TACOM-ARDEC
Software Enterprise (SWE)

CMMI Based
Process Improvement

S. Wayne Sherer
973-724-3531
wsherer@pica.Army.Mil

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

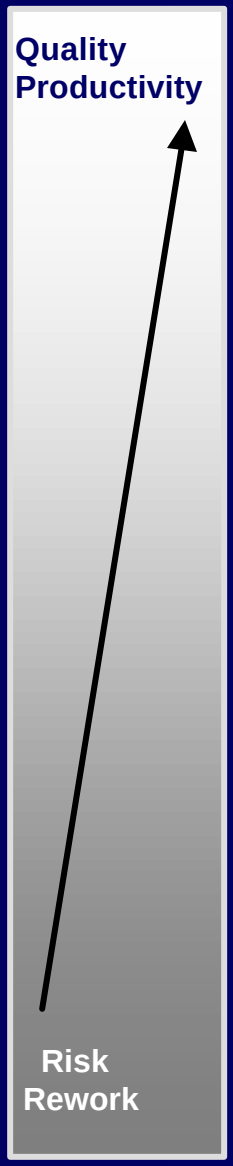
- Maintain and enhance Core Competencies.
- Improve quality & consistency of services and products.
- Increase productivity & reduce cycle time.
- Improve customer satisfaction.
- Improve competitive advantage.

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	*Continuous Process Improvement*	Organizational Innovation and Deployment Causal Analysis and Resolution
4 Quantitatively Managed	*Quantitative Management*	Organizational Process Performance Quantitative Project Management Quantitative Supplier Management
3 Defined	*Process Standardization*	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	*Basic Project Management*	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”

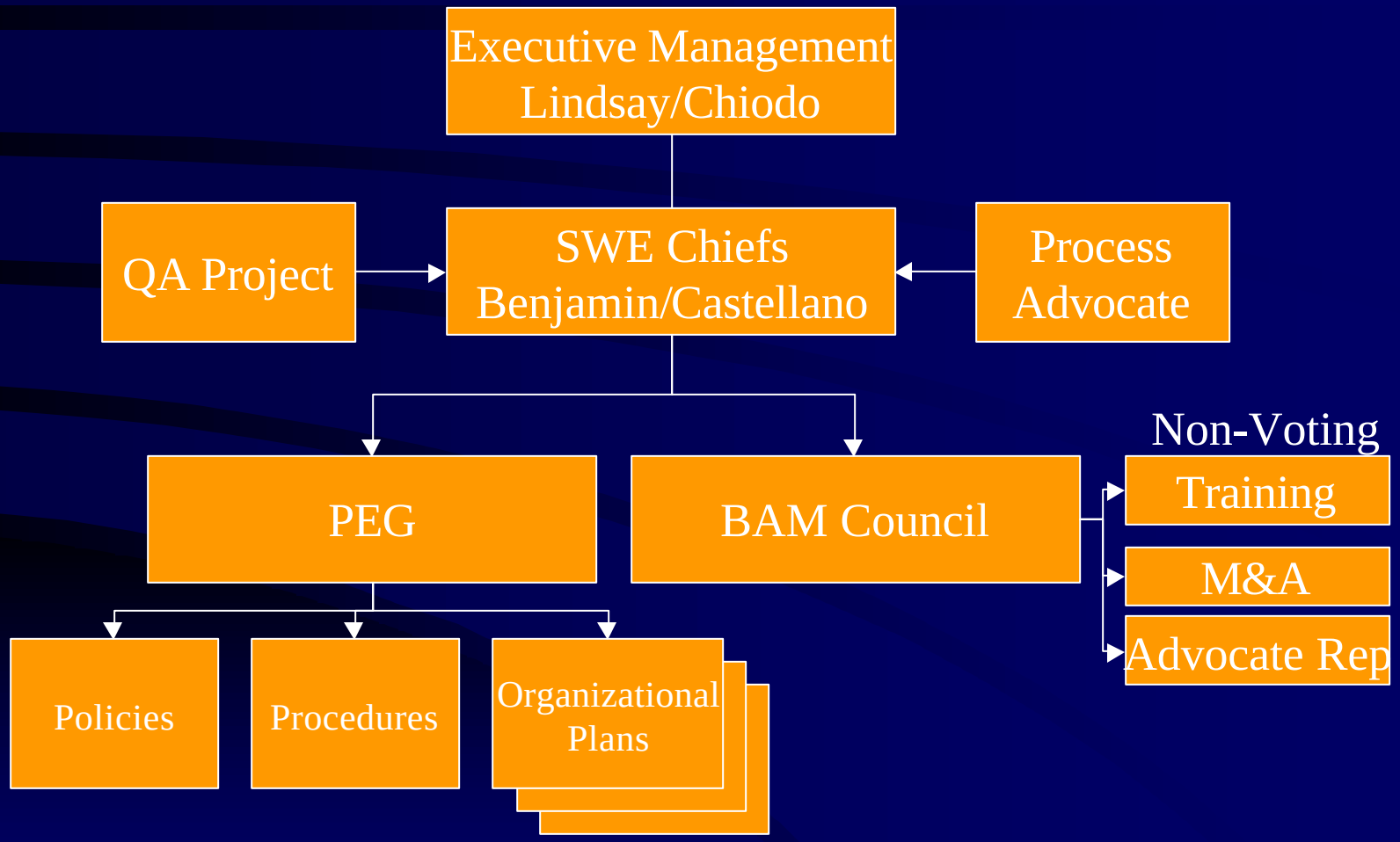
Appraisal	Projects	Practices	Time	Time/Practice
Sept 00	8	161	37 hr	13.79 min
Aug 01	9	179	41.2 hr	13.82 min
Sept 02	3	148	34.1 hr	13.82 min

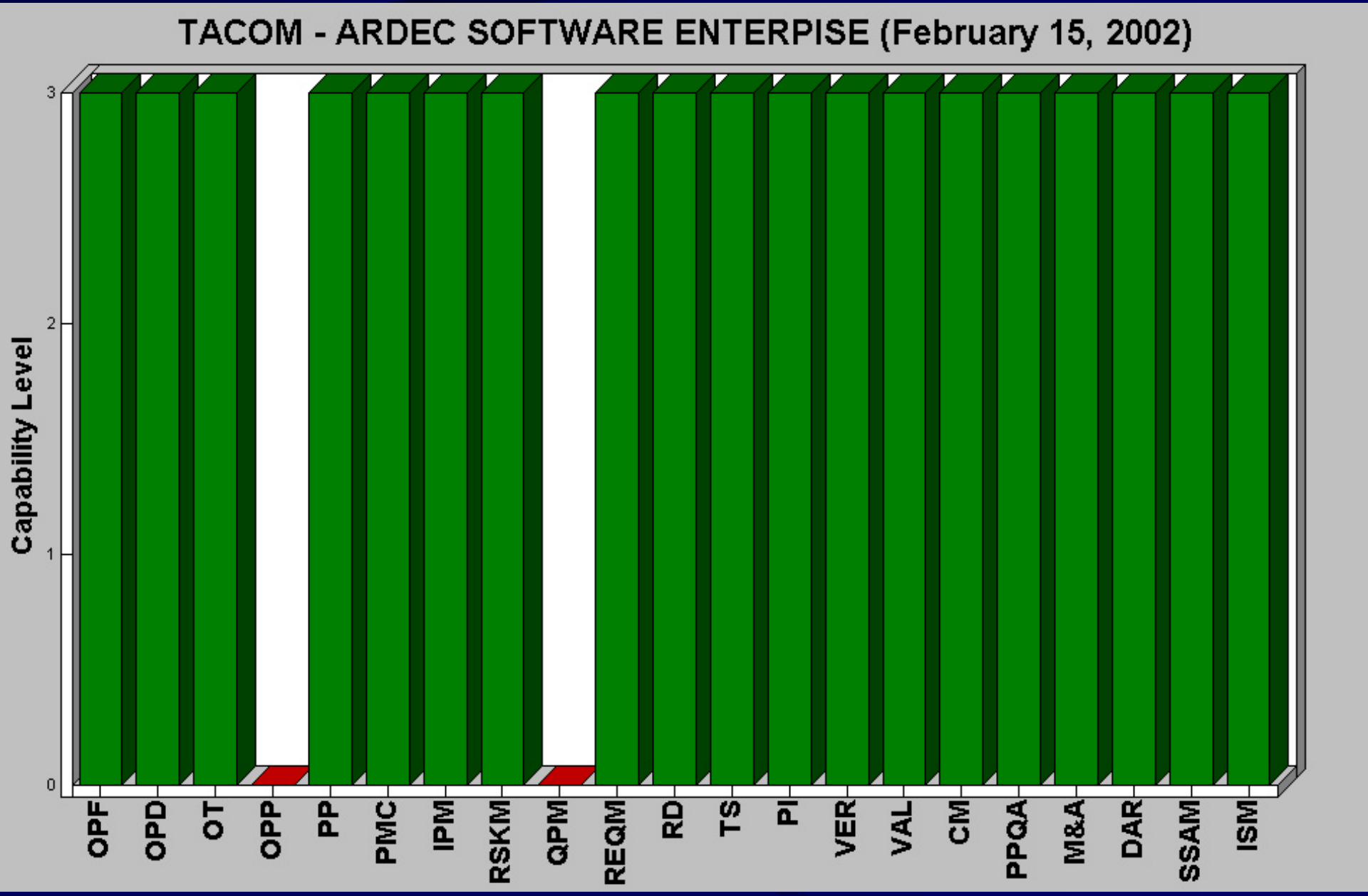
Sept 00 included all of CMMI-SE/SW/A levels 2 & 3

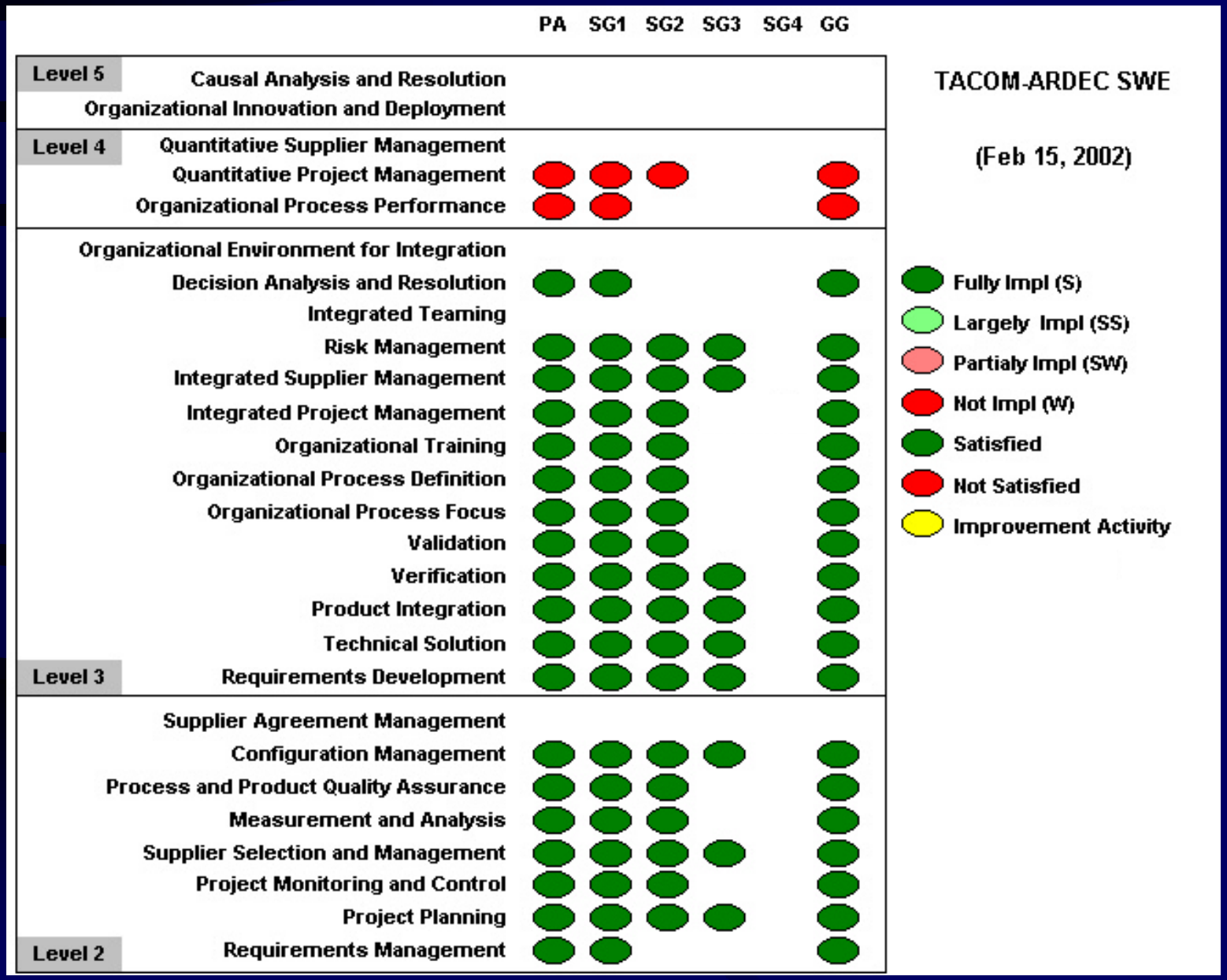
Aug 01 included all of CMMI-SE/SW/A levels 2, 3, & 4

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

Software Enterprise Process Improvement Structure




TACOM - ARDEC SOFTWARE ENTERPISE (February 15, 2002)
Capability Level
3
2
1
0
OPF
OPD
OT
OPP
PP
PMC
IPM
RSKM
QPM
REQM
RD
TS
PI
VER
VAL
CM
PPQA
M&A
DAR
SSAM
ISM


PA SG1 SG2 SG3 SG4 GG
Level 5
Causal Analysis and Resolution
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
TACOM-ARDEC SWE
(Feb 15, 2002)
Fully Impl (S)
Largely Impl (SS)
Partialy Impl (SW)
Not Impl (W)
Satisfied
Not Satisfied
Improvement Activity