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CMMI:
Fitting a Vision to Program Execution Needs

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Mark D. Schaeffer
Director, Systems and Software Engineering
Office of the Under Secretary of Defense (AT&L)

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CMMI Vision*

The initial vision for CMMI was to integrate the competing maturity models and provide a framework for more consistent process improvement

- Cause integration of the functional disciplines within organizations and across programs
- Increase systems engineering and software process maturity as organizations migrate from the sun-setting CMMs to CMMI

Build on and improve the significant work done by many to establish best practices

* Extract: 2004, 2005, 2006 CMMI Conference Keynotes

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gress Toward Executing the Vision

- We have attained the original vision
- We have taken steps to address CMMI issues:
  - Integrity issues with appraisals
  - Guidance for acquiring organizations
- Current Issues:
  - Staged vs. Continuous
    - Cost of levels versus Return on Investment
  - High Maturity
    - Level 4 and 5 inconsistency
    - High maturity appraisals and training
    - Relationship to other continuous process improvement initiatives
  - Next Gen Process Improvement
    - How do we revise the CMMI vision to meet program execution needs?

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Necessary but not sufficient.

- We have revitalized Systems Engineering Policy, Guidance, Education and Trainingé
- We have driven good systems engineering practices back into the way the acquisition community does business, and have had a positive impact on programsé
- We have expanded the boundaries to include increasingly important enablers for sound SE applicationé
- We have a rigorous process to capture what went wrong...
- é but failed to change, root cause behavior that leads to programs that do not meet cost, schedule, and performance expectationsé adequate maturity at program initiation

What are the systemic issues that need to be addressed?

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The Real World and CMMI: nship between CMMI and Program Execution*

- Programs adhering to organizational processes:
  - 85% of programs find the supplier performs their defined processes with minor non-compliance
- For programs that don't adhere to processes:
  - Primary reasons are schedule, cost, and customer impact
- There does not appear to be a link between maturity levels and program performance
  - No correlation between maturity levels and cost variance or CPI
  - Indication of negative correlation between ML and schedule variance or SPI
- There does not appear to be cost and schedule improvement from ML3 -> ML5

***DCMA Data Findings (2007)**

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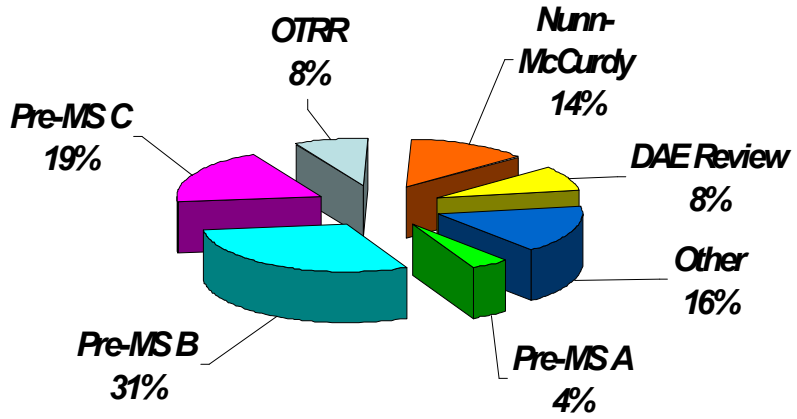
m Support Review Activity

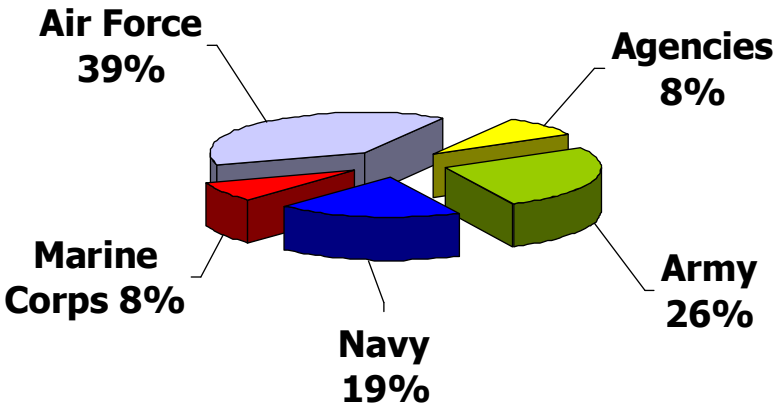
(since March 2004)

- PSRs/NARs completed: 42
- AOTRs completed: 10
- Nunn-McCurdy Certifications: 10
- Participation on Service-led IRTs: 2
- Technical Reviews: 9
- Reviews planned for remainder FY07
  - PSRs/NARs: 12
  - AOTRs: 2
  - Nunn-McCurdy: 6
  - Technical Reviews: 3

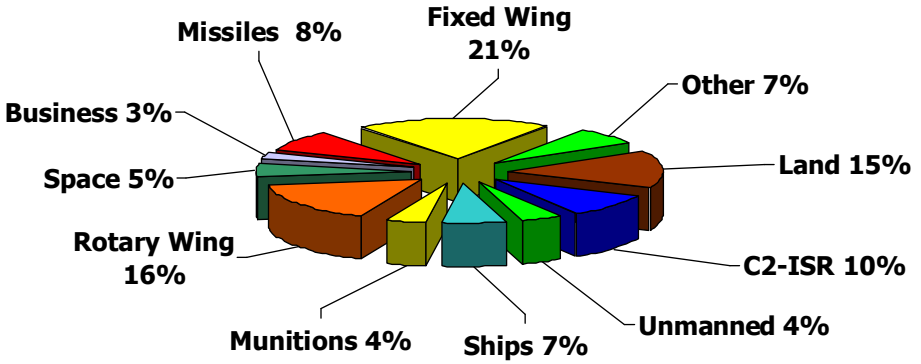
Decision Support Reviews



Service-Managed Acquisitions



Programs by Domain Area



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0 Emerging Systemic Issues

"Deep Dive" Program Reviews since Mar 04)

1. Management	Å IPT roles, responsibilities, authority, poor communication Å Inexperienced staff, lack of technical expertise
2. Requirements	Å Creep/stability Å Tangible, measurable, testable
3. Systems Engineering	Å Lack of a rigorous approach, technical expertise Å **Process compliance ≠ Program execution**
4. Staffing	Å Inadequate Government program office staff
5. Reliability	Å Ambitious growth curves, unrealistic requirements Å Inadequate ñtest timeòfor statistical calculations
6. Acquisition Strategy	Å Competing budget priorities, schedule-driven Å Contracting issues, poor technical assumptions
7. Schedule	Å Realism, compression
8. Test Planning	Å Breadth, depth, resources
9. Software	Å Architecture, design/development discipline Å Staffing/skill levels, organizational competency (process)
10. Maintainability/Logistics	Å Sustainment costs not fully considered (short-sighted) Å Supportability considerations traded

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Nunn-McCurdy Breaches

- Nine key visible failures:
  - Change in doctrine, driving quantity or mission changes
  - Requirements problems (immature, unrealistic, not stable, creep, etc)
  - Lack of a robust baseline
  - Inadequate SE/T&E, risk management, and/or FMECA
  - Inadequate staffing/experience/oversight levels
  - Poor reliability
  - Acquisition reform
  - Schedule/cost realism (concurrency, estimation, etc)
  - Contract (warranty, price curves, TSPR, etc)

Processes in place ≠ Program Execution

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10 Emerging Systemic Issues from Triage Assessment

1. Insufficient trade space (resources)	24 programs (37%)
2. Insufficient schedule trade space	22 programs (34%)
3. Budget not properly phased/ magnitude to support planned developmental (SE, T&E, production, etc.) efforts	17 programs (26%)
4. Concurrent test program	16 programs (25%)
5. Insufficient performance/ requirements trade space	16 programs (25%)
6. Operational or Developmental performance results indicate not effective/ suitable or KPPs not meeting threshold	15 programs (23%)
7. Lack of JROC-validated requirements document for basic program (ORD, CDD, CPD)	14 programs (22%)
8. Funding instability	14 programs (22%)
9. Inadequate implementation of EVMS and use of EVM as a vehicle for planning, executing, and controlling the program	14 programs (22%)
10. Current unit cost factors indicate significant/ critical APB breach	12 programs (19%)

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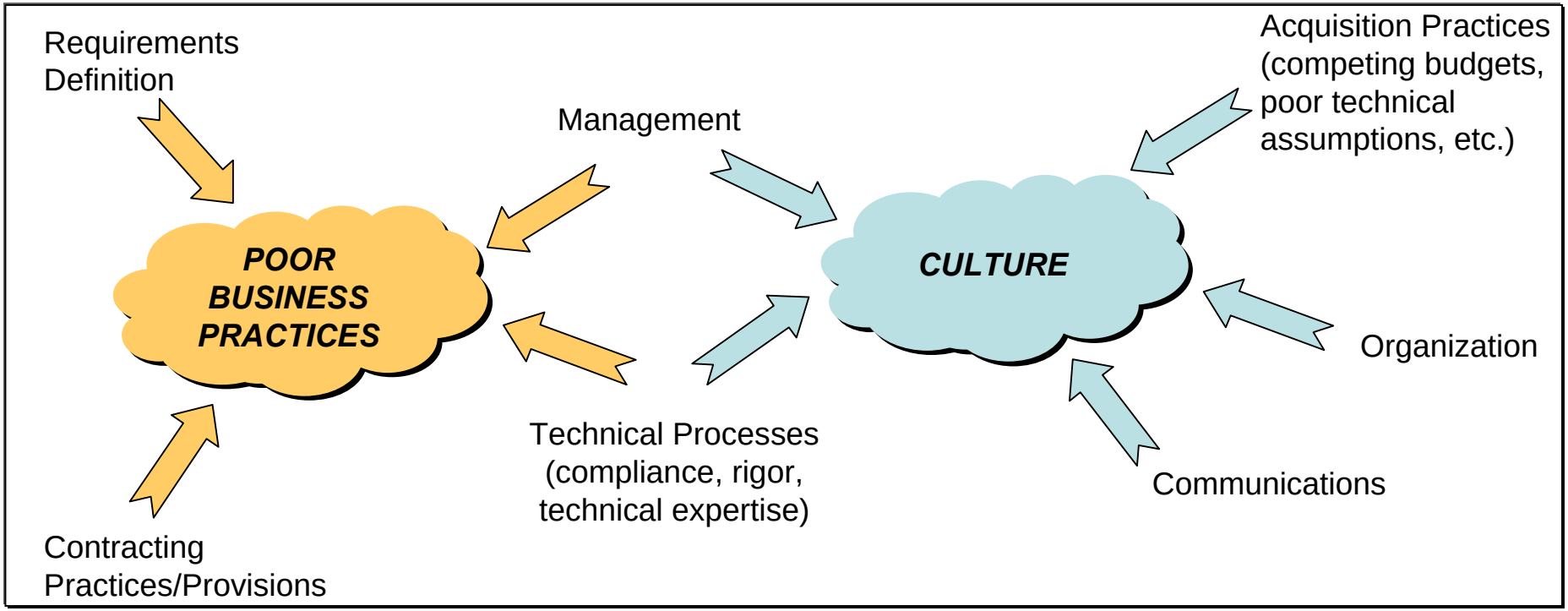
Root Cause Analysis Emerging Results

- Emerging systemic analyses point to the following 2 core root cause areas and their top 4-5 drivers:



An "Execution Discipline" problem… Solutions need to address "state-of-the-practice" vice "state-of-the-art"

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Let's Review…

- Staged vs. Continuous
  - DoD does not encourage use of levels
  - Current practice of attaining levels
    - Continues to drive program/enterprise cost
    - Does not correlate to program success
    - Contributes to acquirers and developers not having to "think" about program execution
- High Maturity
  - High maturity is ill defined/narrowly applied -- vice adopting CPI in all required areas
- Next Gen Process Improvement
  - Starting programs right – disciplined execution – highest probability for program success
  - We must address state of the practice, vice state of the art

Fit CMMI Vision to Program Execution Needs

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CMMI Vision for the Future

- Current
  - 5 Levels
  - Three SCAMPIs
  - Constellations for major stakeholders
  - High Maturity improvement plans
  - Cost of integrity
- Future
  - Foundational best practices
  - Tailored to organizational, domain, and program needs
  - Focus areas to extend the foundation to specific interest areas (e.g. safety, COTS)
  - Structured measurement process aligned with tools for high maturity

CMMI should continue to ensure foundational best practices; tailored to Org/Domain/Program needs

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DCMA Survey and Data Collection*

- Survey conducted in response to OUSD (AT&L) request:
  - ñIs there a relationship between CMMI levels and program performance?ò
- 85-142 programs reported each quarter
- ACAT Levels reported
  - ACAT IAC ï 9 programs
  - ACAT IAM ï 5 programs
  - ACAT IC ï 33 programs
  - ACAT ID ï 79 programs
  - ACAT II ï 16 programs
- Claimed maturity levels (MLs)
  - ML 1 ï 3 programs
  - ML 2 ï 1 program
  - ML 3 ï 47 programs
  - ML 4 ï 17 programs
  - ML 5 ï 74 programs

*** Excerpt from DCMA Data Call Results briefing - Nov 07**

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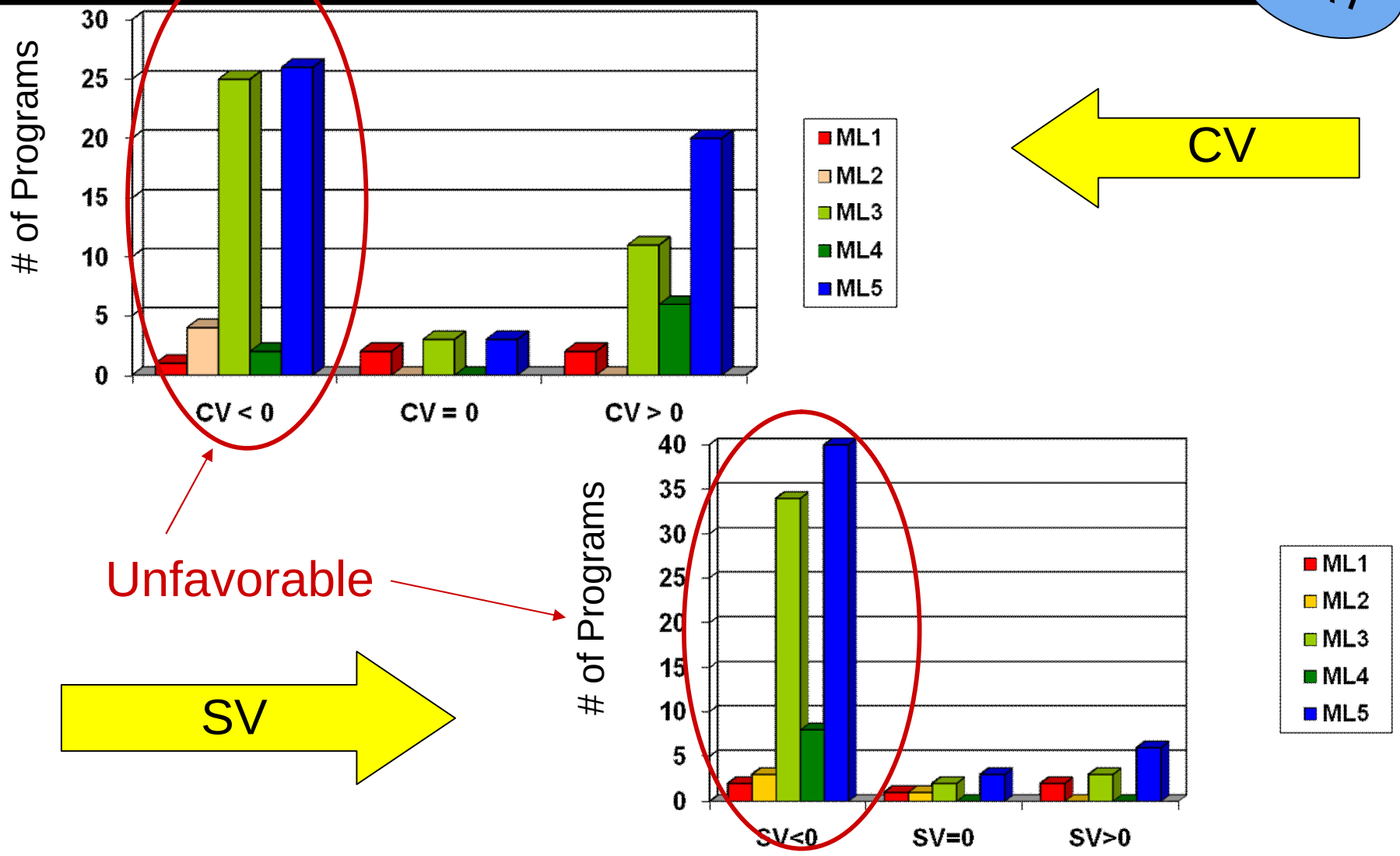
V/SV and Maturity Levels

MAY



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DCMA Study - Data Assumptions

- Many survey questions are subjective (Local DCMA viewpoints)
- If both Maturity Level (ML) and Capability Level (CL) reported, only captured ML
- Only captured highest Maturity Level achieved
  - Example: ML 5 SW only with ML 3 for SE; ML 5 data was used
- If a range (eg. 5-10%) was given for any EV data, highest value (10%) was recorded
- Only used latest PO/contract for a program
- Not all the totals will add up to the sample size due to unanswered questions
- Have deleted some EV data points due to suspect data (Suspect decimal point issues)

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