Accelerating CMMI Implementation with PSP and TSP in a Small Organization

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QuarkSoft, S.C.

SEPG 2005
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Agenda

Introduction

CMM Implementation Status

Approach to CMMI

Lessons Learned

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The Company

- Small start up company
- Core business: Outsourcing software development
- Committed to quality software development
- Created with PSP/TSP principles

- Focus on creating an organizational culture based on quality
- Management sponsorship and commitment since the creation of the company
- Strong interest on improvement not just for a CMM/CMMI rating

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PSP/TSP and SW-CMM [1]

Level	Focus	Key Process Areas (KPA)
5 Optimizing	**Continuous process improvement**	√**Defect prevention** √**Technology change management** √**Process change management**
4 Managed	**Product and process quality**	√**Quantitative process management** √**Software quality management**
3 Defined	**Engineering process**	√**Organization process focus** √**Organization process definition** Training program √**Integrated software management** √**Software product engineering** Intergroup coordination √**Peer reviews**
2 Repeatable	**Project management**	Requirements management √**Software project planning** √**Software project tracking** Software quality assurance Software configuration management Software subcontract management

√ indicates CMM key process areas that are fully or partially addressed at the personal level in the PSP

[1] *Adapted from Carnegie Mellon Software Engineering Institute (SEI)*

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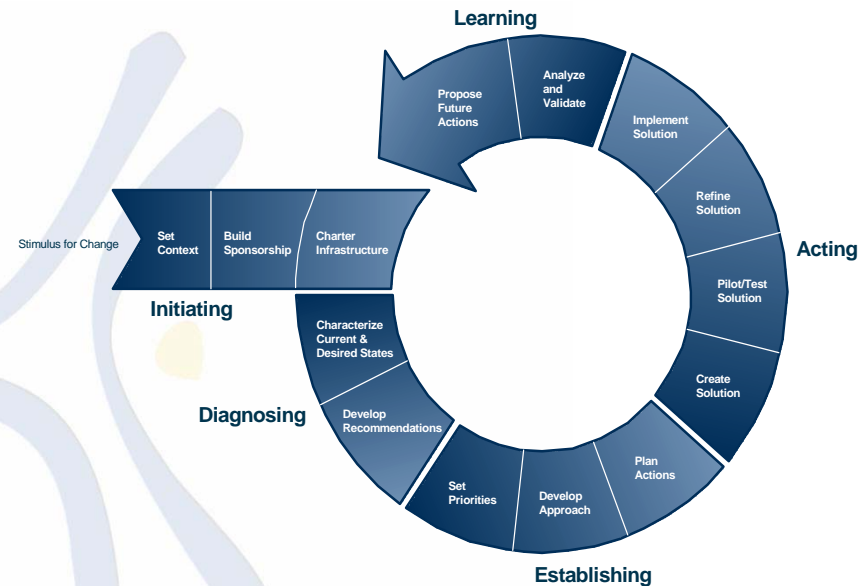
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Motivation

- Maintain a strong competitive position based on the ability to follow a mature process and produce quality products

- Consolidate PSP/TSP implementation

- Based on results from report: CMU/SEI-2002-TR-008 [2]

- Consolidate as a level 5 organization

[2] *Relating the Team Software Process (TSP) to the Capability Maturity Model for Software® (SW-CMM®), Davis, Noopur and McHale, Jim, CMU/SEI-2002-TR-008, ESC-TR-2002-008, June 2002*

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How we did it?

- Initially SW-CMM was the model chosen for SPI

- SEI's IDEAL^{SM} model used for planning and implementing SPI program
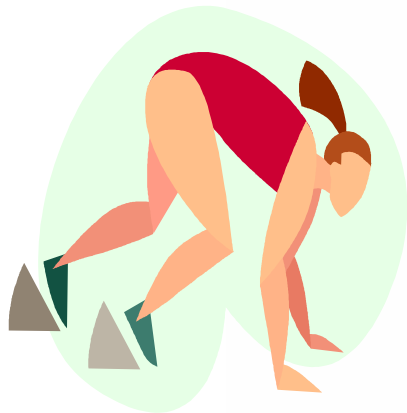
- PSP and TSP used for CMM implementation

- SEPG team: Two full-time persons

- TWG participation

Learning

Acting

Establishing

Diagnosing

Initiating

Stimulus for Change — Set Context — Build Sponsorship — Charter Infrastructure

Characterize Current & Desired States

Develop Recommendations

Set Priorities

Develop Approach

Plan Actions

Create Solution

Pilot/Test Solution

Refine Solution

Implement Solution

Analyze and Validate

Propose Future Actions

* CMU/SEI-96-HB-001
IDEAL: A User's Guide for Software Process Improvement

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SPI Timeline

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	2001		2002			2003		2004
PSP-TSP	05/01 First PSP trained group	06/01 TSP Project Launch						
CMM			04/02 SEPG officially started	05/02 Initial self-assessment	08/02 Executing action plan for CMM L2 gaps and TSP improvements	02/03 Final adjustments to CMM L2 Processes	02/03 Executing action plan for CMM L3 gaps	11/03 Final adjustments to CMM L3	03/04 CMM Level 3 Self-assessment
SEI TR-008			06/02 SEI-TR-008 Release					

SPI Implementation - Initiating

- **I**DEAL - Initiating
  - Inherent management sponsorship, support and commitment
  - TSP widely used
  - SEPG formed
  - TSP selected for planning and monitoring the SPI project
  - SPI high-level plan

Initiating

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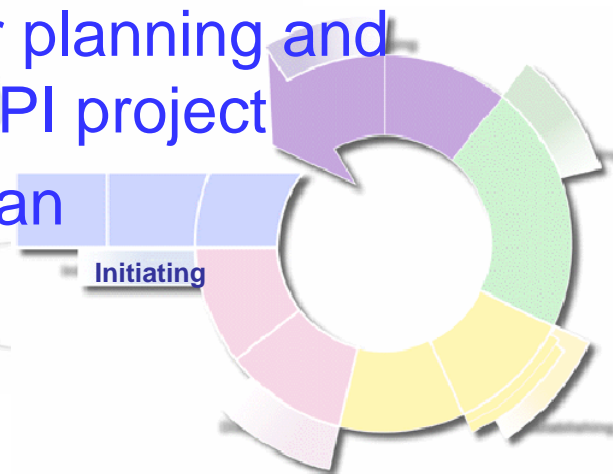
SPI Implementation – Diagnosing

- **ID**EAL - Diagnosing
  - Self-assessment completed
  - CMU/SEI-2002-TR-008 results considered
  - SPI plan refined
 - QuarkSoft's diagnostic recommendations and results

Diagnosing

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SPI Implementation – Establishing

- **IDEAL – Establishing**
  - Baseline findings and recommendations integrated into SPI plan
  - Implementation Strategy approved
  - Set priorities
  - SPI launch (TSP tailoring)
  - New SEPG members
    - SQA person (part-time)
   - Technical Working Groups (TWG) participation

Establishing

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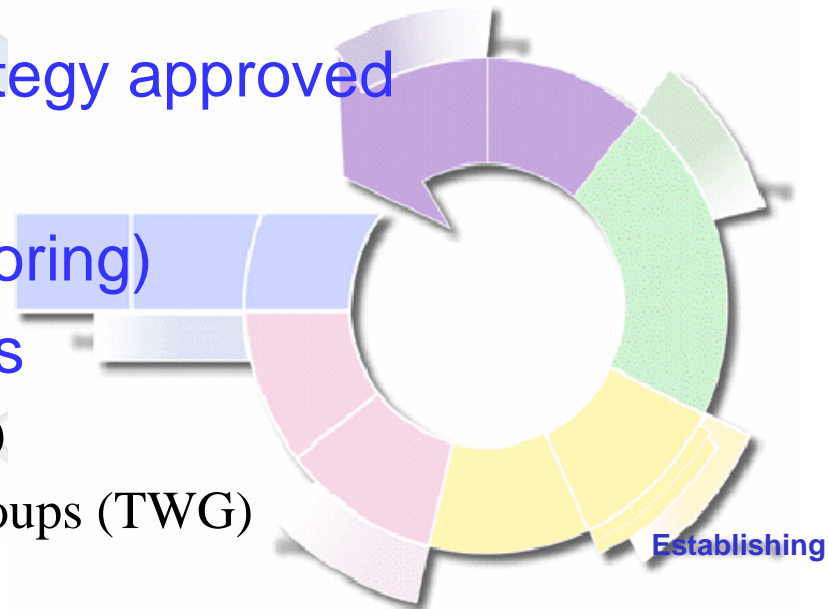
SPI Implementation – Acting

- **IDEAL** – Acting
  - Executing detailed plan obtained from SPI launch
    - Build up existing PSP/TSP processes
  - TWG's work coordinated by SEPG
  - Support from other organizational departments:
    - Human Resources person (HR)
    - Finance and accounting
  - Piloting of potential solutions on available SW projects
  - TSP help us identify a set of SPI standard tasks

Acting
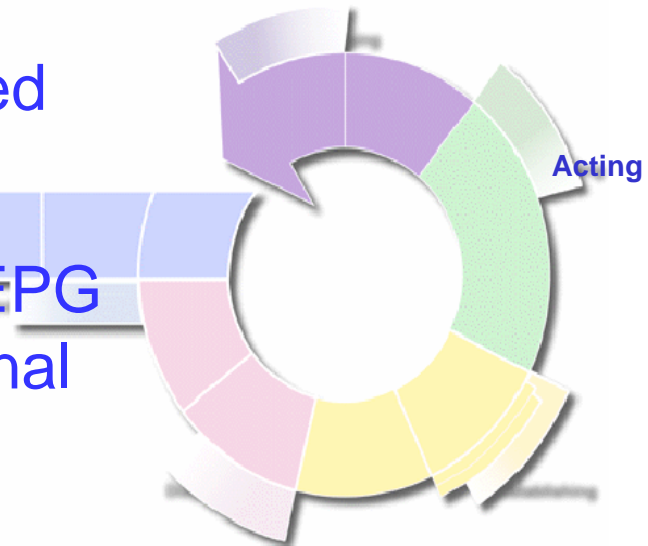
SPI Implementation – Learning

- ## IDEAL – Learning

  - Postmortems (TSP) were made on each SPI cycle

  - SPI estimation adjustment based on previous cycle results

  - Adjustments on TWG's plans and SPI task definitions

  - Requirements from different clients and small projects modified improvement plan

Learning

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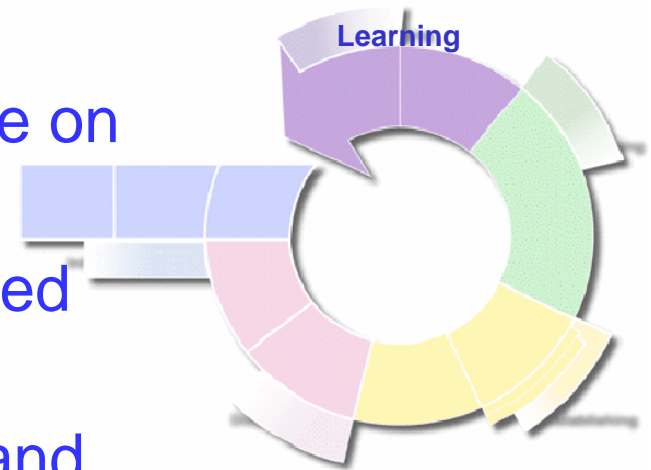
Implementation Issues

- TWGs
  - Participation facilitates process improvement adoption and acceptance
  - Different levels of experience
  - Management and coordination effort
- Planning of new process piloting is critical
- Tailoring of organizational practices for a small company is required
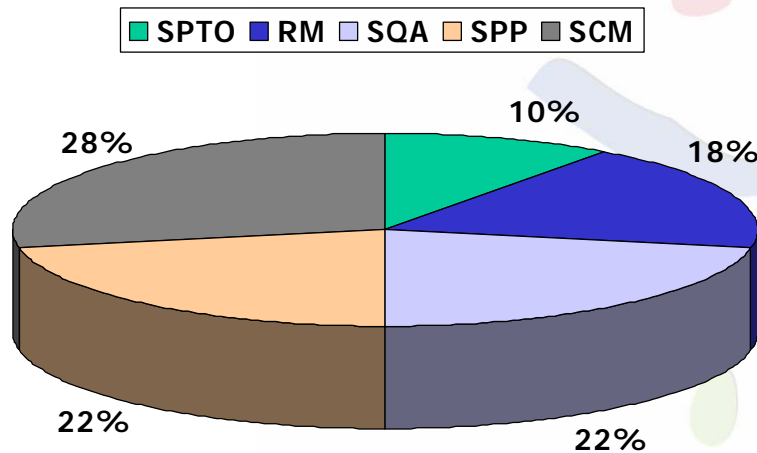
Results and TSP coverage - 1

- CMU/SEI-2002-TR-008 was an invaluable tool to define SPI strategy and action plan

- Most CMM implementation was at organizational level

- Adjustments and improvements on TSP implementation were required

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Results and TSP coverage - 2

- SW-CMM Level 2
  - On practice, TSP provided strong coverage of the practices required for SPP and SPTO KPAs
  - SPP KPA:
    - Due to business needs and project characteristics we allocate more effort to improve SPP practices
  - SQA KPA:
    - QS reinforced SQA practices with an organizational SQA but most of the SQA project activities are performed by TSP Quality Manager role
  - SCM KPA:
    - CCB was already implemented by TSP
    - TSP Support Manager role help to perform most SCM project practices
  - RM KPA:
    - Due to business needs and project characteristics we allocate more effort to improve RM practices
    - Customer Interface role helped with RM responsibilities

- SW-CMM Level 3
  - TSP facilitates the creation of the organization's software process database
  - Due to the organizational focus of L3 more work was required to achieve this level
  - PR KPA was strongly supported by TSP practices
  - TP KPA required considerable effort
  - IC KPA required practices from TSPm (multi-team)

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Results and TSP Coverage - 1

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SPI Effort for CMM-L2

Legend: ■ SPTO ■ RM □ SQA □ SPP ■ SCM

Pie chart values:
- 28%
- 10%
- 18%
- 22%
- 22%

* No need to develop **SSM**

* Based on TSP implementation and Organization Business needs

Bar chart legend:
- □ Not applicable
- □ Not addressed
- ■ Partially addressed
- ■ Fully addressed

Y-axis: Key Practices (0% – 100%)

X-axis categories: RM, SPP, SPTO, SQA, SCM — Key Process Areas
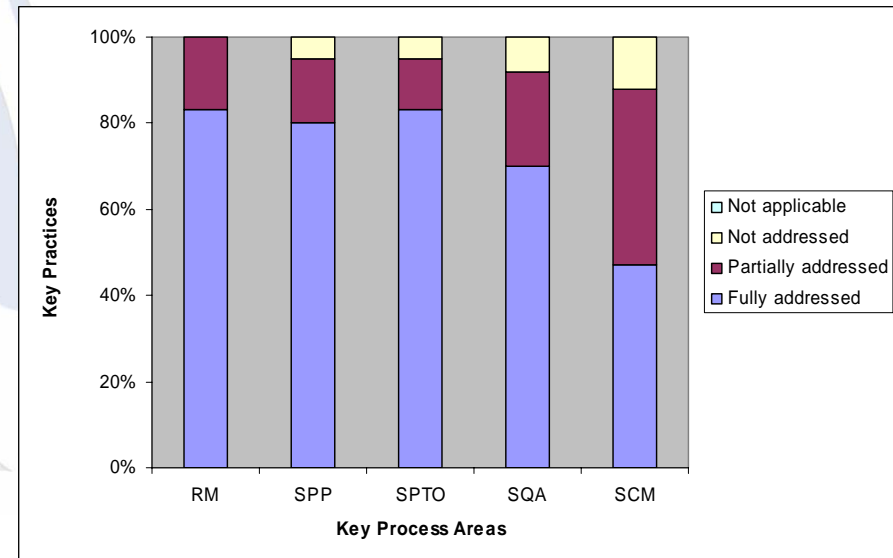
Project Key Practices Profile at Level 2 *

* From *CMU/SEI-2002-TR-008 report*

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Results and TSP Coverage - 2

SPI Effort for CMM-L3

* Based on TSP implementation and
Organization Business needs

Legend: **PR** **IC** **ISM** **TP** **SPE** **OPF** **OPD**

Pie chart values: 2%, 3%, 9%, 18%, 24%, 23%, 21%

Bar chart legend:
- Not applicable
- Not addressed
- Partially addressed
- Fully addressed
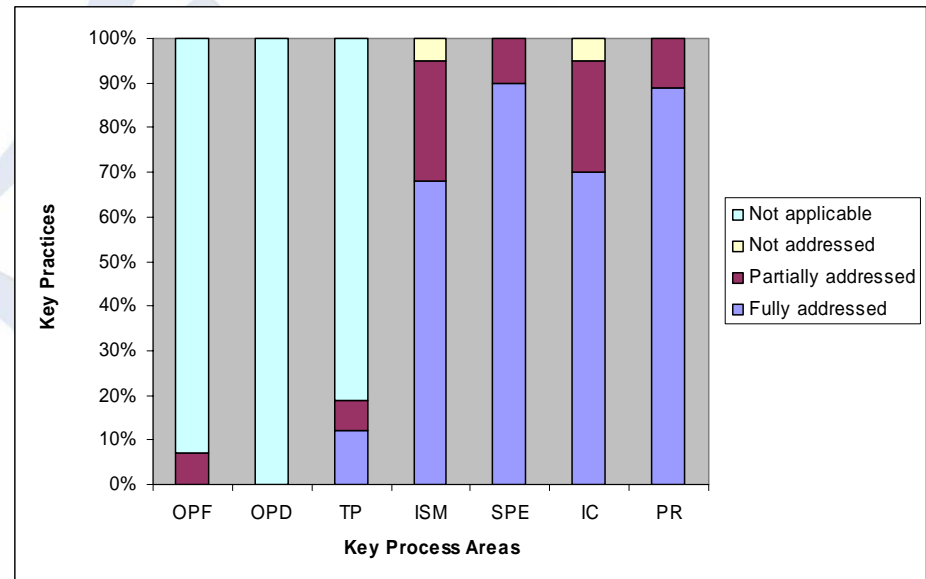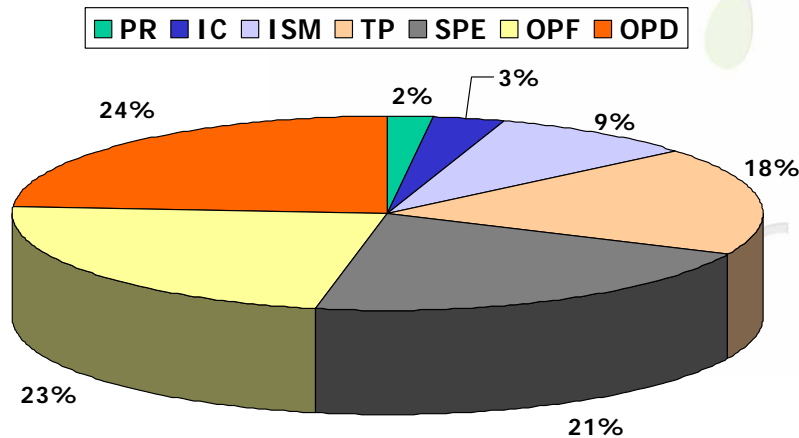
Project Key Practices Profile at Level 3 *

* From *CMU/SEI-2002-TR-008 report*

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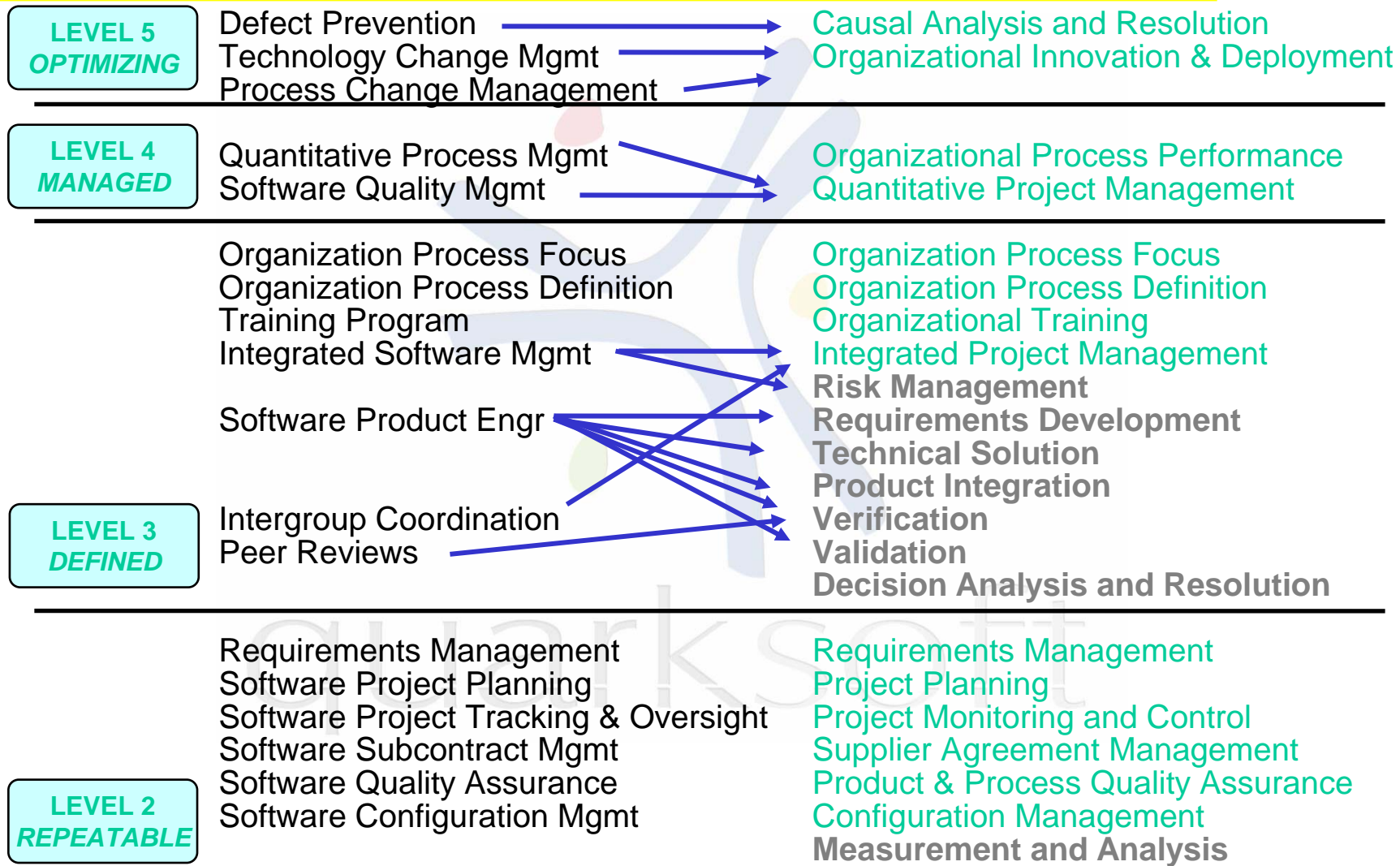CMM Implementation Status

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SW-CMM vs. CMMI [3]

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LEVEL 5 OPTIMIZING		
	Defect Prevention	→ Causal Analysis and Resolution
	Technology Change Mgmt	→ Organizational Innovation & Deployment
	Process Change Management	

LEVEL 4 MANAGED		
	Quantitative Process Mgmt	Organizational Process Performance
	Software Quality Mgmt	Quantitative Project Management

LEVEL 3 DEFINED

Organization Process Focus — Organization Process Focus
Organization Process Definition — Organization Process Definition
Training Program — Organizational Training
Integrated Software Mgmt — Integrated Project Management
Risk Management
Software Product Engr — **Requirements Development**
Technical Solution
Product Integration
Intergroup Coordination — **Verification**
Peer Reviews — **Validation**
Decision Analysis and Resolution

LEVEL 2 REPEATABLE

Requirements Management — Requirements Management
Software Project Planning — Project Planning
Software Project Tracking & Oversight — Project Monitoring and Control
Software Subcontract Mgmt — Supplier Agreement Management
Software Quality Assurance — Product & Process Quality Assurance
Software Configuration Mgmt — Configuration Management
Measurement and Analysis

[3] *Adapted from Carnegie Mellon Software Engineering Institute (SEI) M. Phillips*

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SPI Direction Change

- SPI project had completed CMM L2 and L3 processes improvements
- Some L3 improvements still required to be piloted
- Strategic Business needs
- SW-CMM sunset (2005)
- Limited resources for appraisals/assessments

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Strategy from CMM to CMMI

- QuarkSoft (QS) used SW-CMM L3 processes
- QS had an improved and a stronger TSP implementation
- Therefore, thinking on CMMI-L3 (staged representation) was natural
- But, CMMI training was required and as well as a detailed gap analysis between CMM-CMMI and TSP-CMMI
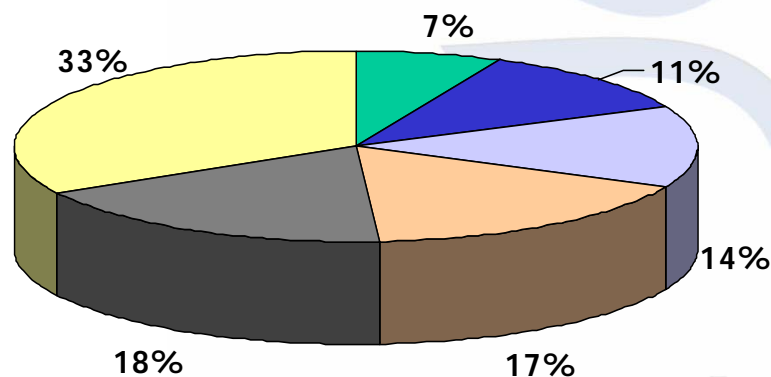- SCAMPI B before a SCAMPI A

TSP and CMMI Findings
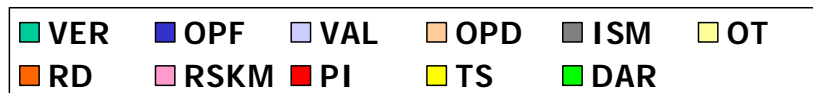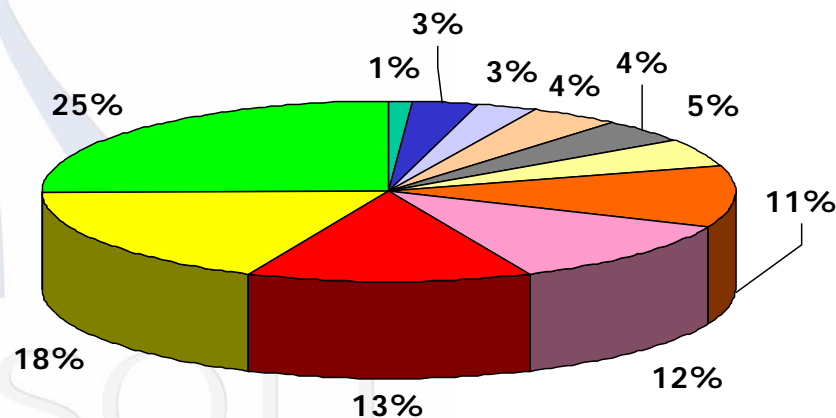
Estimated SPI Effort for
CMMI – L2 & L3

CMMI-L2

CMMI-L3

* No need to develop **SAM**

* No need to develop **IPPD**

* Based on TSP implementation and
Organization Business needs

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SEI TR-008				06/02 SEI-TR-008 Release								
CMMI						02/03 Analysis and Evaluation to move from CMM to CMMI			05/04 Decision to move from CMM to CMMI	07/04 CMMI strategy	10/04 - 11/04 SCAMBI B & C released	12/04 SCAMPI B at QS

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What did PSP/TSP provide?

- PSP and TSP help to build organizational quality culture

- TSP was the base of the organizational standard software process (QSSDP)

- Most processes at level 2

- Framework to guide and control SPI project

- TSP project roles fit very well with CMM/CMMI roles

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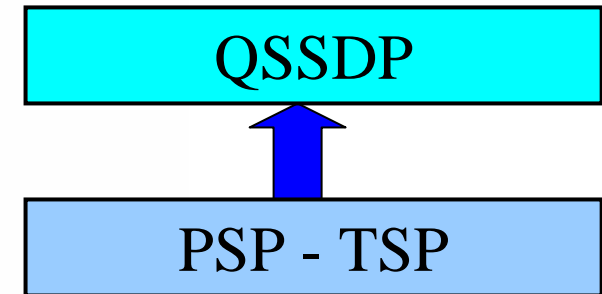
Lessons Learned - 1

- TSP is an important foundation to build OSSP
- PSP for engineers training was fundamental for CMM/CMMI implementation
- PSP/TSP training refreshments are required to maintain improvements
- TSP reduces change resistance
- TSP is useful to run any type of project, including an SPI project
- A better TSP tool is needed
- Pilot planning is essential to maintain the SPI initiative on time

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Lessons Learned - 2

- CMM and CMMI can be applied on small organizations but roles need to be tailored

- TSP has a good coverage of CMM/CMMI at project level

- Moving from CMM to CMMI seemed easy but has required considerable effort

- This experience shows that TSP actually accelerates CMM/CMMI implementation in a small setting

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