Tailoring CMMI for an Enterprise Resource Planning COTS Software Environment

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Director, Army COE
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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.
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

• 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

"The Americans will always do the right thing... after they've exhausted all the alternatives." -- Winston Churchill
Understand SEI’s CMMI-DEV and CMMI-SVC

**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)

Initial large and complex development effort; augment with CMMI-SVC constellation

Appraise to CMMI-DEV

Eventually: Maintain a high-quality service-providing organization

**Goals:**
- Implement a hybrid CMMI Model
- Share templates and Best Practices
# CMMI Model Comparison

<table>
<thead>
<tr>
<th>Process Areas</th>
<th>CMMI-SVC</th>
<th>CMMI-DEV</th>
<th>CMMI-ACQ</th>
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<tbody>
<tr>
<td>CMMI Model Foundation</td>
<td>✔️</td>
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<td>Services Specific</td>
<td>✔️²</td>
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<td>Engineering</td>
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<td>✔️¹</td>
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<td>Acquisition</td>
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<td>✔️³</td>
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² Change Management added by COE to cover this crucial COTS function

³ Acquisition constellation is a resource when acquiring COTS software (SAP) and services (contractors with SAP skills).

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

2 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
Which process areas are covered by each model?

- **CMMI-SVC**
  - 7 Service Specific Process Areas
  - Addition of Service System Transition

- **CMMI-DEV**
  - 6 Engineering Process Areas

- COE
  - 16 CMMI Model Foundation Process Areas
## COE’s COTS Implementation Process Areas

**CMMI-DEV process areas**

<table>
<thead>
<tr>
<th>Process Management</th>
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<tr>
<td>OPF</td>
<td>Organizational Process Focus</td>
<td>OPP</td>
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<tr>
<td>OPD</td>
<td>Organizational Process Definition + IPPD</td>
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<td>OT</td>
<td>Organizational Training</td>
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<td>OID</td>
<td>Organizational Innovation and Deployment</td>
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<th>Project Management</th>
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<td>PP</td>
<td>Project Planning</td>
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<td>PMC</td>
<td>Project Monitoring and Control</td>
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<tr>
<td>SAM</td>
<td>Supplier Agreement Management</td>
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<td>IPM</td>
<td>Integrated Project Management + IPPD</td>
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<tr>
<td>RSKM</td>
<td>Risk Management</td>
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<td>QPM</td>
<td>Quantitative Project Management</td>
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<th>Engineering</th>
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<td>REQM</td>
<td>Requirements Management</td>
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<td>RD</td>
<td>Requirements Development</td>
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<td>TS</td>
<td>Technical Solution</td>
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<td>PI</td>
<td>Product Integration</td>
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<td>VER</td>
<td>Verification</td>
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<td>VAL</td>
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<th>Support</th>
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<tr>
<td>CM</td>
<td>Configuration Management **</td>
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<td>MA</td>
<td>Measurement and Analysis</td>
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<td>DAR</td>
<td>Decision Analysis and Resolution</td>
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<tr>
<td>CAR</td>
<td>Causal Analysis and Resolution</td>
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**Addition of 1 CMMI-SVC process area**

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<tr>
<th>Service Specific</th>
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<tr>
<td>SST</td>
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<tr>
<td>Service System Transition</td>
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**Tailor CM Policy & Procedures**

- Version control and numbering
- Product release and delivery
# Relevant CMMI-ACQ Process Areas

<table>
<thead>
<tr>
<th>Process Area</th>
<th>COE Examples</th>
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<tbody>
<tr>
<td><strong>Agreement Management (AM)</strong></td>
<td>• At the highest level, the agreement between the Army and SAP.</td>
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<td></td>
<td>• Each services contract for SAP contractor assignments.</td>
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<tr>
<td><strong>Acquisition Validation (AVAL)</strong></td>
<td>• Audits and reviews of base SAP software against Army goals and vision.</td>
</tr>
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<td></td>
<td>• Functional and Physical audits of various existing Army systems the COE acquires.</td>
</tr>
<tr>
<td><strong>Acquisition Verification (AVER)</strong></td>
<td>• Verification that the skills and output artifacts from each contract are as expected.</td>
</tr>
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<td></td>
<td>• Verification that the base SAP software performs as expected and support levels are maintained.</td>
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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
- Level-5 Developed Practices
- Expansion of Policies, Procedures, & Examples to include COTS

ASEC

SEI
- 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

Add new policy for Change Mgmt

Add new procedure for Change Mgmt

All CM procedures tailored
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**
  - Streamlined common processes

- **Project # 1 Plan**

- **Project # 2 Plan**
  - Deltas to the overarching Project Plan

- **Result:**
  - 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

Code additions and updates

Data Freeze

v1

v2

COTS Versioning

SAP ECC v5.0

Production ERP environment

Thursday update

Thursday update

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
- 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