

# CMMI<sup>®</sup> and V&V: Best Practices in Acquisition and Development

Verification and Validation Summit 2009

Mike Phillips  
Software Engineering Institute  
Carnegie Mellon University

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



# SEI Background

---

Funded by the U.S. government as a research & development lab; (FFRDC)

Created in 1984 and administered by Carnegie Mellon University

Headquartered in Pittsburgh, Pennsylvania; offices and support worldwide



# My Background....

---

Performed developmental testing for USAF

Planned and then managed testing for B-2

Managed CMMI since 2000

Led development of CMMI for Acquisition



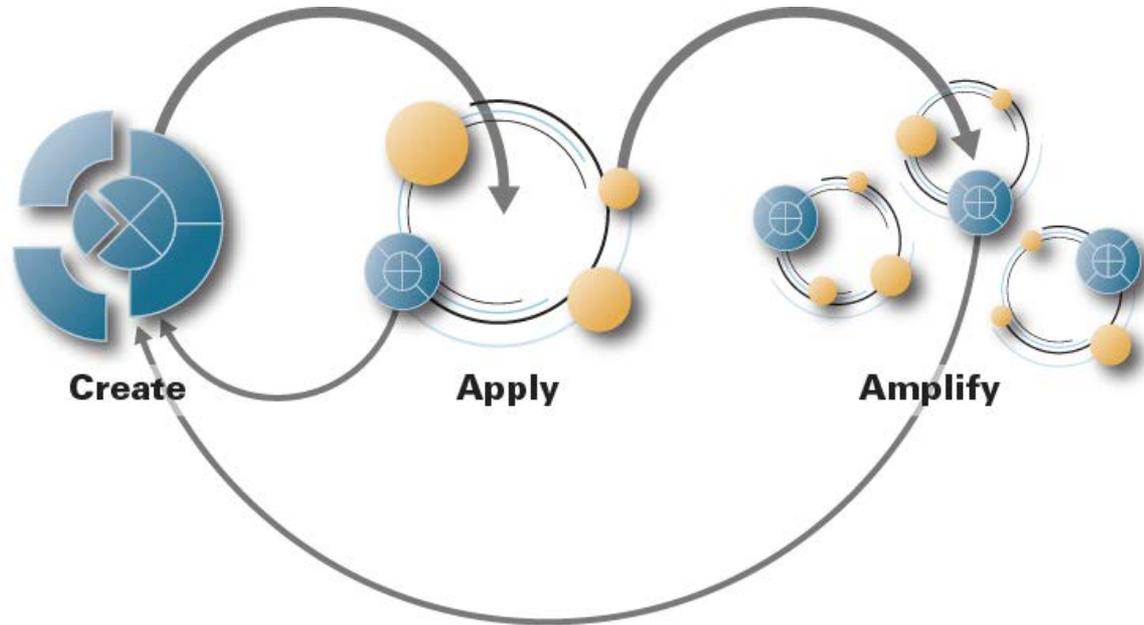
# SEI Mission and Strategy

---

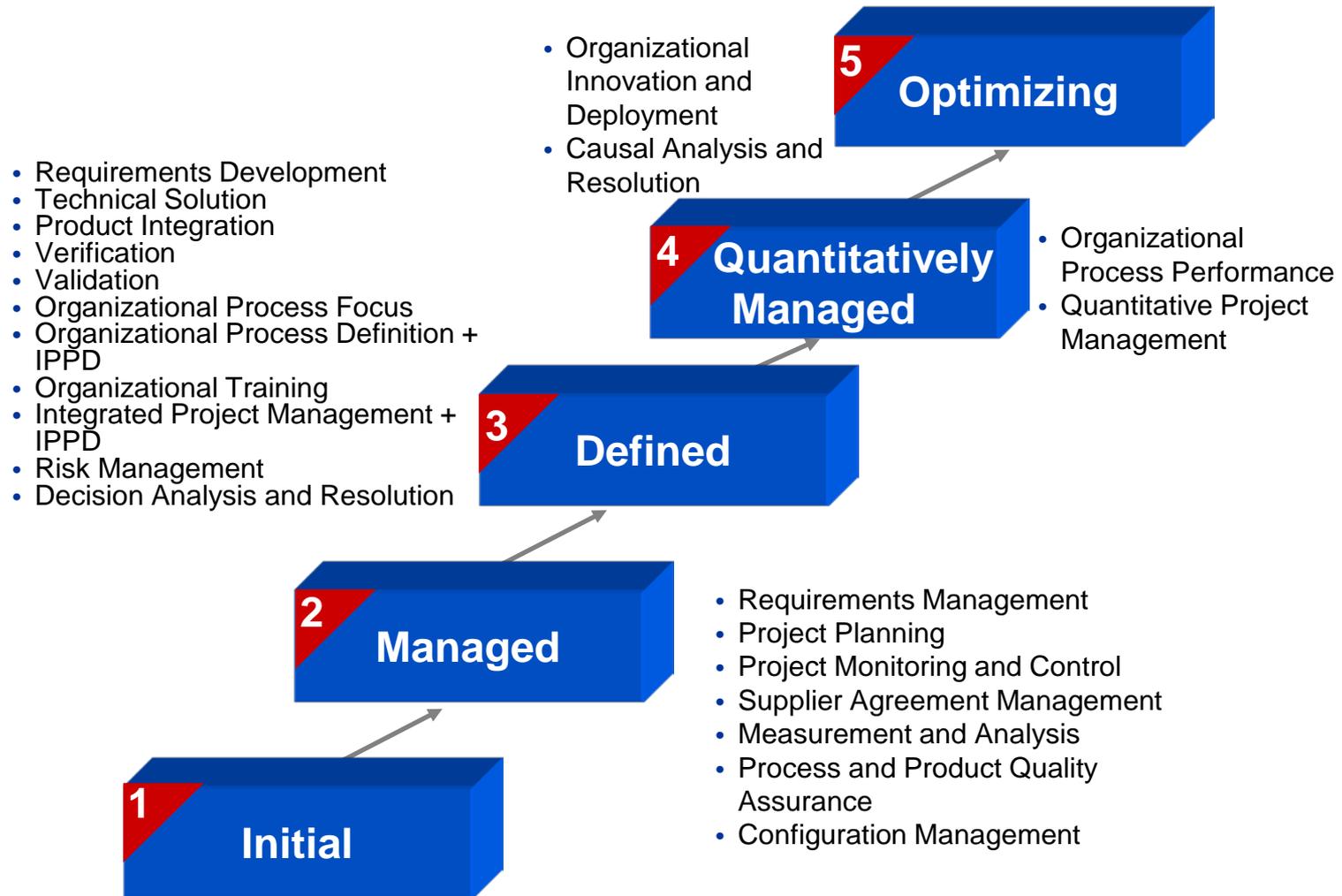
## Mission

The SEI advances software engineering and related disciplines to ensure systems with predictable and improved quality, cost, and schedule.

## Strategy



# CMMI®: Staged Representation

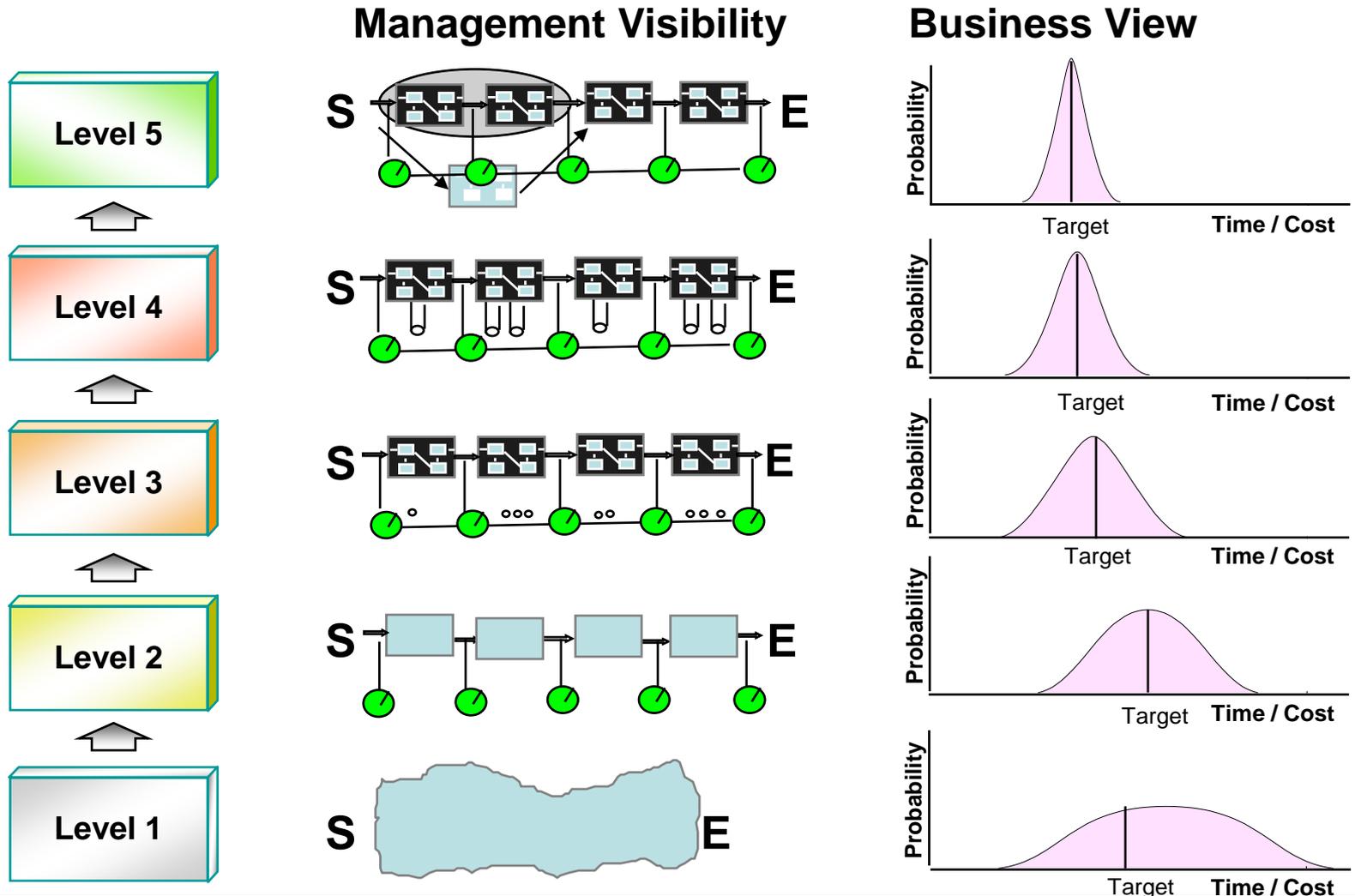


# CMMI®: Continuous Representation

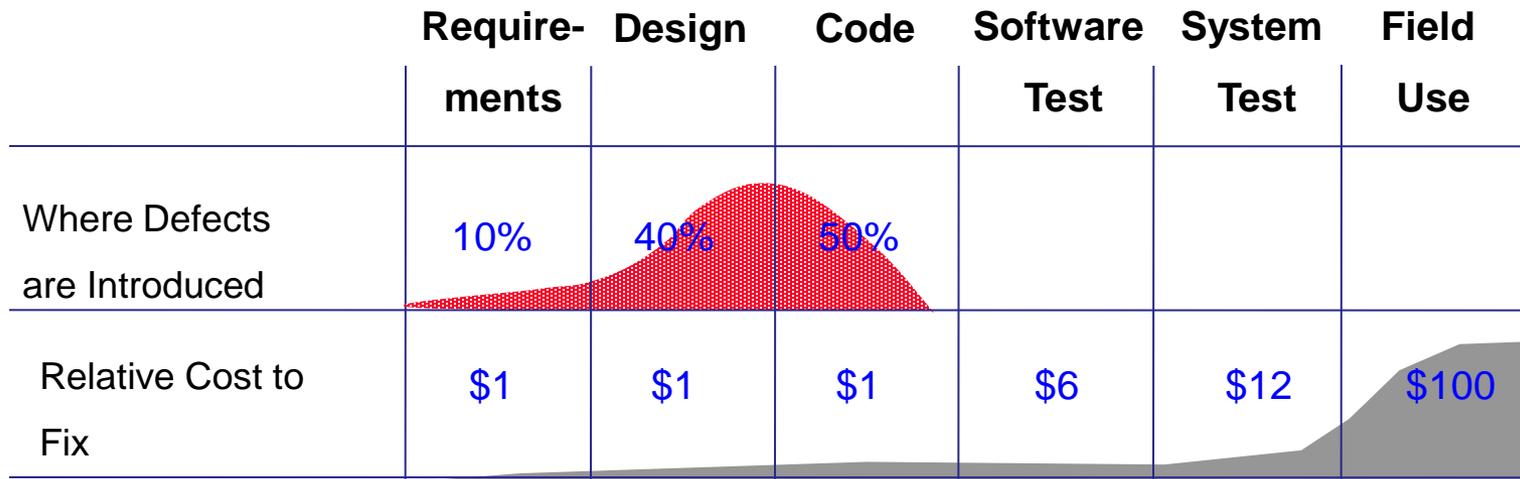


# Visibility & Predictability

Source: SEPG Asia Pacific 2009  
presented by Ravindra Nath, KUGLER MAAG CIE GmbH



# Defects : Insertion Pattern & Cost of Removal

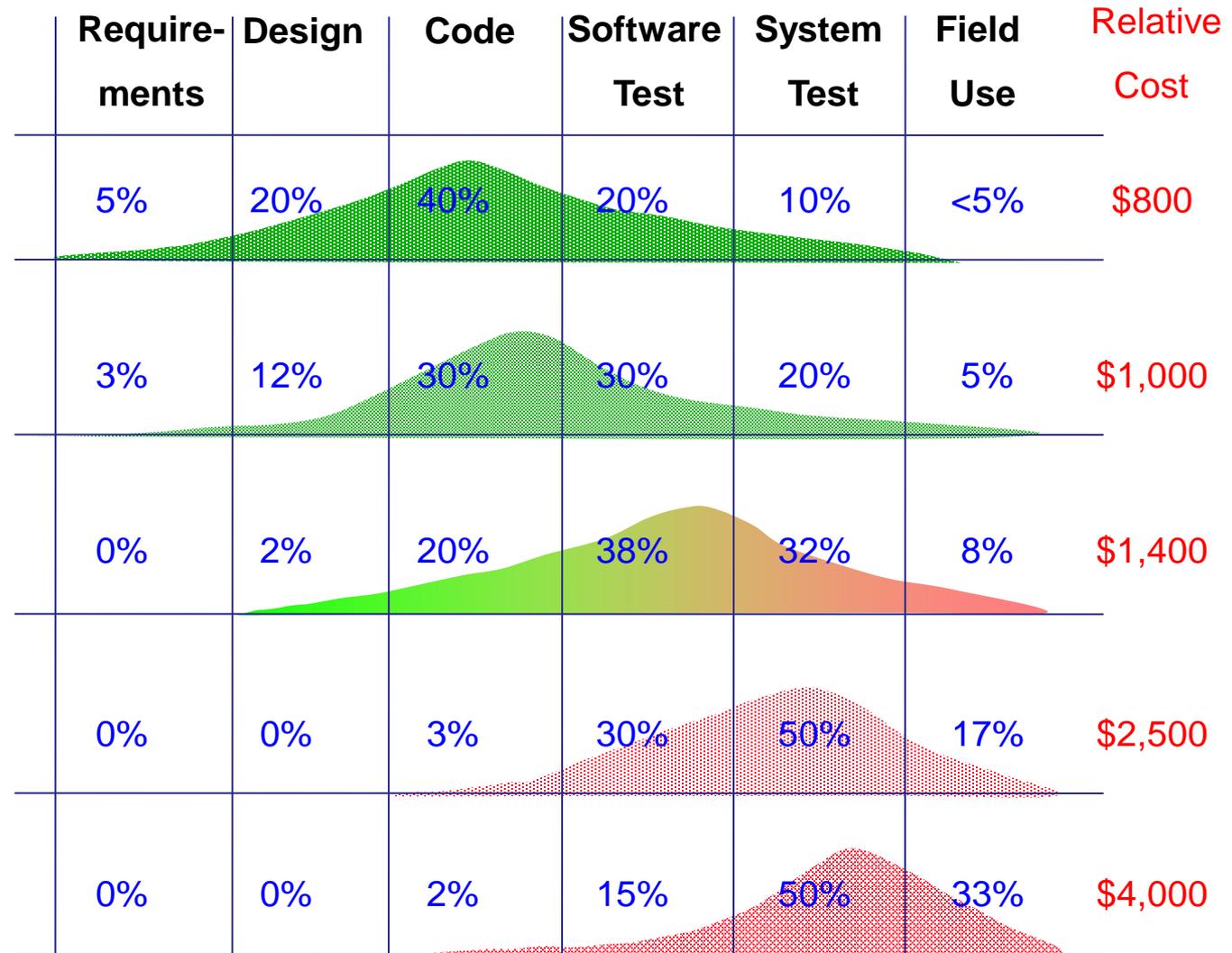
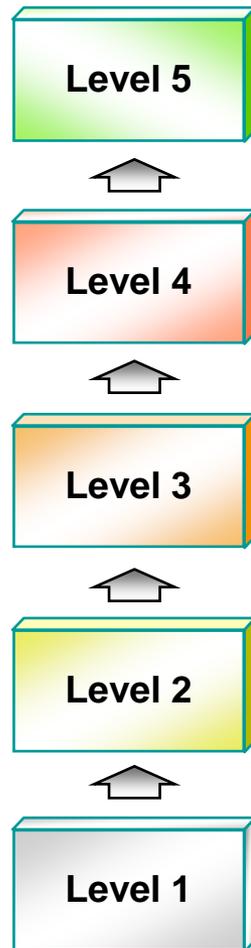


Source: SEPG Asia Pacific 2009  
presented by Ravindra Nath, KUGLER MAAG CIE GmbH

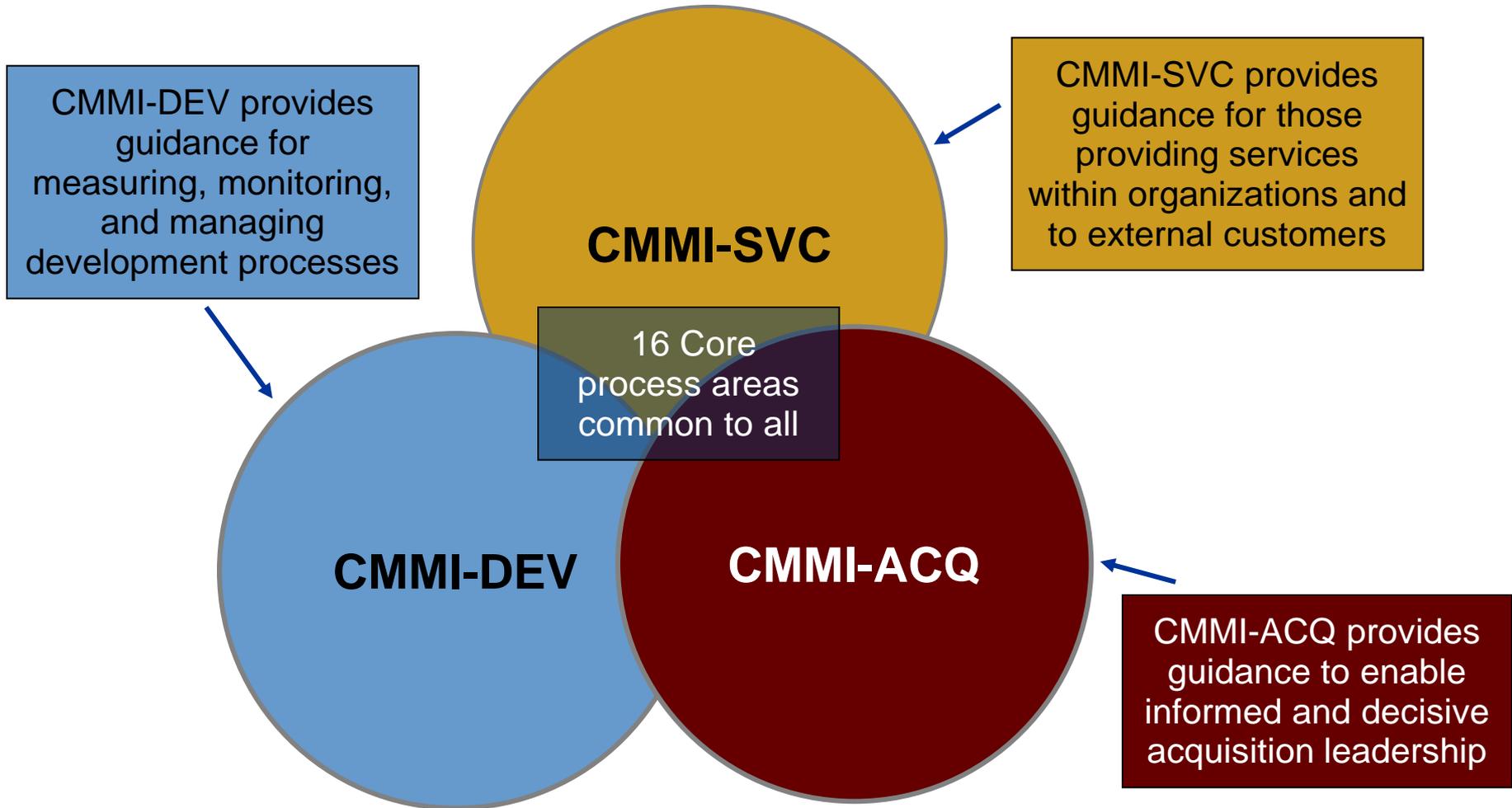


# Early Defects Detection

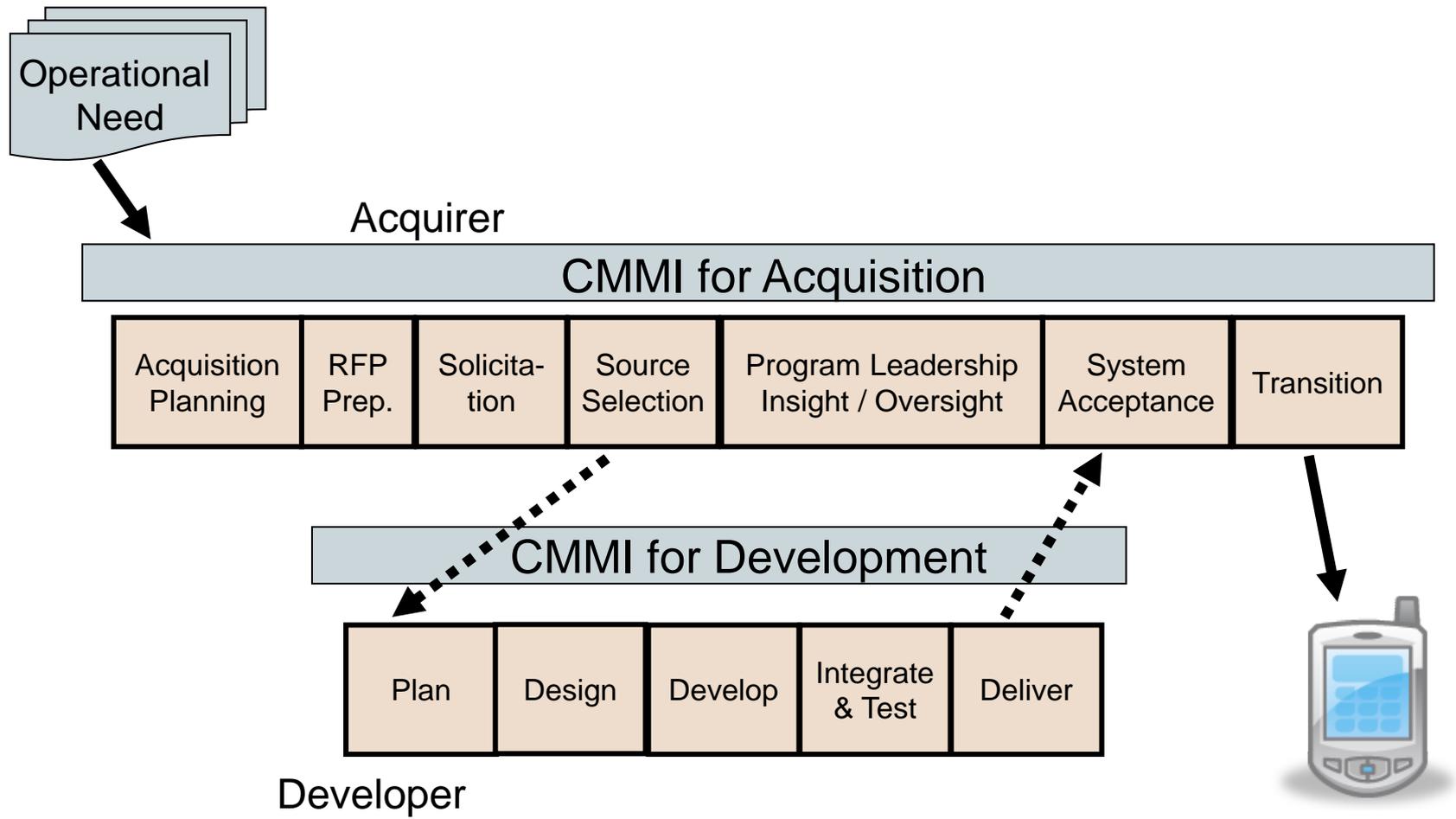
Source: SEPG Asia Pacific 2009  
presented by Ravindra Nath, KUGLER MAAG CIE GmbH



# Three Complementary CMMI Constellations

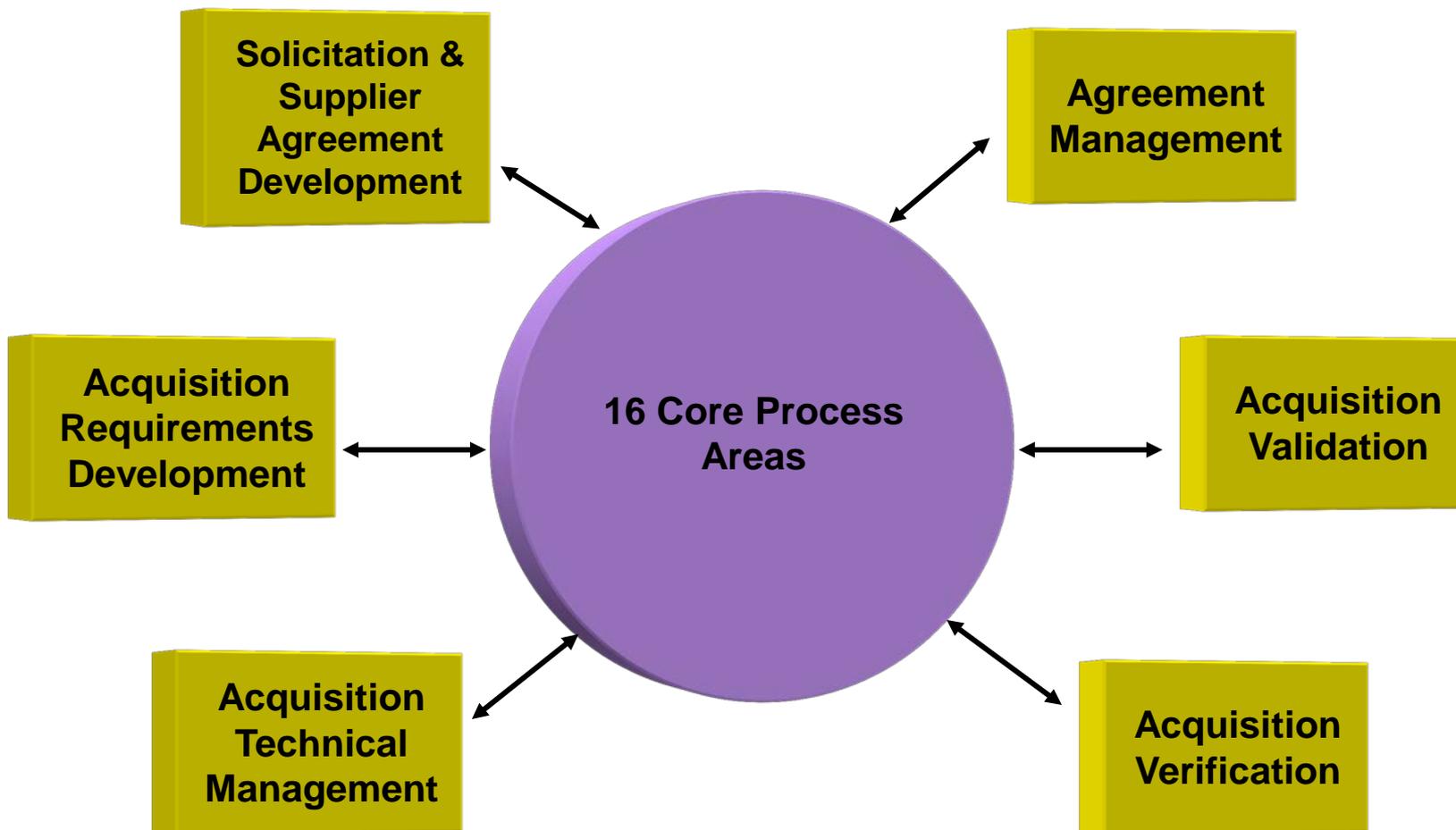


# Visibility into the Team's Capability



# CMMI-ACQ v1.2

## Acquisition Category Process Areas



# Acquisition Technical Management - Goals

---

## **SG 1: Evaluate Technical Solutions**

Supplier technical solutions are evaluated to confirm that contractual requirements continue to be met.

## **SG 2: Perform Interface Management**

Selected interfaces are managed.



# Examples of technical reviews

---

- Initial Technical Review (ITR)
- Alternative System Review (ASR)
- Integrated Baseline Review (IBR)
- Technology Readiness Assessment (TRA)
- System Requirements Review (SRR)
- System Functional Review (SFR)
- Preliminary Design Review (PDR)
- Critical Design Review (CDR)
- Test Readiness Review (TRR)
- System Verification Review (SVR)
- Production Readiness Review (PRR)
- Operational Test Readiness Review (OTRR)
- Physical Configuration Audit (PCA )



# Acquisition Verification - Specific Goals

---

## **SG 1: Prepare for Verification**

Preparation for verification is conducted.

## **SG 2: Perform Peer Reviews**

Peer reviews are performed on selected work products.

## **SG 3: Verify Selected Work Products**

Selected work products are verified against their specified requirements.



# Acquisition Verification - Summary

---

Verification includes

- Selecting work products for verification
- Establishing a verification environment
- Establishing criteria and procedures
- Preparing for and conducting peer reviews
- Analyzing peer review data
- Performing verification
- Analyzing verification results and identifying corrective actions



# Acquisition Validation - Goals

---

## **SG 1: Prepare for Validation**

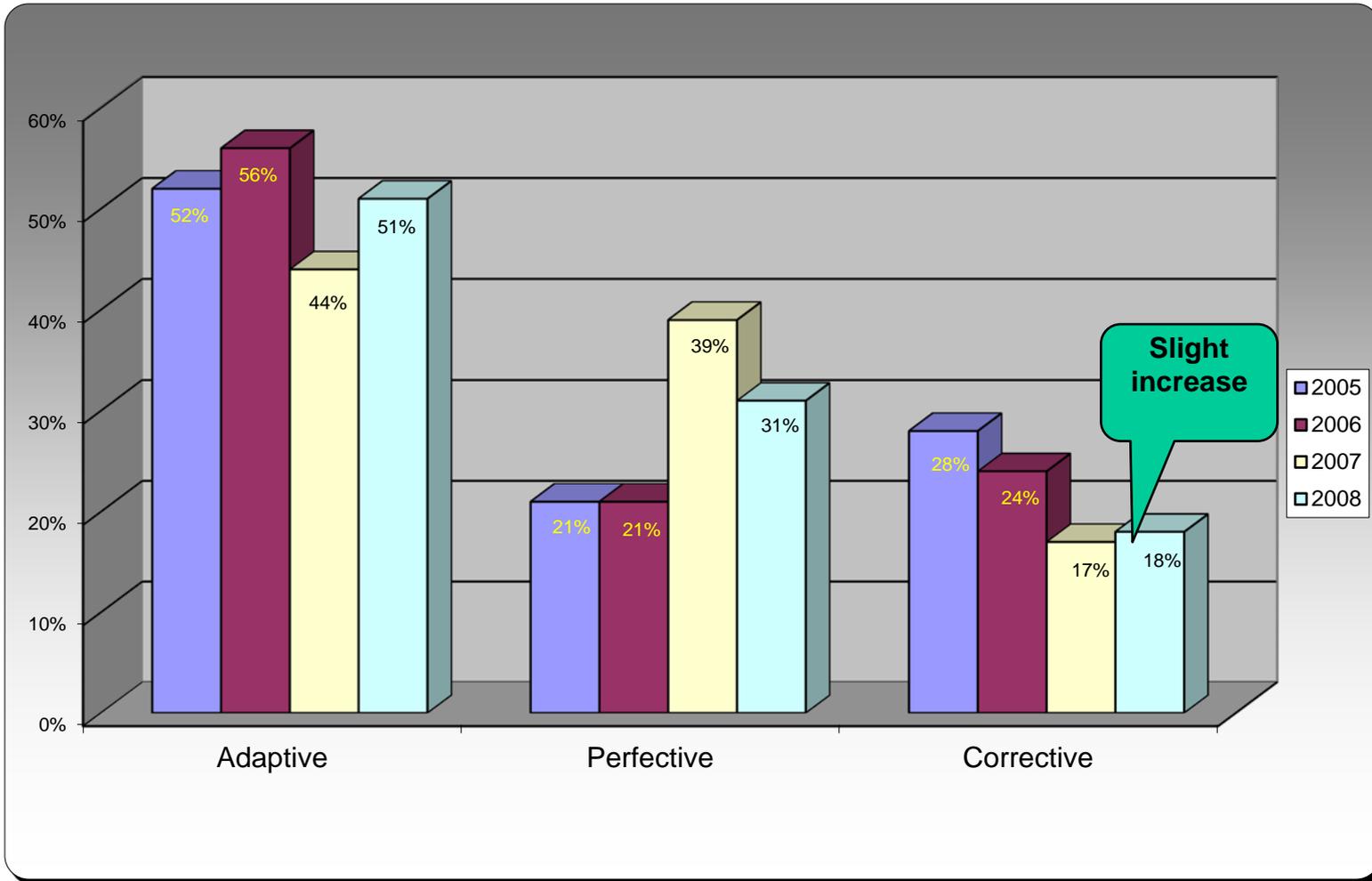
Preparation for validation is conducted.

## **SG 2: Validate Selected Products and Product Components**

Selected products and product components are validated to ensure that they are suitable for use in their intended operating environment.



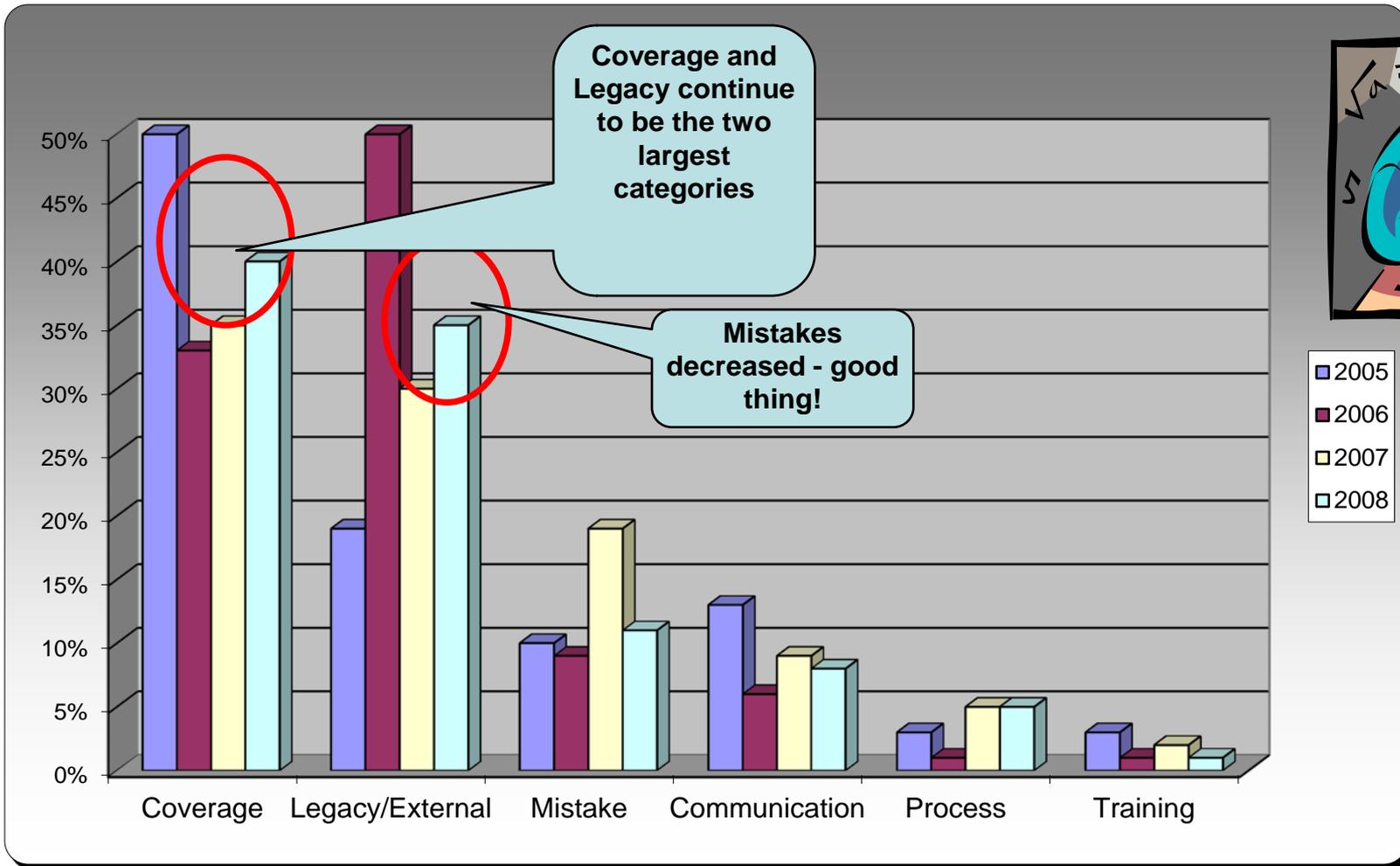
# Analysis – Test Metrics



Source: ITEA Annual Symposium 2009  
presented by 46 Test Wing from Eglin Air Force Base, FL



# Analysis – Test Metrics



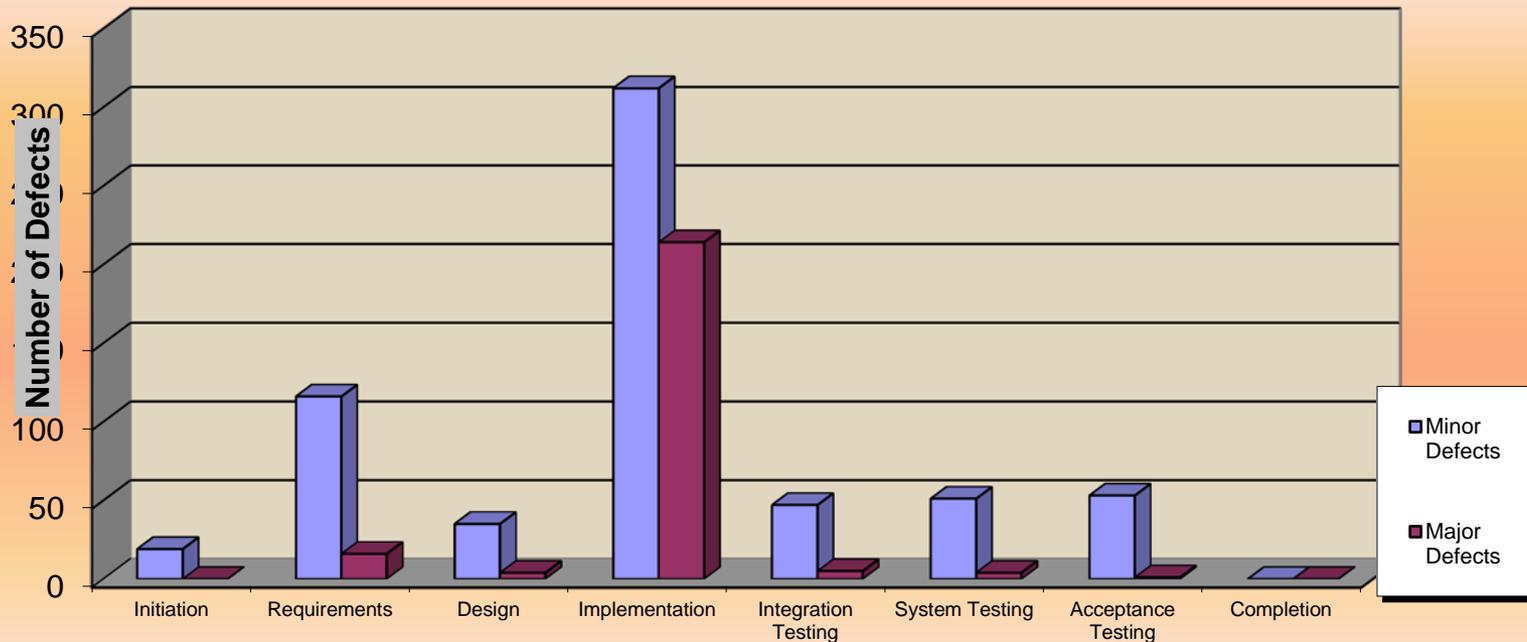
Source: ITEA Annual Symposium 2009  
presented by 46 Test Wing from Eglin Air Force Base, FL



# Analysis – Test Metrics

## Amount of Minor and Major Defects Saves by Category

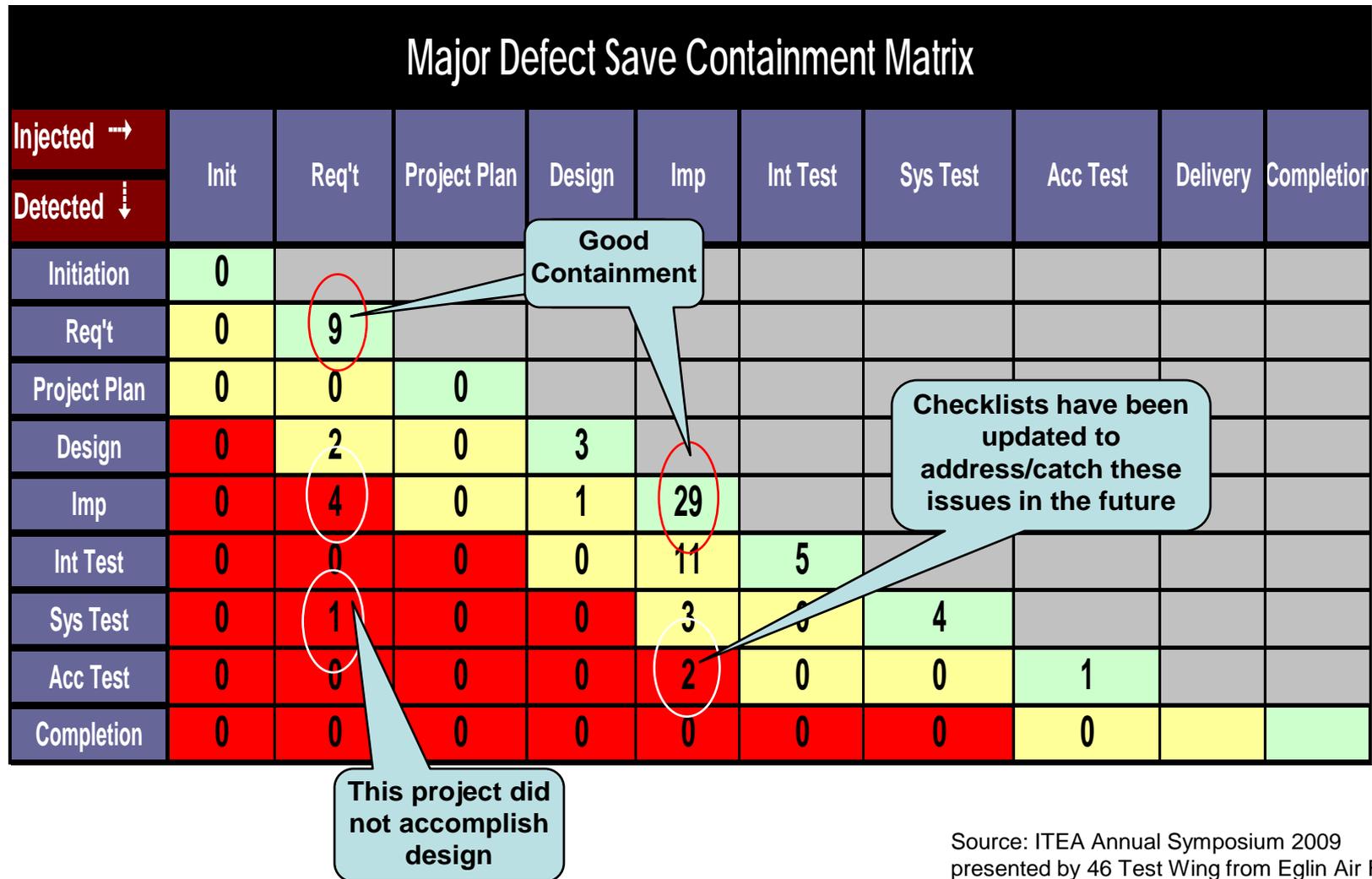
Amount of Defect Saves (Major + Minor) = 1147  
778 last year



Source: ITEA Annual Symposium 2009  
presented by 46 Test Wing from Eglin Air Force Base, FL



# Analysis – Test Metrics



Source: ITEA Annual Symposium 2009  
presented by 46 Test Wing from Eglin Air Force Base, FL



# Analysis – Statistical Control

---

Reducing **PROCESS** variation is the key to improving productivity and quality.

- Control charts provide a quick method to evaluate process stability/capability
- Boxplots provide a method to determine if performance is significantly different by group, state, model, date range
- Time Series plots provide a method to evaluate data patterns and behavior over time



# What Have We Missed?

---

Now let's chat....



# Acknowledgements

---

Slides 18,19, 20, and 21 are from a presentation given at the ITEA Annual Symposium 2009. It was presented by Ms Kathy Reid of the 46 Test Wing from Eglin Air Force Base, FL.

Slides 7, 8, and 9 are from a presentation given at SEPG Asia Pacific 2009. It was presented by Mr Ravindra Nath from KUGLER MAAG CIE, GmbH, Kornwestheim, Germany.

