

TACOM-ARDEC

Software Enterprise (SWE)

CMMI Based

Process Improvement

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Agenda

- **SWE overview.**
- **Basis for process improvement.**
- **Appraisal summary.**
- **Experience summary.**
- **Future plans.**
- **Organizational summary.**

Organizational Environment

- **TACOM-ARDEC Software Enterprise (SWE) consist of the software intensive weapon system elements of:**
 - **FSAC Fire Control & Software Engineering Division.**
 - **QED Systems/Software Technology, Analysis and Reliability (STAR) Team.**

SWE Demographics

- **Provides Post Deployment and Acquisition support for Software Intensive Weapon Systems (Combat Vehicles, Artillery, Trainers, Munitions, etc.).**
- **SWE has 166 Army and Contractor personnel.**
- **Has participated in CMMI development and testing from it's start.**
- **Achieved CMMI Maturity Level 3.**

Process Needs

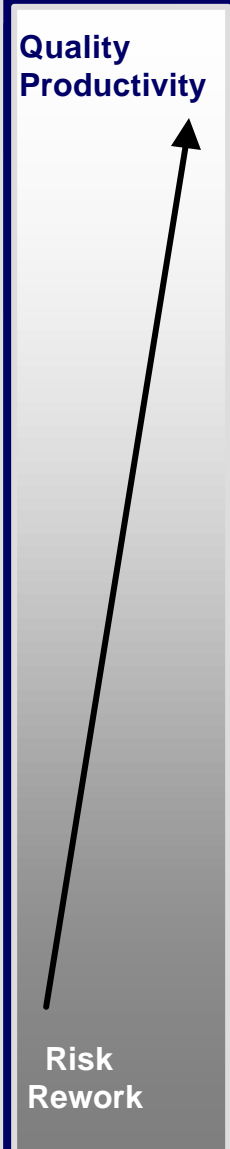
- **Maintain and enhance Core Competencies.**
- **Improve quality & consistency of services and products.**
- **Increase productivity & reduce cycle time.**
- **Improve customer satisfaction.**
- **Improve competitive advantage.**

Business Processes

- **Requirements Management (RM)**
- **Project Management (PM)**
- **Acquisition Management (AM)**
- **System Engineering (SE)**
- **Product Evaluation (PE)**
- **Performance Management (PFM)**
- **Organizational Process Management (OPM)**
- **Status Review (SR)**
- **Configuration Management (CM)**
- **Process Assurance (PA)**

CMMI-SE/SW/A v1.02d

Level	Focus	Process Areas
5 Optimizing	<i>Continuous Process Improvement</i>	Organizational Innovation and Deployment Causal Analysis and Resolution
4 Quantitatively Managed	<i>Quantitative Management</i>	Organizational Process Performance Quantitative Project Management Quantitative Supplier Management
3 Defined	<i>Process Standardization</i>	Requirements Development Technical Solution Product Integration Verification Validation Organizational Process Focus Organizational Process Definition Organizational Training Integrated Project Management Risk Management Decision Analysis and Resolution Integrated Supplier Management
2 Managed	<i>Basic Project Management</i>	Requirements Management Project Planning Project Monitoring and Control Supplier Selection and Monitoring Measurement and Analysis Process and Product Quality Assurance Configuration Management
1 Initial		



Approach

- **Map CMMI-SE/SW/A goals and practices to the business processes.**
- **Group the mapped goals and key practices by common requirements and threads.**

Approach (cont.)

- **Develop concepts, policy, processes and procedures for each Business Process that address the mapped CMMI requirements.**
- **Implement the Business Processes.**
- **Appraise SWE against CMMI-SE/SW/A.**
- **Act on findings.**

Appraisal Summary

Five appraisals:

- March 2000, Class A, resulted in level 1
- October 2000, Class B, status check
- January 2001, Class A, resulted in level 2
- August 2001, Class B, status check
- February 2002, Class A, resulted in level 3

Appraisal Description

- **Standard CMMI Appraisal Method for Process Improvement (SCAMPI) v1.0 and Software Capability Evaluation (SCE) v3.0:**
 - **Methods for evaluating the process capability of an organization.**
 - **Appraisal process can be used with the Software Engineering Institute's SW-CMM, SA-CMM, or CMMI.**
 - **Outcome - Characterizations of practices (organized by KPA or PA), findings and ratings.**

Lessons Learned

- **Active senior management involvement is a prerequisite.**
- **Communication, training and coaching are all essential and must be integrated.**
- **CMMI and the standard processes must be supplemented.**
- **Start measurement effort early and keep it streamlined.**
- **Process group should include all project leaders.**

Lessons Learned (cont.)

- **CMMI does not address the quality of the framework.**
- **Should handle infrastructure efforts (PI, CM, QA, etc.) as individual projects.**
- **CMMI needs to be tailored for non-developmental projects.**
- **A central Process Asset Library and repository are basic and must be actively stocked and maintained.**

Successful Practices

- **Active integration of the quality assurance function into the process improvement effort.**
 - Periodically assess project activities & artifacts.
 - Target the audits to assess compliance with CMMI.
- **Extension of the standard processes through a comprehensive set of framework elements.**
 - Templates, forms, checklists.
 - Training and coaching information.

CMMI Benefits (vs. SW-CMM)

- **CMMI is less burdensome in the implementation phases, for example:**
 - eliminating the extensive set of required procedures.
 - permitting a more tailored, economic development of standard processes and procedures.
- **CMMI has an integrated acquisition discipline that provides supplier management coverage.**
- **CMMI can be applied to non-developmental projects, increasing the “bang for the buck.”**

SWE Benefits

- **Highest customer satisfaction ratings ever.**
- **Increase in on-time deliveries.**
- **Improved cost management.**
- **Fewer complaints to upper management.**

Plans

- **Streamline and improve business processes and assets.**
- **Maintain SWE satisfaction of CMMI level 3 requirements.**
- **Institutionalize business processes across the organization.**
- **Prepare the infrastructure for CMMI level 4.**

Plans (cont.)

- **Expand coverage to new areas (ATE, DPOs, systems, hardware, etc.).**
- **Work to evolve CMMI to better meet our needs.**
- **Conduct appraisals to baseline new areas and measure progress.**

Organizational Summary

- **Senior management is proactively involved with process improvement effort.**
- **The organization is committed to process improvement.**
- **CMMI based approach has worked and benefited the organization.**

Backup Slides

Timing results for Class “A”

Appraisal	Projects	Practices	Time	Time/Practice
Mar 00	4	120	52 hr	26.0 min
Jan 01	4	160	88.4 hr	33.1 min
Feb 02	4	173	75.7 hr	26.2 min

Mar 00 included all of CMMI-SE/SW/A level 2 & part of level 3

Jan 01 included all of CMMI-SE/SW/A levels 2 & 3

Feb 02 included all of CMMI-SE/SW levels 2, 3 & 4 + ISM

Timing results for Class “B”

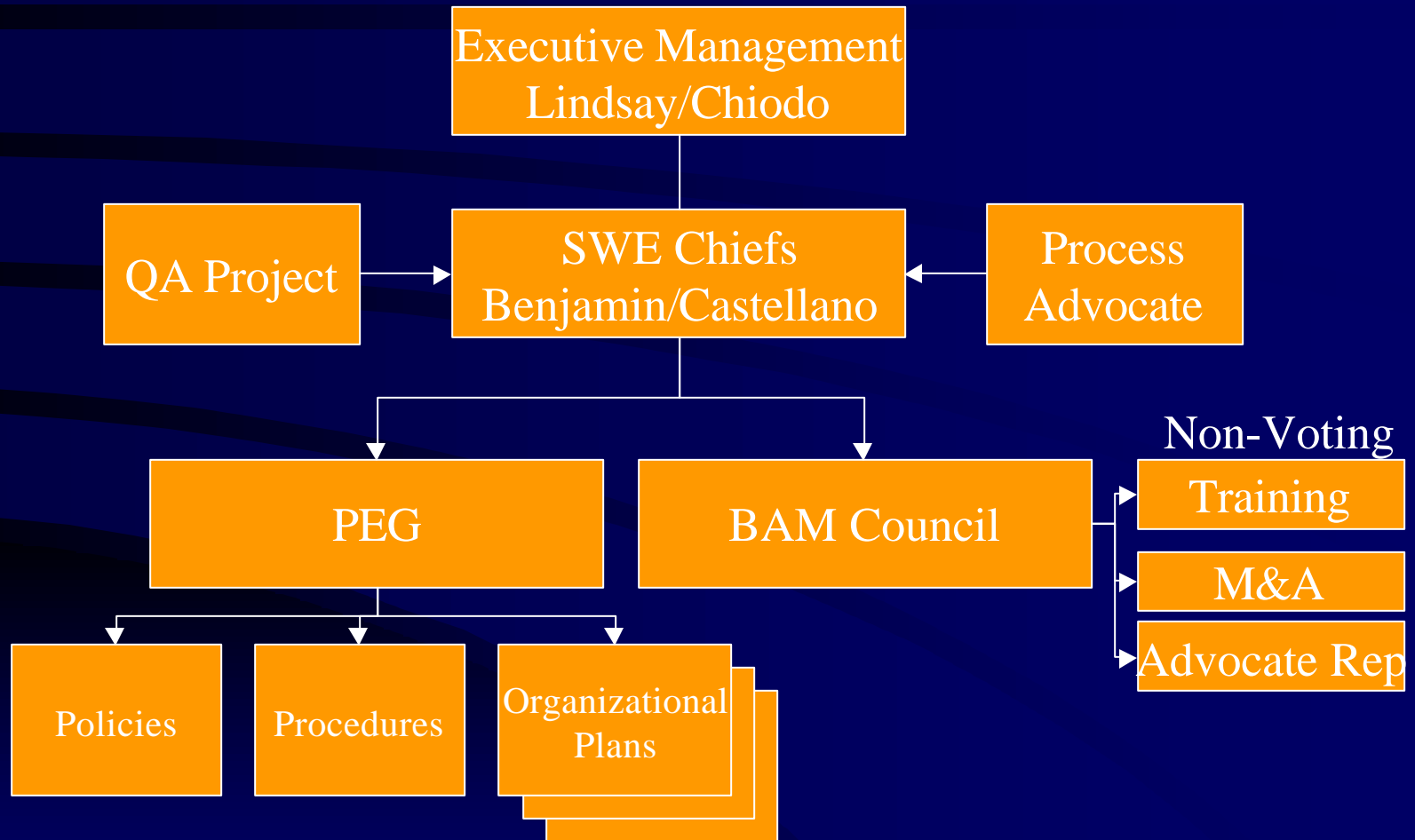
Appraisal	Projects	Practices	Time	Time/Practice
Sept 00	8	161	37 hr	13.79 min
Aug 01	9	179	41.2 hr	13.82 min
Sept 02	3	148	34.1 hr	13.82 min

Sept 00 included all of CMMI-SE/SW/A levels 2 & 3

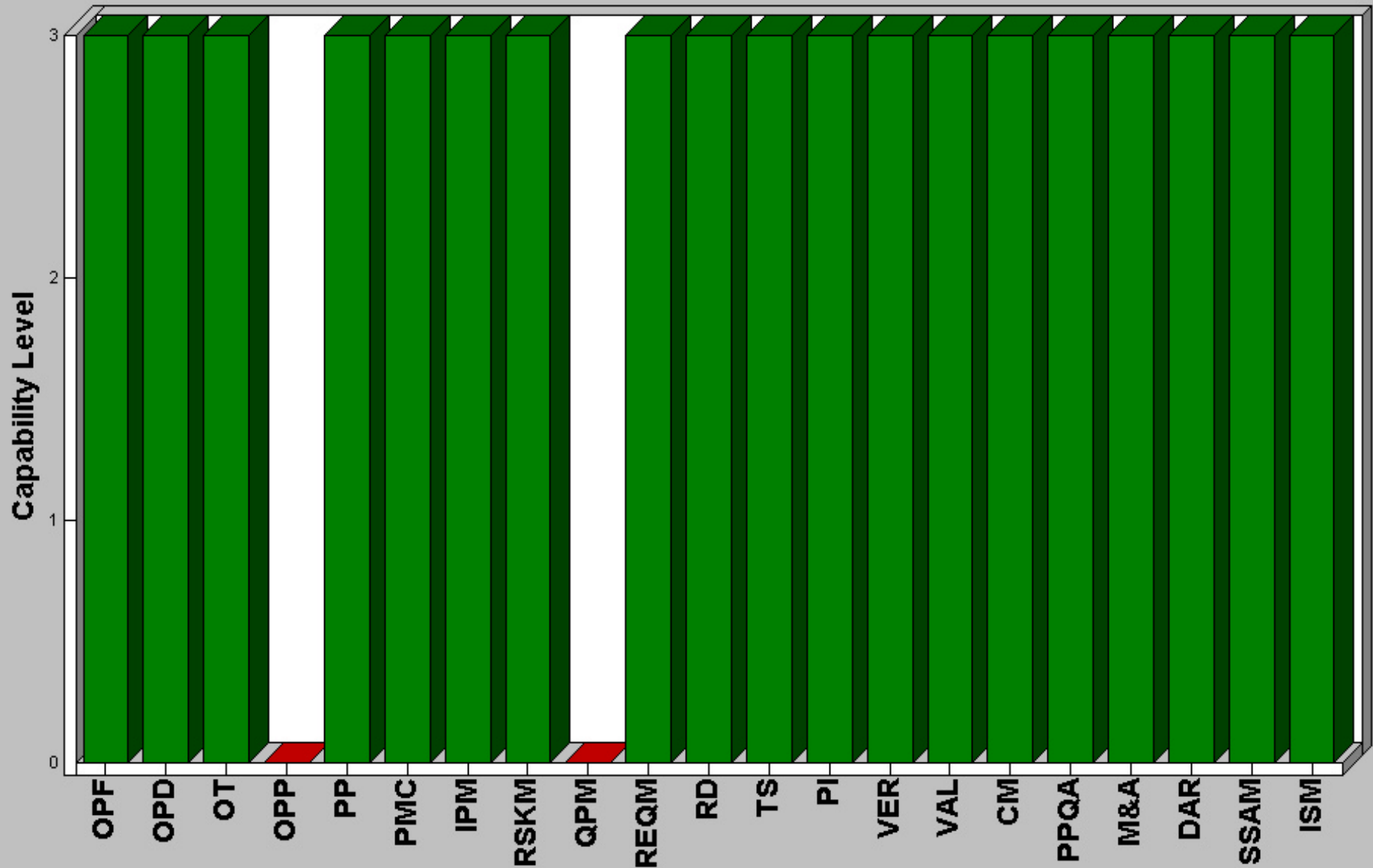
Aug 01 included all of CMMI-SE/SW/A levels 2, 3, & 4

Sept 02 included all of CMMI-SE/SW/A levels 2 & 3 except OPD & OPF

Software Enterprise Process Improvement Structure



TACOM - ARDEC SOFTWARE ENTERPRISE (February 15, 2002)



PA SG1 SG2 SG3 SG4 GG

TACOM-ARDEC SWE

(Feb 15, 2002)

Level 5	Causal Analysis and Resolution	PA	SG1	SG2	SG3	SG4	GG
	Organizational Innovation and Deployment						
Level 4	Quantitative Supplier Management	●	●	●			●
	Quantitative Project Management	●	●	●			●
	Organizational Process Performance	●	●				●
	Organizational Environment for Integration						
	Decision Analysis and Resolution	●	●				●
	Integrated Teaming						
	Risk Management	●	●	●	●		●
	Integrated Supplier Management	●	●	●	●		●
	Integrated Project Management	●	●	●			●
	Organizational Training	●	●	●			●
	Organizational Process Definition	●	●	●			●
	Organizational Process Focus	●	●	●			●
	Validation	●	●	●			●
	Verification	●	●	●	●		●
	Product Integration	●	●	●	●		●
	Technical Solution	●	●	●	●		●
Level 3	Requirements Development	●	●	●	●		●
	Supplier Agreement Management						
	Configuration Management	●	●	●	●		●
	Process and Product Quality Assurance	●	●	●			●
	Measurement and Analysis	●	●	●			●
	Supplier Selection and Management	●	●	●	●		●
	Project Monitoring and Control	●	●	●			●
	Project Planning	●	●	●	●		●
Level 2	Requirements Management	●	●				●

- Fully Impl (S)
- Largely Impl (SS)
- Partially Impl (SW)
- Not Impl (W)
- Satisfied
- Not Satisfied
- Improvement Activity