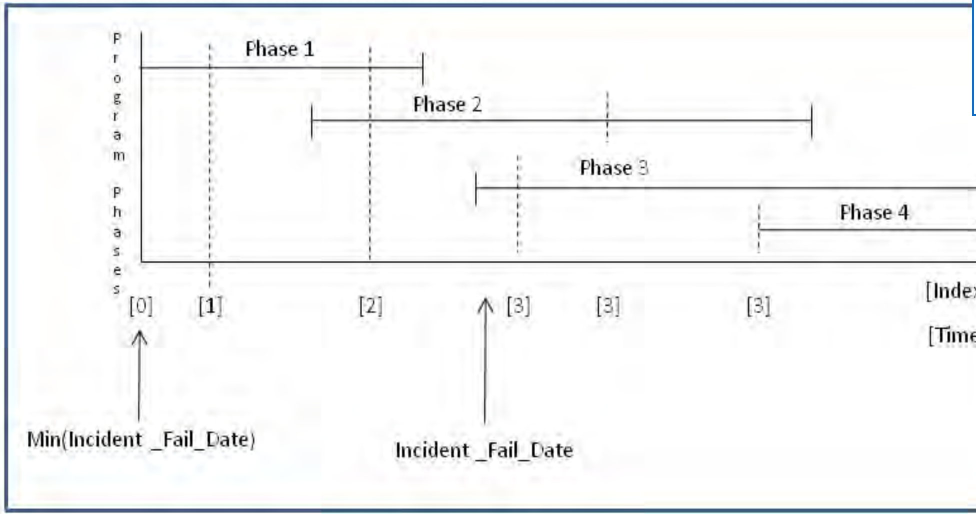
Step 3 – Assign Corrective Action Tracking Index

- Corrective action resides in one of two states "incorporated" or "not incorporated"

- Defects reside in one of two states "customer" or "non-customer" returns

- 4 key docket-level parameters provide state-control
  - Program Phase, Corrective action Index, Fail Date, and Customer return status

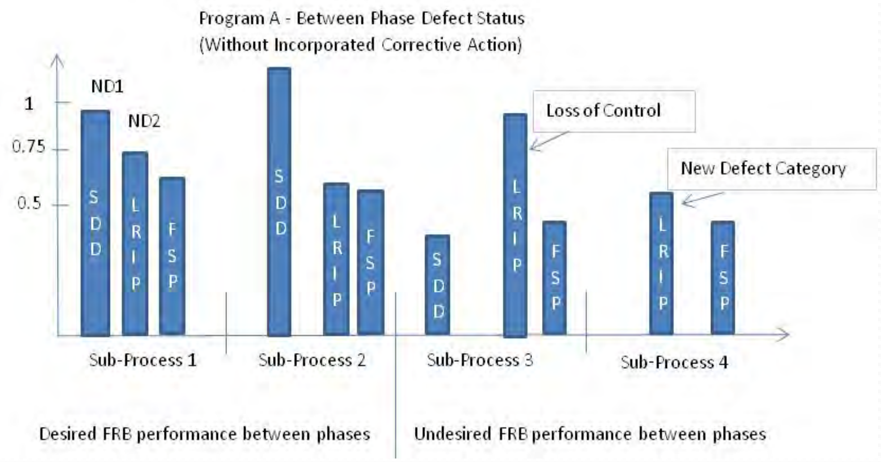


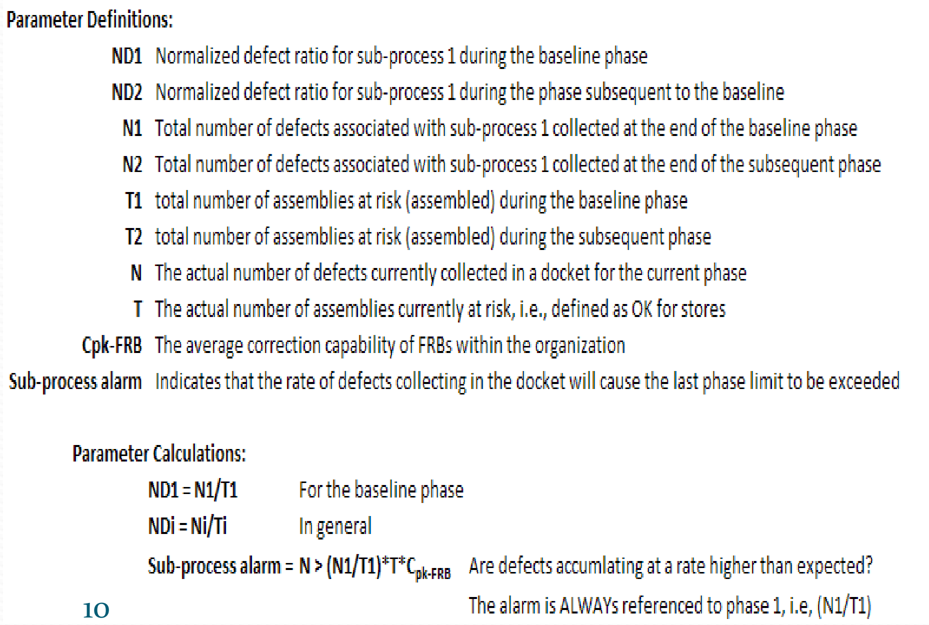


- State sequencing for non-customer defects is completely automated

Step 4: The Output Metrics Answer the 5 Critical Questions

- FRB Effectiveness example answers only one of 5 key questions
  - Affects only dockets that have not had corrective action incorporated
  - Is only meaningful when measured across sub-processes not within sub-processes
  - Alarms monitor rate of defect accumulation
  - Provides three measurements of improvement


Program A - Between Phase Defect Status
(Without Incorporated Corrective Action)


Parameter Definitions:

ND1	Normalized defect ratio for sub-process 1 during the baseline phase
ND2	Normalized defect ratio for sub-process 1 during the phase subsequent to the baseline
N1	Total number of defects associated with sub-process 1 collected at the end of the baseline phase
N2	Total number of defects associated with sub-process 1 collected at the end of the subsequent phase
T1	total number of assemblies at risk (assembled) during the baseline phase
T2	total number of assemblies at risk (assembled) during the subsequent phase
N	The actual number of defects currently collected in a docket for the current phase
T	The actual number of assemblies currently at risk, i.e., defined as OK for stores
Cpk-FRB	The average correction capability of FRBs within the organization
Sub-process alarm	Indicates that the rate of defects collecting in the docket will cause the last phase limit to be exceeded

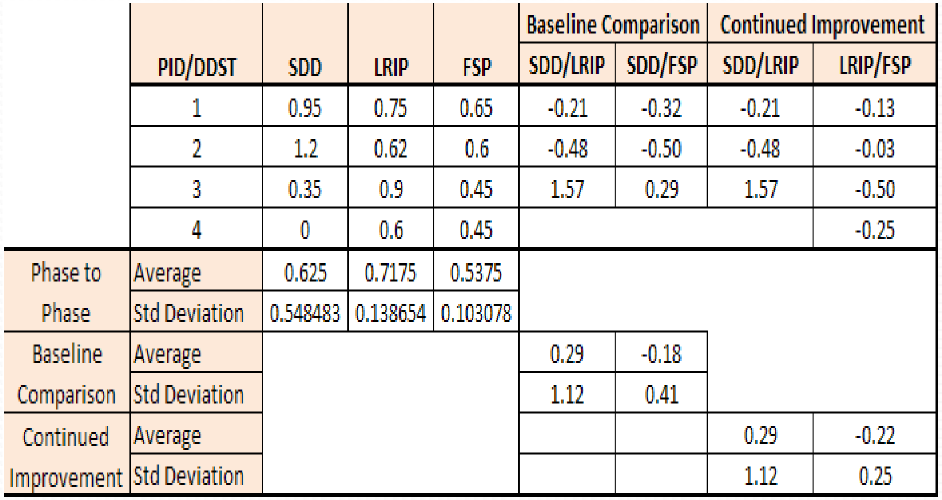
Parameter Calculations:

ND1 = N1/T1 For the baseline phase

NDi = Ni/Ti In general

Sub-process alarm = N > (N1/T1)*T*$C_{pk\text{-}FRB}$ Are defects accumlating at a rate higher than expected?

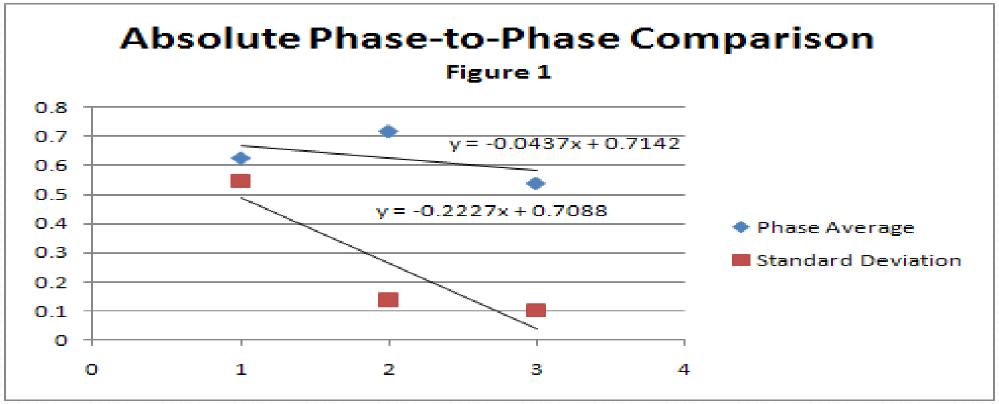
The alarm is ALWAYs referenced to phase 1, i.e, (N1/T1)

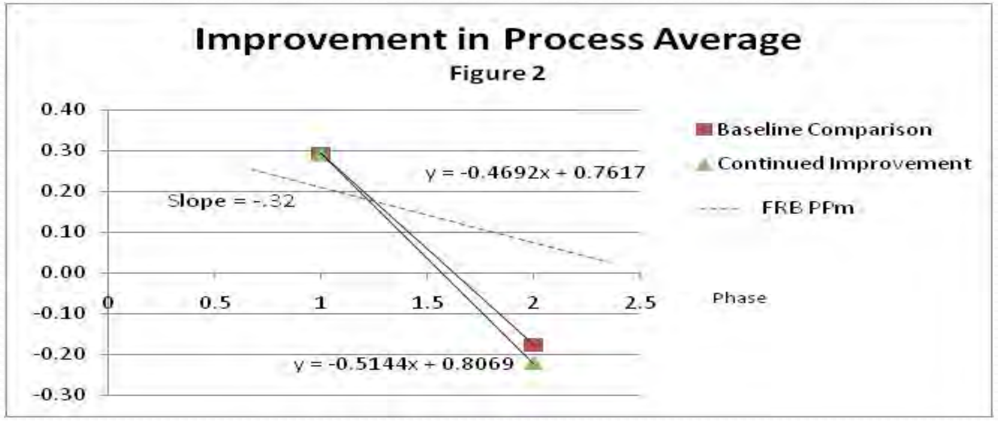


					Baseline Comparison		Continued Improvement	
	PID/DDST	SDD	LRIP	FSP	SDD/LRIP	SDD/FSP	SDD/LRIP	LRIP/FSP
	1	0.95	0.75	0.65	-0.21	-0.32	-0.21	-0.13
	2	1.2	0.62	0.6	-0.48	-0.50	-0.48	-0.03
	3	0.35	0.9	0.45	1.57	0.29	1.57	-0.50
	4	0	0.6	0.45				-0.25
Phase to Phase	Average	0.625	0.7175	0.5375				
	Std Deviation	0.548483	0.138654	0.103078				
Baseline Comparison	Average				0.29	-0.18		
	Std Deviation				1.12	0.41		
Continued Improvement	Average						0.29	-0.22
	Std Deviation						1.12	0.25

Results can Demonstrate the Effectiveness of FRB and Provide a CMMI-PPM

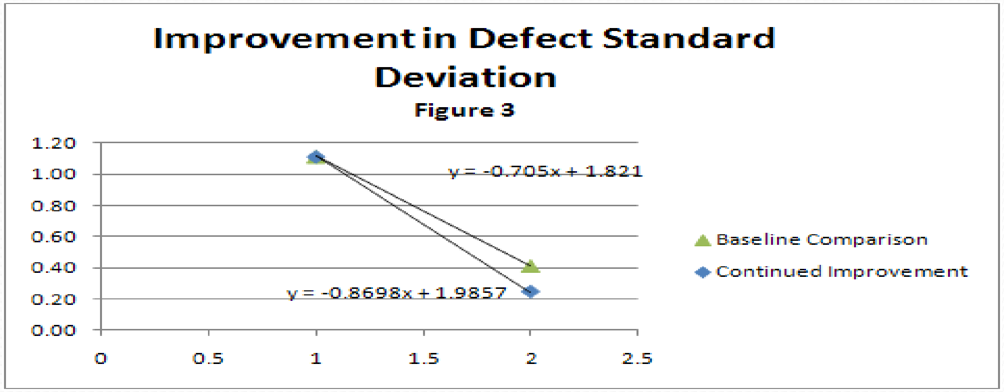
- Metrics show negative slopes for decreasing defect count
- Single phase comparisons measure absolute performance





- CMMI Process performance model measures consistent performance

- Standard deviations provide evidence of decreased dispersion between phases



Summary

- New industry requirements require a fresh look at reliability prediction
- CMMI-CAR integrates the physical and process aspects of failure
- 5 critical questions define the algorithm for corrective action control and measurement
- CMMI-PPMs are developed around the measured results

Questions?

References

[1] Ernest Seglie, Christopher Dipetto, Office of the Secretary of Defense, "Report of the Reliability Improvement Working Group", September 4, 2008

[2] Ministry of Defence Standard 00-42, Reliability and Maintainability (R&M) Assurance Guidance Part 3 R&M Case, Issue 2 Publication 6 June 2003

[3] SAE JA1000-1, "Reliability Program Standard Implementation Guide", 1999-03-01

[4] DODD 5000.1, Department of Defense Directive, "The Defense Acquisition System", May 12, 2003, paragraph E1.1.17

[5] CMMI® for Acquisition, Version 1.2, CMU/SEI-2007-TR-017, ESC-TR-2007-017, November 2007

[6] CMMI® for Development, Version 1.2, CMU/SEI-2006-TR-008, ESC-TR-2006-008, August 2006

CMMI® V1.3

From the Past to the Future

November 17, 2009

Software Engineering Institute
Carnegie Mellon University

SCAMPI Calendar Year-End 2008 Statistics

Cumulative #s:	**CYE07**	**CYE08**	**Increase**	**% Increase**
# Appraisals Performed	3,113	4,134	1,021	32.8%
# Unique Organizations Appraised	2,674	3,446	772	28.9%
# Unique Participating Companies	1,882	2,544	672	35.7%
# Re-appraised Organizations	361	564	203	56.2%
# Unique Projects	14,620	21,141	6,521	44.6%

CMMI Transition Status
Reported to the SEI as of 10-31-09

Training

Introduction to CMMI - 108,724
Intermediate CMMI - 2,990
Understanding CMMI High Maturity Practices - 577
Introduction to CMMI V1.2 Supplement for ACQ - 1,050
Introduction to CMMI V1.2 Supplement for SVC (1 Day) - 1,024
Introduction to CMMI Services V1.2 (3 Day) - 102

Authorized/Certified

Introduction to CMMI V1.2 Instructors (63 authorized) - 388
CMMI-ACQ V1.2 Instructors (all certified) - 57
CMMI-SVC V1.2 Instructors (all certified) - 94
SCAMPI V1.2 Lead Appraisers (all certified) - 466
SCAMPI V1.2 B & C Team Leaders (all authorized) - 531
SCAMPI V1.2 High Maturity Lead Appraisers (all certified) - 144
CMMI-ACQ V1.2 Lead Appraisers (all certified) - 48
CMMI-SVC V1.2 Lead Appraisers (all certified) - 101

CMMI V1.2 Foreign Language Translation Status Reported to the SEI as of 10-31-09

CMMI-DEV V1.2

Language	Status
Japanese	Completed August 2007. Intro course translated October 2007
Chinese (Traditional)	Completed December 2007
French	Completed August 2008
German	Completed April 2009. Intro course translated October 2009
Spanish	Completed in June 2009
Portuguese	Underway, to be completed in November 2009

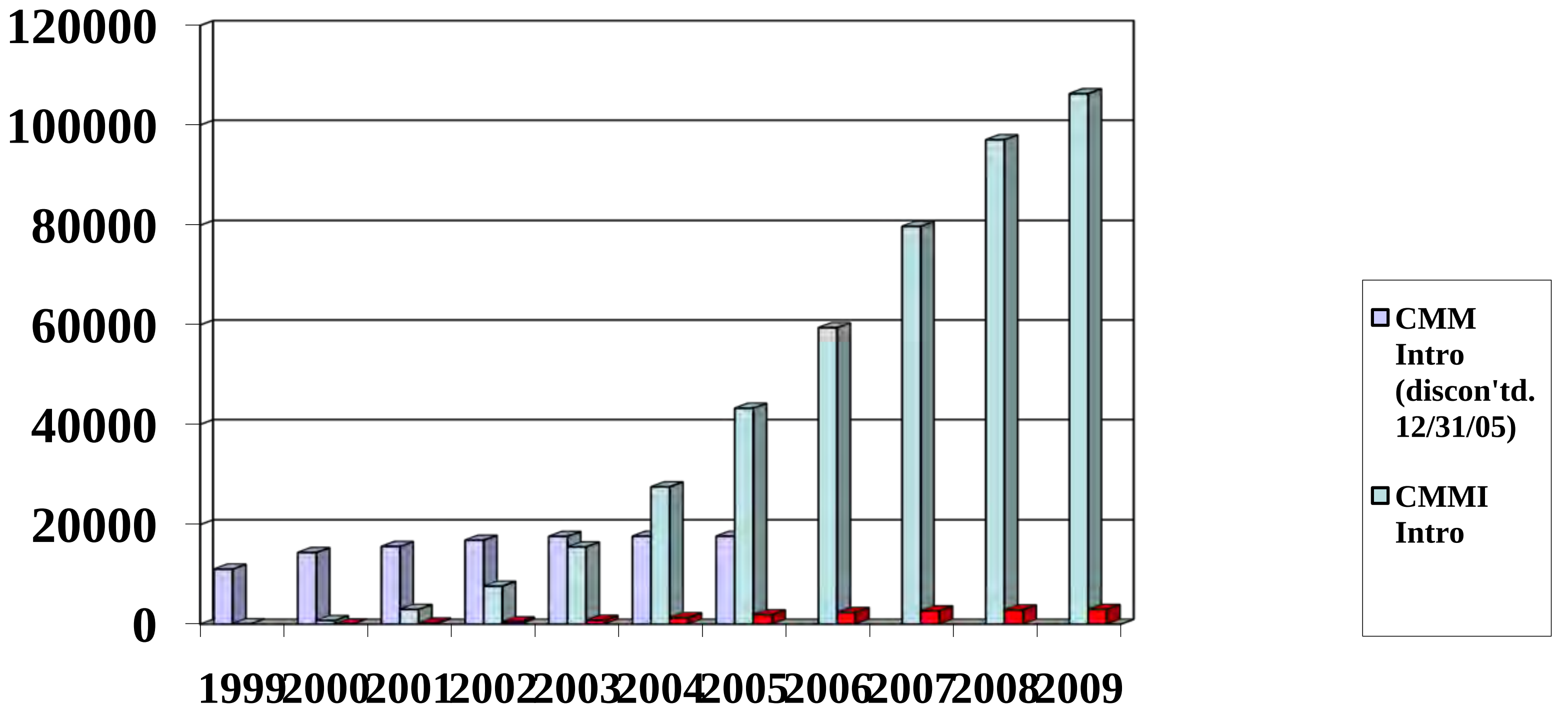
CMMI-ACQ V1.2

Language	Status
Chinese (Traditional)	Completed April 2009

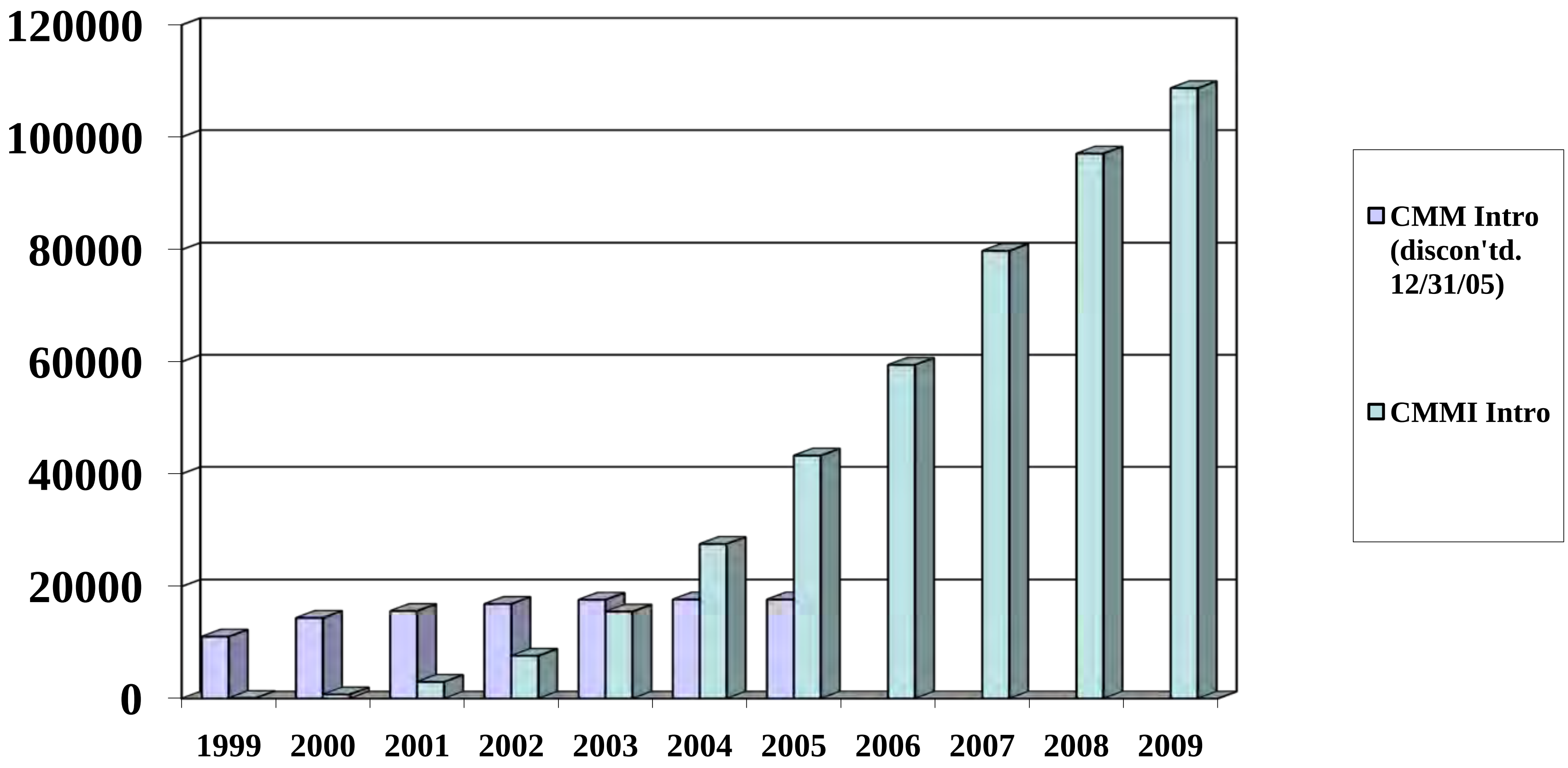
CMMI-SVC V1.2

Language	Status
Chinese (Traditional)	Underway, to be completed 2009-2010

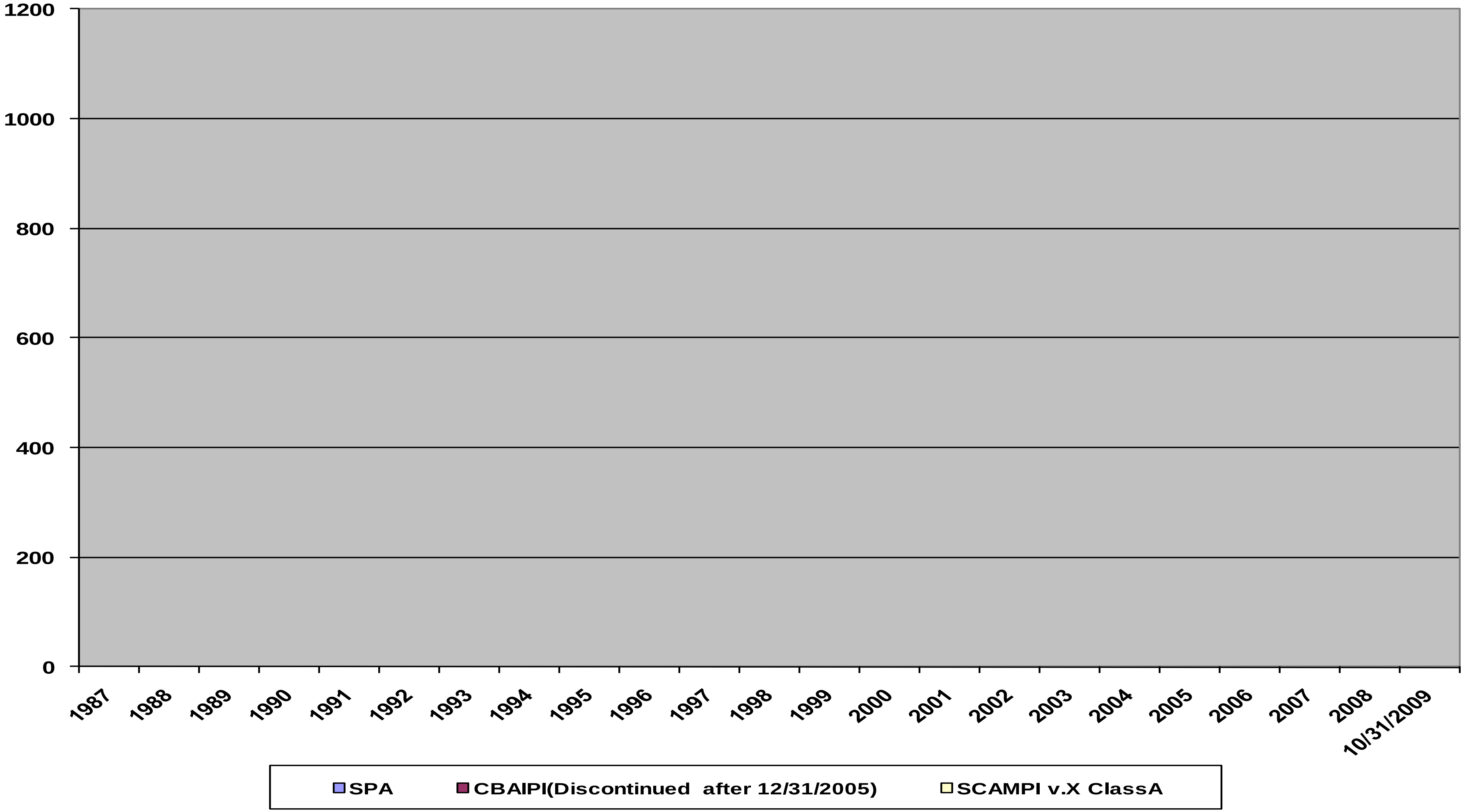
Introduction to CMMI Attendees Cumulative as of 8-31-09



Introduction to CMMI Attendees Cumulative as of 10-31-09



Number of Appraisals Conducted by Year
Reported as of 10-31-09

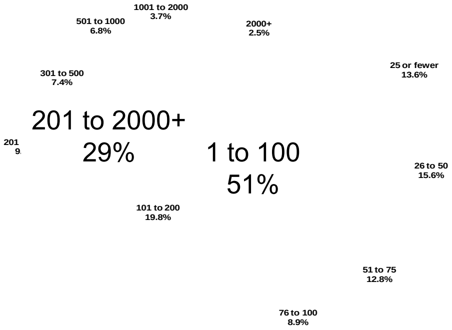


CMMI Adoption Has Been Broad

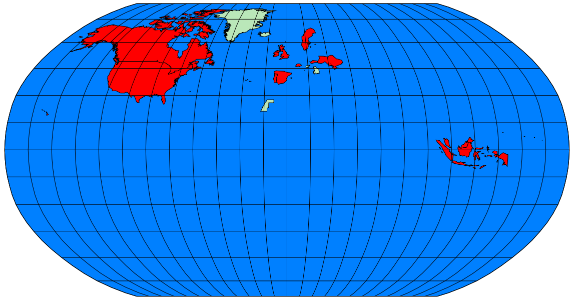
25 countries with 10 or more appraisals (Aug 06 -> Jul 08):

USA	598 -> 1034
China	158 -> 465
India	177 -> 323
Japan	155 -> 220
France	65 -> 112
Korea (ROK)	56 -> 107
Taiwan	31 -> 88
Brazil	39 -> 79
Spain	25 -> 75
U.K.	42 -> 71
Germany	28 -> 51
Argentina	15 -> 47
Canada	18 -> 43
Malaysia	15 -> 42
Mexico	<10 -> 39
Australia	23 -> 29
Egypt	10 -> 27
Chile	<10 -> 20
Philippines	14 -> 20
Colombia	<10 -> 18

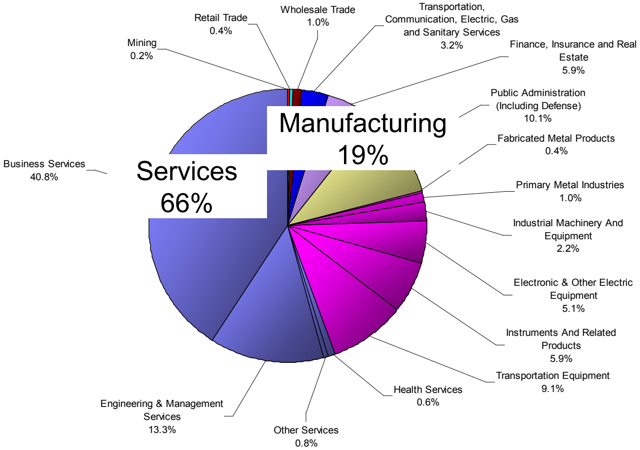
- and Italy, Israel, Singapore, Hong Kong, and Pakistan



Est'd 1,100+K work in orgs that have had a SCAMPI A appraisal.

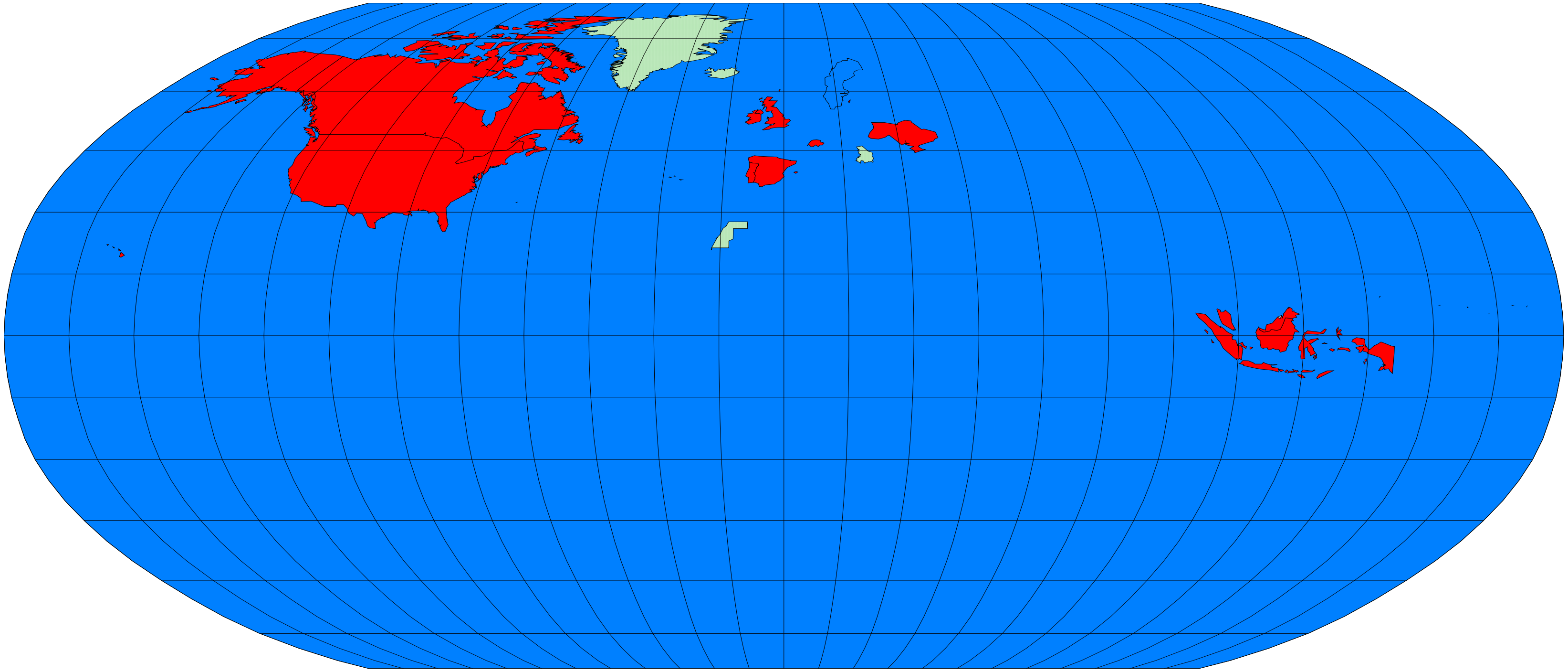


- SCAMPI A reports from 60 countries
- 72% of adopters are commercial orgs
- 2/3 Services; 1/5 Manufacturing
- Approx. 70% of adopters in US are contractors for military/gov't or are gov't



http://www.sei.cmu.edu/cmmi/casestudies/profiles/cmmi.cfm
Is the source for these statistical analyses.

Countries Where Appraisals Have Been Performed and Reported to the SEI



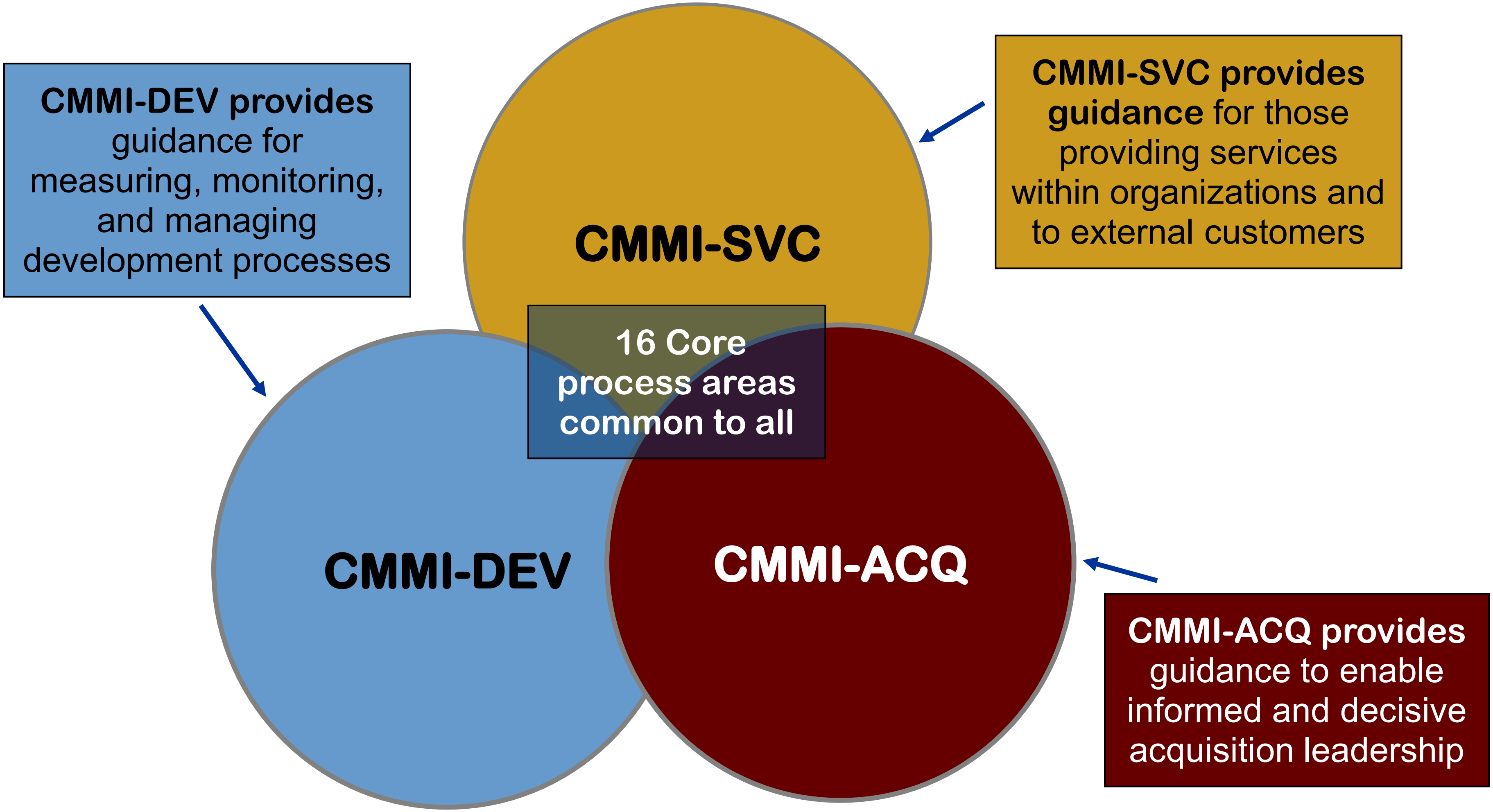
Argentina
Australia
Austria
Bahrain
Bangladesh
Belarus
Belgium
Brazil
Bulgaria
Canada
Chile
China
Colombia
Costa Rica
Czech Republic
Denmark
Dominican Republic
Egypt
Finland
France
Germany
Greece
Hong Kong
Hungary
India
Indonesia
Ireland
Israel
Italy
Japan
Korea, Republic Of
Latvia
Lithuania
Luxembourg
Malaysia
Mauritius
Mexico
Morocco
Nepal
Netherlands
New Zealand
Norway
Pakistan
Panama
Peru
Philippines
Poland
Portugal
Romania
Russia
Saudi Arabia
Singapore
Slovakia
South Africa
Spain
Sri Lanka
Sweden
Switzerland
Taiwan
Thailand
Turkey
Ukraine
United Arab Emirates
United Kingdom
United States
Uruguay
Viet Nam

Number of Appraisals and Maturity Levels Reported to the SEI by Country

Country	Number of Appraisals	Maturity Level 1 Reported	Maturity Level 2 Reported	Maturity Level 3 Reported	Maturity Level 4 Reported	Maturity Level 5 Reported	Country	Number of Appraisals	Maturity Level 1 Reported	Maturity Level 2 Reported	Maturity Level 3 Reported	Maturity Level 4 Reported	Maturity Level 5 Reported
Argentina	64		45	12	2	3	Malaysia	56		20	31		5
Australia	32	1	7	5	2	4	Mauritius	10 or fewer					
Austria	10 or fewer						Mexico	57		24	25	3	4
Bahrain	10 or fewer						Morocco	10 or fewer					
Bangladesh	10 or fewer						Nepal	10 or fewer					
Belarus	10 or fewer						Netherlands	10 or fewer					
Belgium	10 or fewer						New Zealand	10 or fewer					
Brazil	106	1	50	42	1	9	Norway	10 or fewer					
Bulgaria	10 or fewer						Pakistan	25	1	18	4		1
Canada	51	1	12	22	5	3	Panama	10 or fewer					
Chile	30		17	10		2	Peru	10 or fewer					
China	745	1	117	540	27	41	Philippines	21		2	11		7
Colombia	22		7	11	1	2	Poland	10 or fewer					
Costa Rica	10 or fewer						Portugal	10 or fewer					
Czech Republic	10 or fewer						Romania	10 or fewer					
Denmark	10 or fewer						Russia	10 or fewer					
Dominican Republic	10 or fewer						Saudi Arabia	10 or fewer					
Egypt	34	1	17	11	2	2	Singapore	19		3	10	1	4
Finland	10 or fewer						Slovakia	10 or fewer					
France	141	4	81	45	1	2	South Africa	10 or fewer					
Germany	64	9	32	11	1	1	Spain	105	1	60	35	2	4
Greece	10 or fewer						Sri Lanka	10 or fewer					
Hong Kong	18		2	11		5	Sweden	10 or fewer					
Hungary	10 or fewer						Switzerland	10 or fewer					
India	409		14	191	24	166	Taiwan	117	1	74	38		2
Indonesia	10 or fewer						Thailand	27		12	13		1
Ireland	10 or fewer						Turkey	14			12		2
Israel	17		3	10		2	Ukraine	10 or fewer					
Italy	31		14	14			United Arab Emirates	10 or fewer					
Japan	267	17	75	121	13	16	United Kingdom	93	3	42	30	1	3
Korea, Republic Of	138	1	47	61	13	7	United States	1272	27	448	462	21	124
Latvia	10 or fewer						Uruguay	10 or fewer					
Lithuania	10 or fewer						Viet Nam	12			9	1	2
Luxembourg	10 or fewer												

Beyond CMMI V1.2...

Three Complementary Constellations

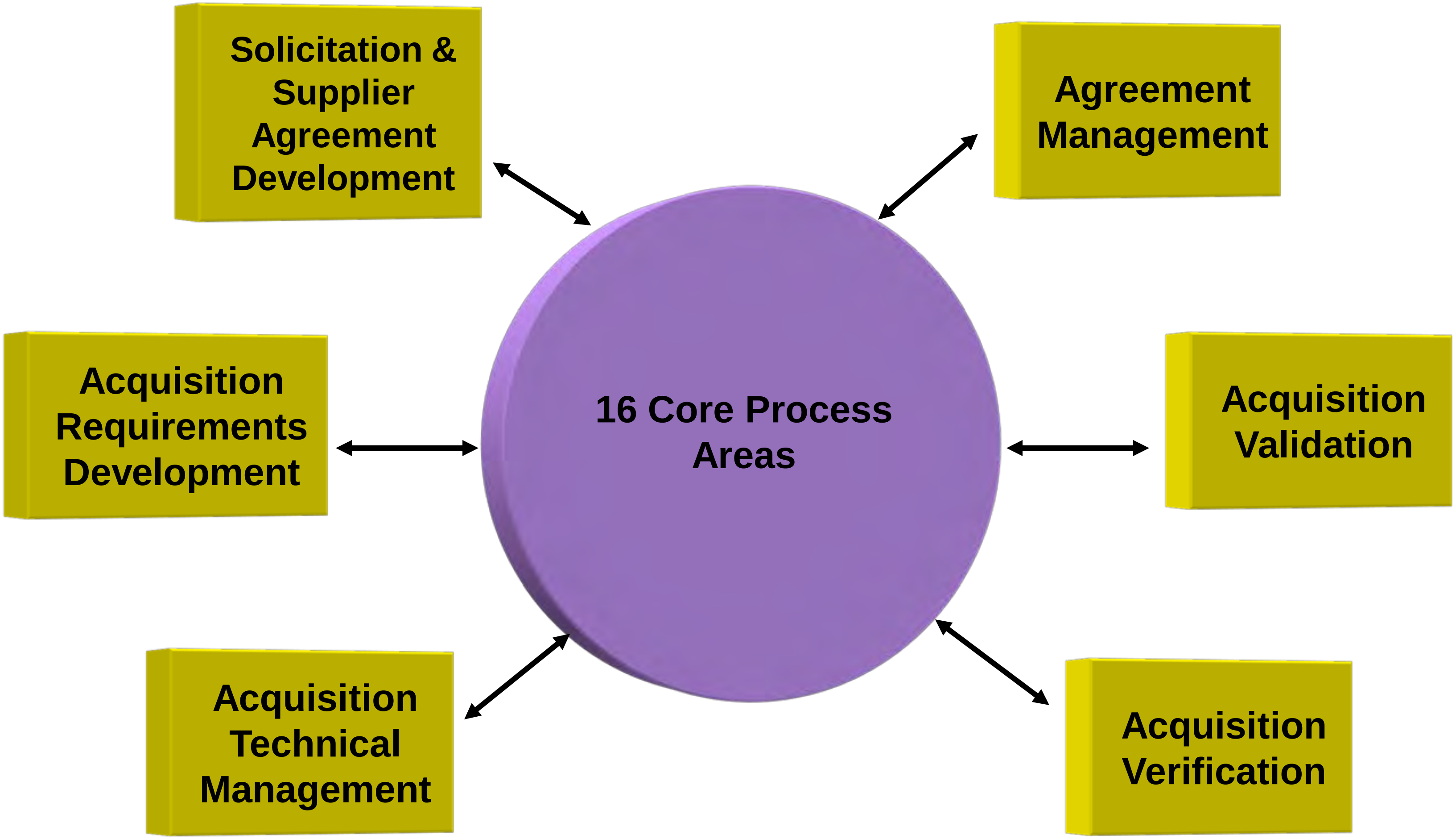


CMMI-DEV provides guidance for measuring, monitoring, and managing development processes

CMMI-SVC provides guidance for those providing services within organizations and to external customers

CMMI-ACQ provides guidance to enable informed and decisive acquisition leadership

CMMI-ACQ V1.2
Acquisition Process Areas



Solicitation & Supplier Agreement Development

Agreement Management

Acquisition Requirements Development

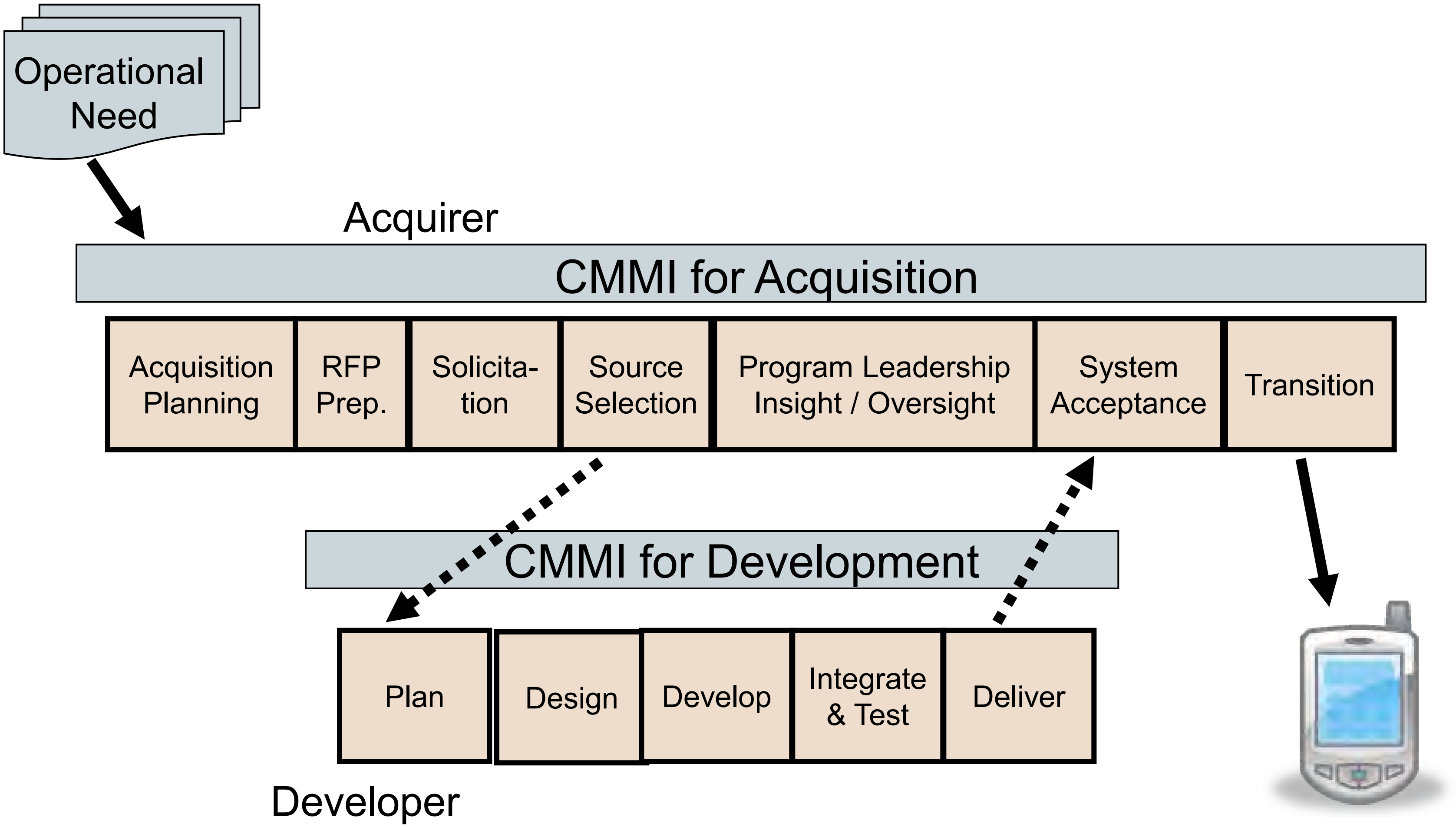
16 Core Process Areas

Acquisition Validation

Acquisition Technical Management

Acquisition Verification

Visibility into the Team’s Capability



Operational Need

Acquirer

CMMI for Acquisition

Acquisition Planning

RFP Prep.

Solicitation

Source Selection

Program Leadership Insight / Oversight

System Acceptance

Transition

CMMI for Development

Plan

Design

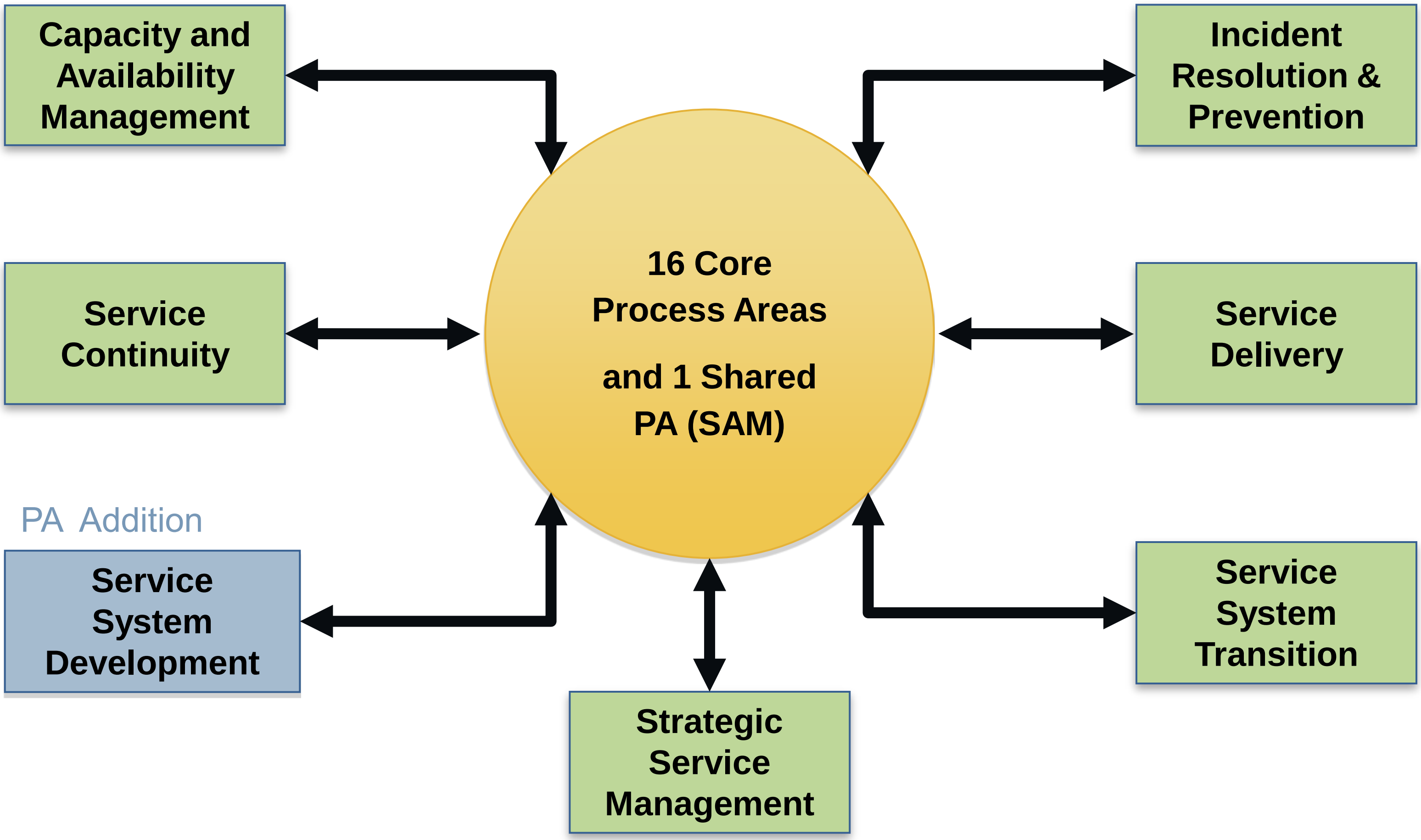
Develop

Integrate & Test

Deliver

Developer

CMMI-SVC V1.2



Capacity and Availability Management

Incident Resolution & Prevention

16 Core Process Areas

and 1 Shared PA (SAM)

Service Continuity

Service Delivery

PA Addition

Service System Development

Service System Transition

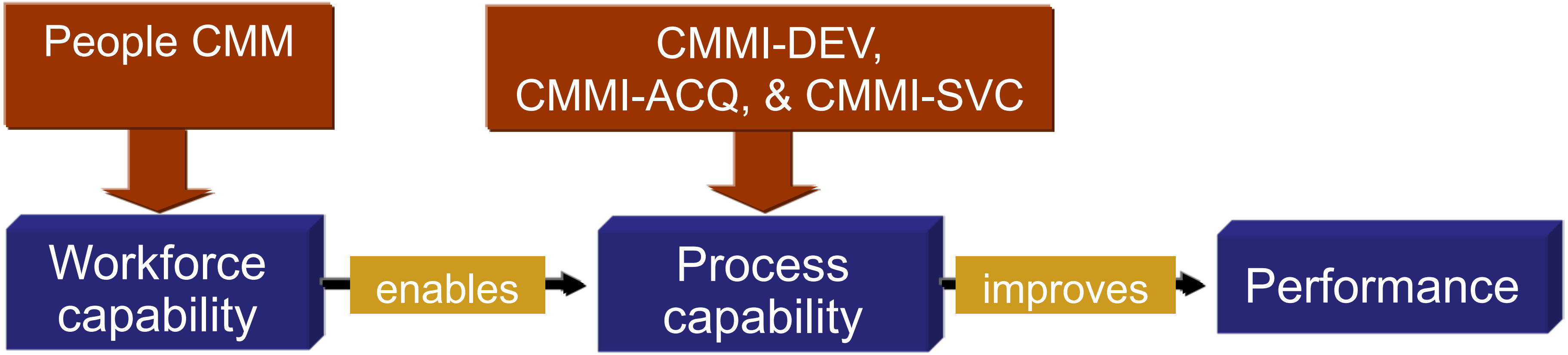
Strategic Service Management

People CMM Primary Objective

The primary objective of CMMI (DEV, ACQ, SVC) is to improve the capability of an organization’s processes within specific domains.

The primary objective of the People CMM is to improve the capability of an organization’s workforce through enhanced management and human capital processes.

> *(The People CMM defines capability as the level of knowledge, skills, and process abilities available within each workforce competency of the organization to build its products or deliver its services.)*



People CMM

CMMI-DEV,
CMMI-ACQ, & CMMI-SVC

Workforce capability

enables

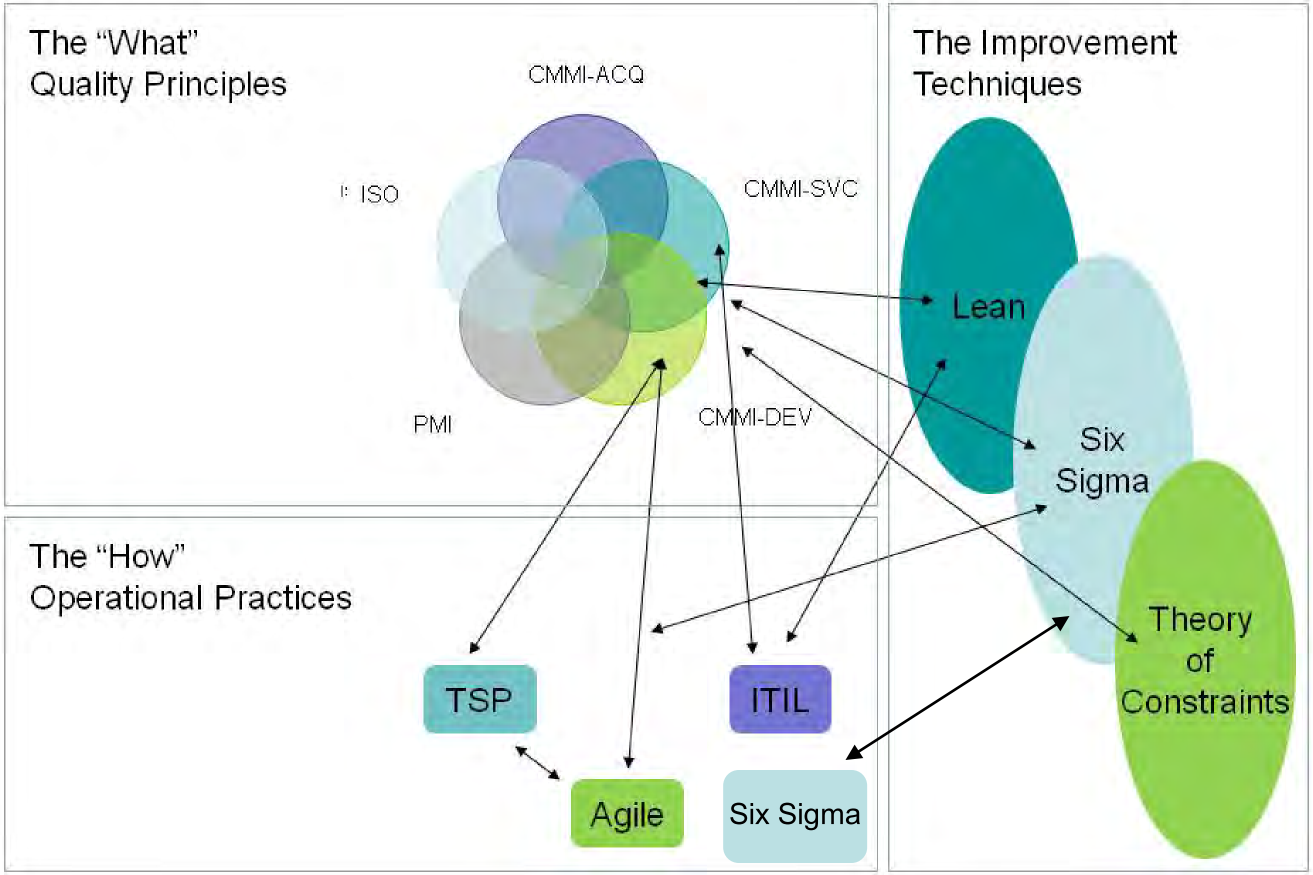
Process capability

improves

Performance

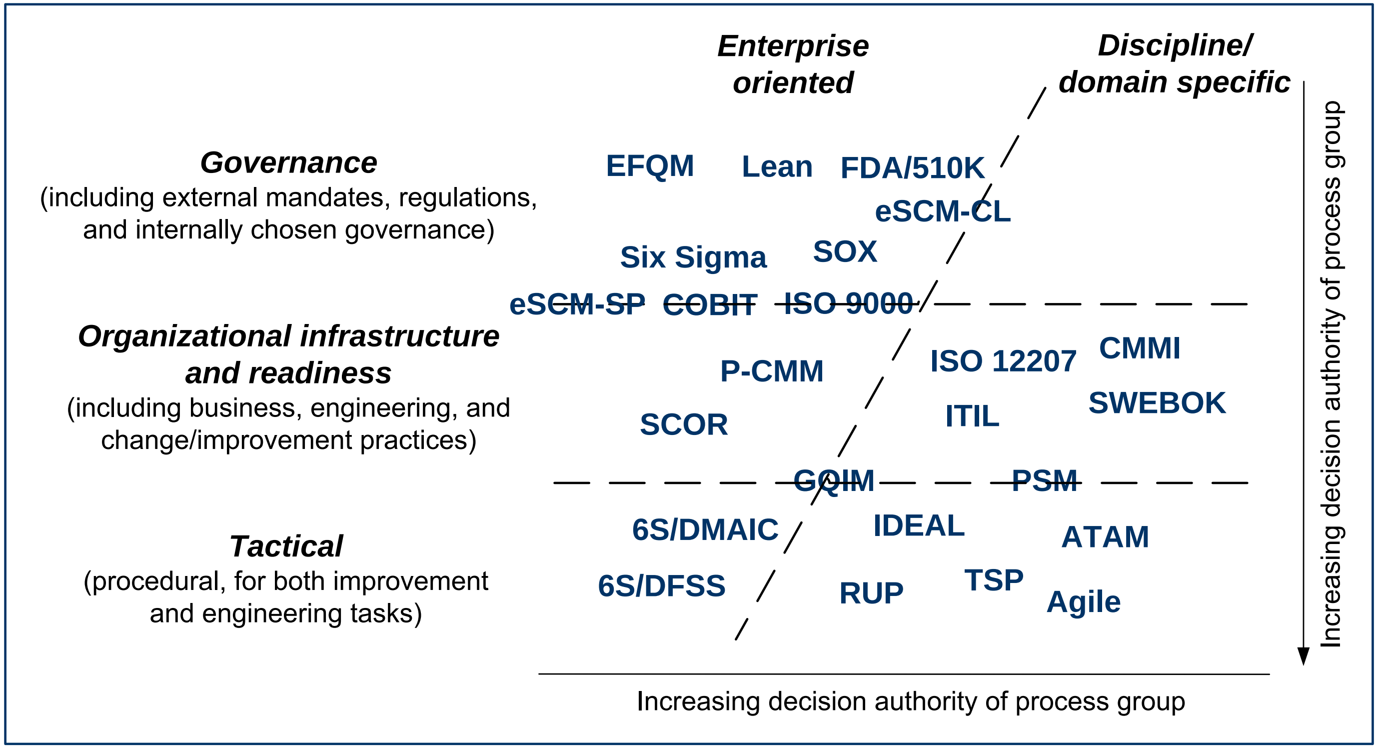
CMMI Planned Elements – Multi-Model (1)

Improving the interfaces is of interest to both government and industry….



CMMI Planned Elements – Multi-Model (2)

Multiple models complicate process improvement – but make it much more powerful by addressing specific needs in various environments….



Enterprise oriented

Discipline/ domain specific

Governance
(including external mandates, regulations, and internally chosen governance)

EFQM Lean FDA/510K eSCM-CL Six Sigma SOX

eSCM-SP COBIT ISO 9000

Organizational infrastructure and readiness
(including business, engineering, and change/improvement practices)

P-CMM SCOR ISO 12207 CMMI ITIL SWEBOK

GQIM PSM

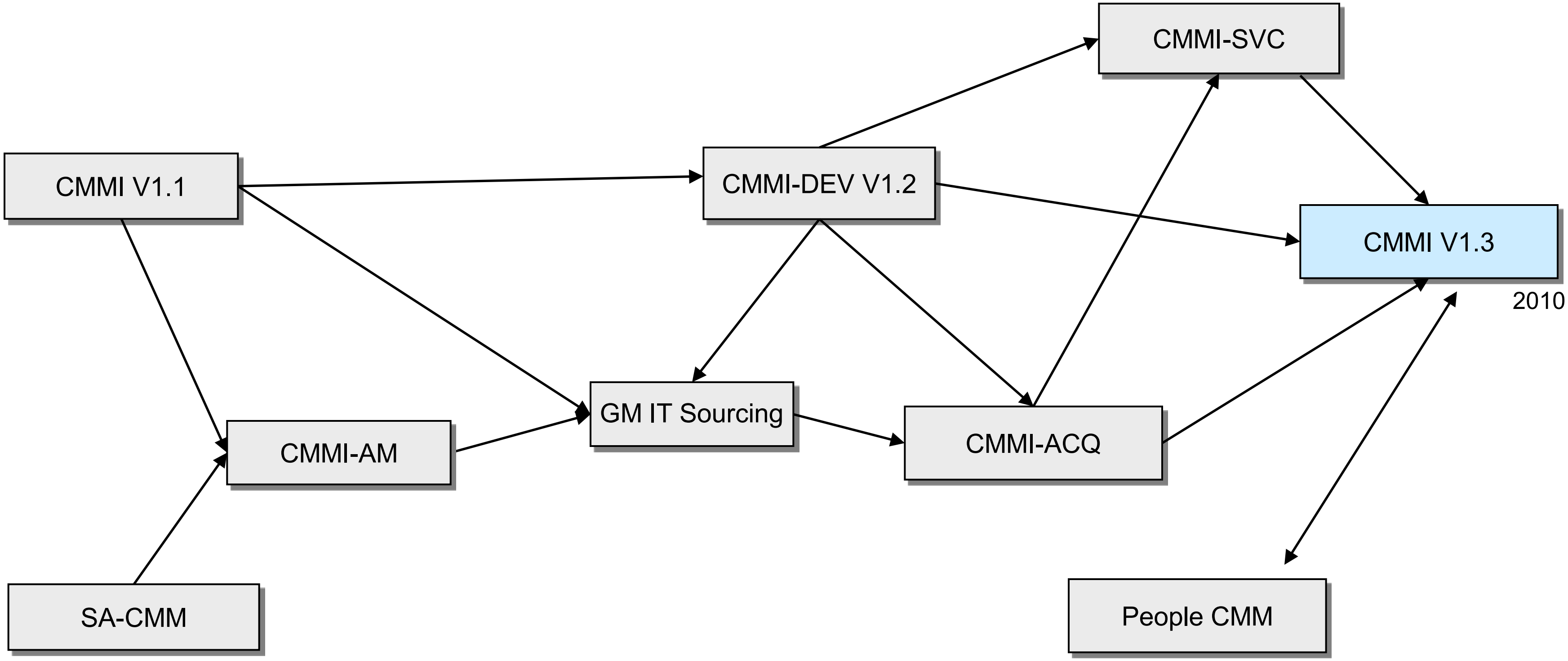
Tactical
(procedural, for both improvement and engineering tasks)

6S/DMAIC IDEAL ATAM 6S/DFSS RUP TSP Agile

Increasing decision authority of process group

Increasing decision authority of process group

Planned Sequence of Models



CMMI-SVC

CMMI V1.1

CMMI-DEV V1.2

CMMI V1.3

2010

GM IT Sourcing

CMMI-ACQ

CMMI-AM

SA-CMM

People CMM

Schedule for CMMI V1.3 Models

Preparation
Jan – May 2009

CPs
June – Oct 2009

QA
July – Nov 1, 2010

CCB Review of CPs
July – Oct 2009

CCB Review of Redlines
Nov 2009 – April 2010

CCB Review of V1.3s
July 2010

Redlines
Aug 2009 – April 2010

V1.3s
May – July 2010

Piloting P-Drafts*
Nov, Jan, and June

Entire Project = Jan 2009 to November 1, 2010

* Piloting will include candidate solutions for appraising multiple constellations as well as a training approach for CMMI.

CMMI V1.3 Criteria

Correct identified model, training material, or appraisal method defects or provide enhancements.

Incorporate amplifications and clarifications as needed.

Accommodate potential additions to model coverage (e.g., safety, security, life cycle) only by specific direction of the CMMI Steering Group.

Decrease overall model size in v1.3 if possible; increases, if any, must not be greater than absolutely necessary.

Model and method changes should avoid adversely impacting the legacy investment of adopting companies and organizations.

Changes to model architecture will only be incorporated with specific CMMI Steering Group authorization.

Changes may only be initiated by Change Requests or the CMMI Steering Group.

Editorial changes to training may be released in advance of v1.3.

Changes must not cause retraining of the nearly 100,000 (as of Dec 2008) personnel already trained in CMMI. Upgrade training may be needed, especially for Instructors, Lead Appraisers, and appraisal team members.

CMMI Product Suite, Version 1.3

Version 1.3 will focus on but not be limited to the following:

- High Maturity
- Appraisal efficiency
- Consistency across constellations
- Simplify the generic practices

Version 1.3 is change request (CR) driven. Events such as this conference presentation are for information sharing and dialogue.

What Have We Missed?

Now let's chat….