Mapping TSP℠ to CMMI®

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Three Reasons to Map

To evaluate

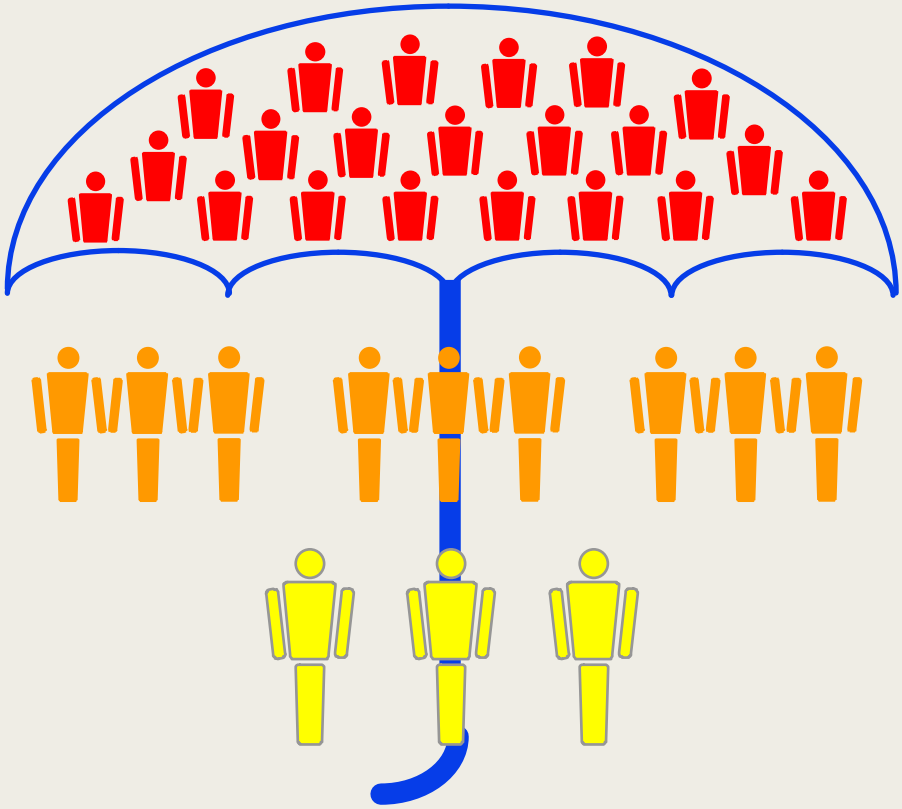
- what you do – practices
- why you want to change – goals
- how to make the change – process improvement

Compatible By Design

CMM/CMMI - *for organizational capability*

TSP - *for quality products on cost and schedule*

PSP - *for individual skill and discipline*



TSP to SW-CMM Mapping

The TSP initiative team at the SEI published results in a Technical Report (2002-TR-008) of an analysis of TSP practices relative to SW-CMM v.1.1.

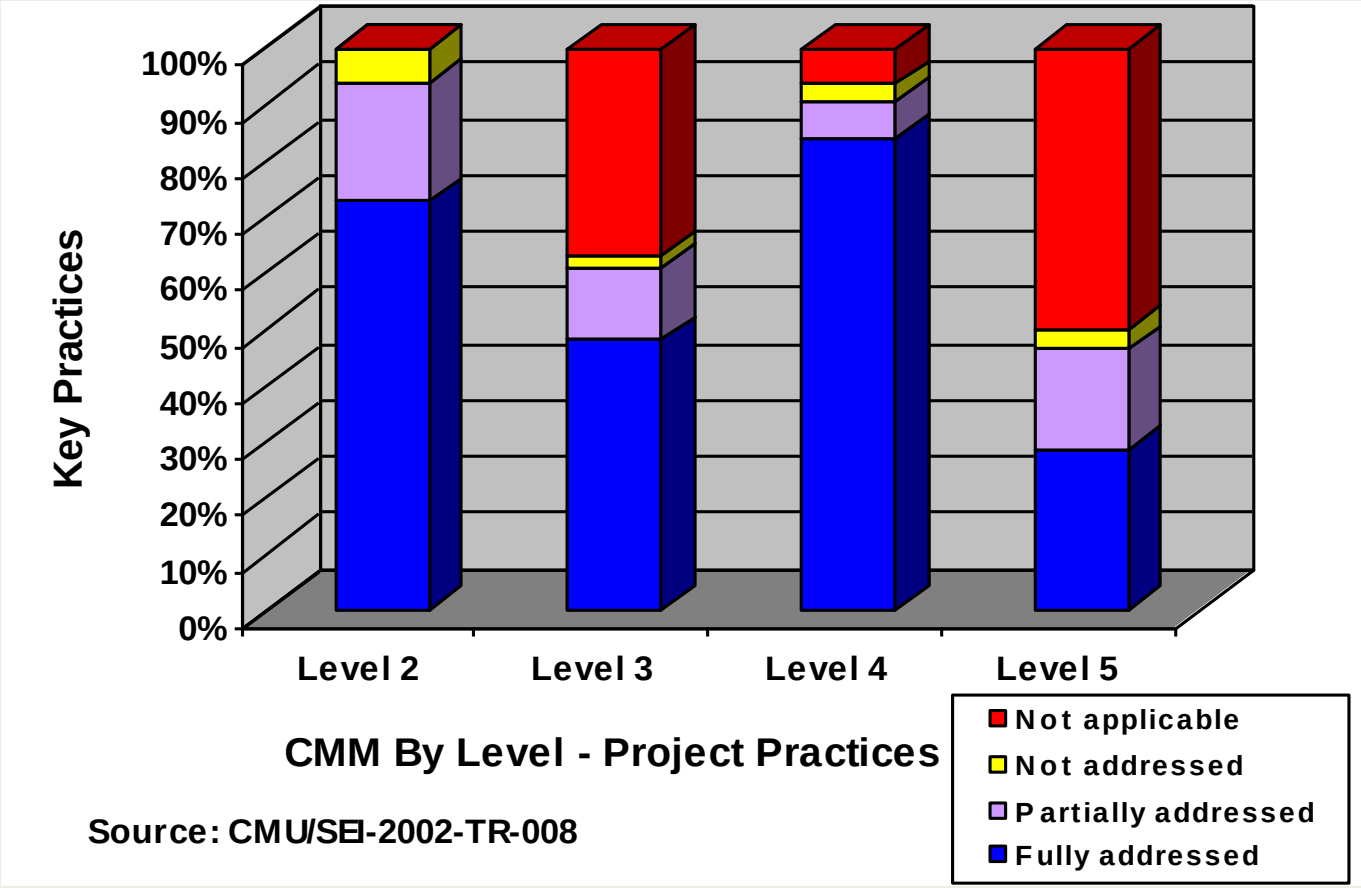
TR-008 assumed that

- an organization uses the SEI-recommended TSP introduction strategy
- all development teams in an organization were using TSP

Early TR-008 drafts were used by the engineering process groups (EPGs) at two government organizations to help guide their work.

*** CMU/SEI-2002-TR-008, Relating the TSP to the CMM for Software, Noopur Davis and Jim McHale, with Strategy and Overview by Watts Humphrey, March 2003.**

CMM-TSP Mapping Results



Source: CMU/SEI-2002-TR-008

Mapping TSP to CMMI

Starting points

- TSP 2001.07
- CMMI-SE/SW/IPPD v.1.1

Assumptions

- The organization followed the SEI-recommended introduction strategy.
- All teams with software development responsibilities are using TSP.

The effort is ongoing.

Project Management & Engineering

Project Management: All Specific Practices (SPs) fully or largely implemented.

- Supplier Agreement Management not rated
- one Integrated Project Management goal's SPs not rated due to the organizational assumption

Most Engineering process areas (PAs) are expected to be fully or largely implemented, even though

- most of the new PAs and practices are here
- TSP was developed based on the SW-CMM

Process Management & Support

Process Management: Most SPs are no more than partially implemented.

- enabling effect of TSP comparable to similar PAs in the CMM mapping
- reflects organizational nature of this process category

Support PAs expectations

- similar to CMM results for comparable areas (CM, PPQA, CAR*)
- favorable for measurement and analysis (MA) which are fundamental to PSP and TSP)
- wait for the data on others

* CM – configuration management, PPQA – product and process quality assurance, CAR – causal analysis and resolution

Generic Practices and PSP

The generic practices (GPs) and the PSP have much in common.

- a consistent set of improvement principles
- a structured, progressive framework for improvement
- independent of the domain

Most people do not think of the Personal **Software** Process as domain-independent.

The two-day *Introduction to Personal Process* was developed for TSP integrated team members who do not develop software.

TSP-to-CMMI Publications

SEI will publish a series of Special Reports (having limited distribution) over the next year.

Each SR will focus on one process category, and will include one or more real project case studies with TSP data.

A capstone Technical Report (unlimited distribution) will be published when confirming data become available.

Technical Notes will augment the SRs and TR.

- using TSP to launch an EPG
- mappings to Acquisition, Safety/Security practices
- mapping PSP training to the CMMI generic practices

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Fundamental Goals of CMM/CMMI

The original CMM goals have not changed with the CMMI.

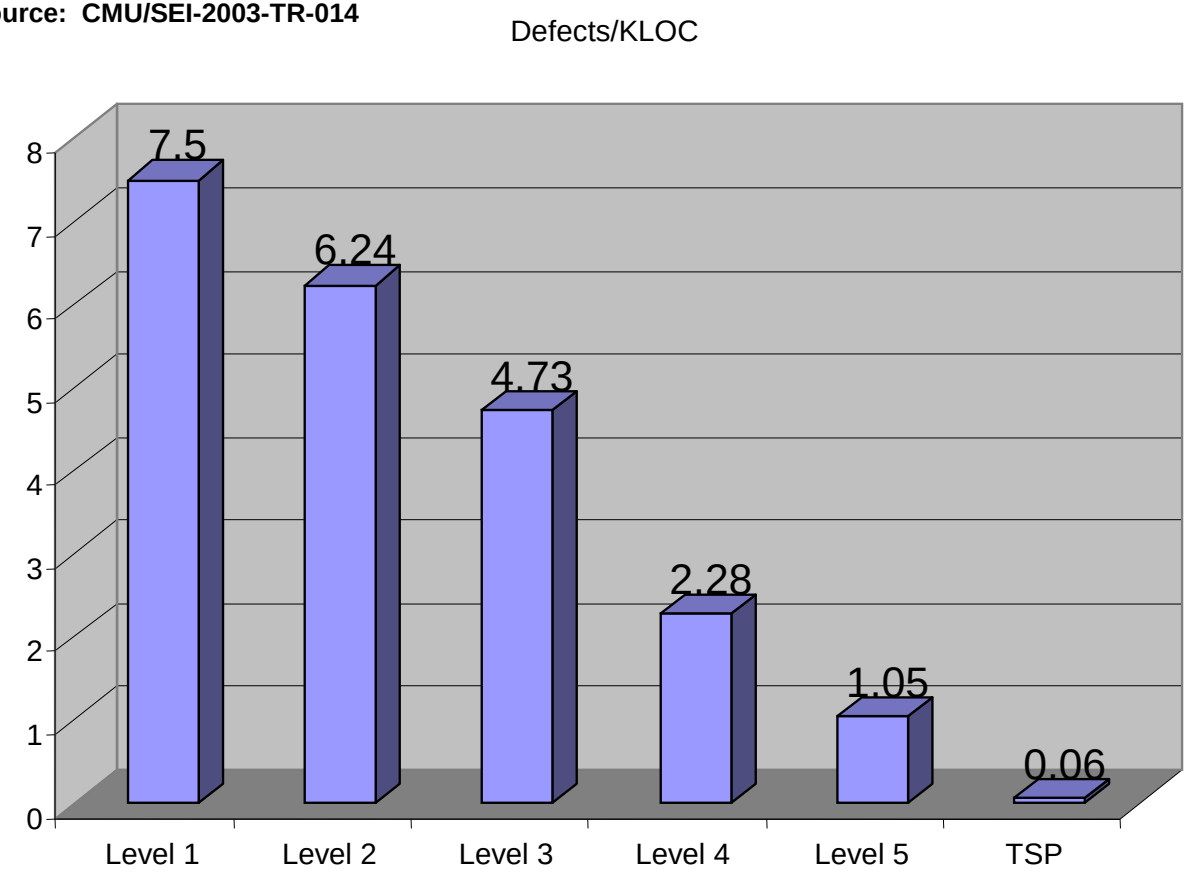
- produce quality products
- on committed schedules
- for the lowest possible costs

CMMI recognizes that these goals apply to the entire engineering life cycle, not just the software development life cycle.

PSP and TSP were designed to support CMM/CMMI goals at the individual and project team levels, respectively.

TSP Quality

Source: CMU/SEI-2003-TR-014



TSP By CMM/CMMI Goals

Category	TSP (2000)[1]	TSP (2003)[2]	Industry Baseline
Schedule Error	5% avg.	6% avg.	180% avg.
Effort Error	-4% avg.	26% avg.	130% avg.
System Test defects/KLOC	0 to 0.9	0.4 avg. 0 to 0.9	10 to 25 approx.
Released defects/KLOC	0 to 0.35	0.06 avg. 0 to 0.2	1 to 7 approx.

1. 18 projects in 4 organizations
2. 20 projects in 13 organizations

Source: CMU/SEI-2003-TR-014

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How Long Does Change Take?

For the SW-CMM (1992 to present)*

- ML1 to ML2: 22 months
- ML2 to ML3: 21 months
- ML3 to ML4: 25 months
- ML4 to ML5: 13 months

The recommended interval between assessments is 18 to 30 months (average 24.)

One should not infer that this is how long these changes should take.

*** Sourece: Process Maturity Profile, September 2003, at http://www.sei.cmu.edu/sema/pdf/SW-CMM/2003sepSwCMM.pdf**

A Thought Experiment

Hypothesis: Moving from one level to the next can take dramatically less than 24 months per level.

What would you need to do to move quickly up the maturity levels?

- choose methods compatible with the **full** model(s)
- use methods with proven results
- train and implement these methods in months or even weeks (not years)

Rapid Process Improvement

Goal: Achieve high maturity (ML 4 or 5) within the recommended evaluation window

Strategy

- Plan on implementing the whole model project by project (rather than across the organization by maturity level or by PA).
- Focus on delivering value to the organization (the best value is at higher maturities).
- Use proven methods with a large “footprint” with respect to the chosen model.
- Check progress frequently (use your map!).

TSP Results: NAVAIR AV-8B

March 2000	Began current CMM-based improvement effort
Oct. 2000	Began PSP/TSP introduction sequence
Jan. 2001	First TSP team launched
May 2001	CBA-IPI: CMM level 2; 3 KPAs satisfied at level 3; level 4/5 observations on TSP
June 2001	Received draft of CMM-TSP gap analysis (levels 2 and 3 only, minus SSM and TP) to help guide improvement efforts
Feb. 2002	Received late-model gap analysis (including TP at level 3 and levels 4 and 5)
June 2002	Launched second TSP team
Sep. 2002	CBA-IPI: CMM level 4 (16 months from L2!)

See Crosstalk, Sep. 2002, "AV-8B's Experiences Using the TSP to Accelerate SW-CMM Adoption," Dr. Bill Hefley, Jeff Schwalb, and Lisa Pracchia.

AV-8B CMMI Practice Profile

PA ->	RM	RD	TS	PI	VE	VAL	CM	PPQA	MA	CAR	DAR	OEI	OPD	OPF	OID	OT	OPP	PP	PMC	IPM	QPM	SAM	RSKM	IT
Specific Goal 1	U	FI	NR	S	S	S	S	S	U	U	NR	S	S	S	U	S	U	S	S	U	U	U	U	S
SP1.1	FI	FI	NR	FI	FI	FI	FI	FI	PI	PI	NR	FI	FI	FI	LI	FI	PI	FI	FI	FI	FI	FI	FI	FI
SP1.2	FI	FI	NR	FI	FI	FI	FI	FI	PI	PI	NR	FI	FI	FI	LI	FI	PI	FI	FI	FI	PI	FI	LI	FI
SP1.3	FI		FI	FI	FI	FI	FI		LI		NR	FI	FI	FI	FI	FI	FI	FI	FI	FI	PI	LI	FI	FI
SP1.4	PI								PI		NR		FI		FI	FI	LI	FI	FI	FI	FI			
SP1.5	FI										NR		FI				PI		FI	PI				
SP1.6											NR								FI					
SP1.7																			FI					
Specific Goal 2		S	NR	S	S	S	S	U	U	U		NR		U	U	U		S	S	NR	U	U	S	S
SP2.1		FI	FI	FI	FI	FI	FI	LI	LI	PI		PI		FI	FI	LI		FI	FI	NR	PI	NR	FI	FI
SP2.2		FI	FI	FI	FI	FI	FI	FI	LI	PI		NR		FI	FI	FI		FI	FI	FI	PI	LI	FI	FI
SP2.3		FI	FI		FI				PI	NR		PI		FI	LI	FI		FI	FI	FI	LI	FI		FI
SP2.4			NR						LI					LI				FI			LI	FI		FI
SP2.5																		FI						FI
SP2.6																		FI						
SP2.7																		FI						
SP2.8																								
Specific Goal 3		NR	S	S	S		S											S		S			S	
SP3.1		NR	FI	FI	FI		FI											FI		FI			FI	
SP3.2		FI	FI	FI	FI		FI											FI		FI			FI	
SP3.3		LI		FI														FI						
SP3.4		NR		FI																				
SP3.5		NR																						
Specific Goal 4																				S				
SP4.1																				FI				
SP4.2																				FI				
SP4.3																				FI				

PA ->	RM	RD	TS	PI	VE	VAL	CM	PPQA	MA	CAR	DAR	OEI	OPD	OPF	OID	OT	OPP	PP	PMC	IPM	QPM	SAM	RSKM	IT
Generic Goal 2	S						S	S	U									S	S			S		
Generic Goal 3	S	U	U	S	S	S	S	S	U	U	NR	NR	S	S	NR	S	U	S	S	S	S	S	S	S

LEGENDS

Practices

- FI Fully Implemented or Satisfied
- LI Largely Implemented
- PI Partially Implemented
- NI Not Implemented
- NR Not Rated

Goals

- S Satisfied
- U Unsatisfied (Goals)
- NR Not Rated

Some Lessons Learned

The models (SW-CMM and CMMI) really are compatible.

- It's very difficult to implement usable processes for one model and have them contradict the other.
- Worst case is implementing a SW-CMM practice that has reduced importance in CMMI (or vice versa).
- Focus on business and model goals and you can't go wrong.

Where model-based improvement efforts exist

- TSP speeds and quantifies improvement
- model-based efforts help TSP "stick"

TSP launch and tracking processes have been adapted for use by EPGs, QA and CM teams, and the TSP Initiative team at the SEI.

Available Training

- *TSP Executive Seminar*
- *Managing TSP Teams*
- *PSP for Engineers*
- *Introduction to Personal Process*
- *PSP Instructor Training*
- *TSP Launch Coach Training*

References

http://www.sei.cmu.edu/tsp/

The Team Software Process (TSP) in Practice: A Summary of Recent Results
CMU/SEI-2003-TR-014 (see also CMU/SEI-2000-TR-015)
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Noopur Davis, Jim McHale, with Strategy & Overview by Watts Humphrey

The Personal Software Process (PSP)
CMU/SEI-2000-TR-022
The Team Software Process (TSP)
CMU/SEI-2000-TR-023
Watts Humphrey

For More Information

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Contact a PSP or TSP transition partner

http://www.sei.cmu.edu/collaborating/partners/trans.part.psp.html

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