What the SEI Won't Teach You*

*Nothing to hide, just not their style.

**TOPICS**

▲ A brief history of the SEI and CMMI

▲ What the CMMI is and isn’t

▲ What the appraisal is and isn’t

▲ How the appraisal works

▲ How you need to qualify and prepare

▲ Typical SPI Plan

▲ Different macro-level ways to get everything set-up
A BRIEF HISTORY OF THE SEI AND CMMI

Well… it sounded like a good idea.

SEI

▲ Software Engineering Institute

▲ DOD Funded

▲ Standish Group Study ("Chaos Report")

▲ Carnegie Mellon University

▲ Beat U of MD in a Competition (GQM)
**SEI’s Purpose**

▲ STOP THIS:

▼ ~80% software projects fail

▼ ½ cancelled

▼ ½ are over budget and schedule by 2x and deliver <60% expected functionality

▼ ~20% succeed:

➢ <20% over budget and schedule and deliver >75% of expected functionality

---

**Brass Tacks**

▲ Software customers

▼ Paid *twice* as much

▼ Waited *twice* as long

▼ And Got *half* of what they expected

▲ And the DoD was **TIRED** of it!
CMMI

▲ Started out as CMM
   ▼ Capability
   ▼ Maturity
   ▼ Model

▲ Became SW-CMM when SEI introduced
   ▼ SE
   ▼ SA
   ▼ IPD
   ▼ P
   ▼ Security
NAME(s)
NOTWITHSTANDING

Goal of CMM/CMMI,
As organizations mature...

WHAT THE
CMMI
IS AND ISN’T

Definitions and Misconceptions
CMMI IS A FRAMEWORK

▲ Not a standard
▲ Not a prescription
▲ IS a description
▲ CANNOT be cookie cutter (and still work well)
▲ Does not require purchase of software or tools
▲ Meant for process **improvement**, not process **compliance**.

IMPROVEMENT VS. COMPLIANCE

▲ Process Compliance =

   *Do the process this way.*

▲ Process Improvement =

   *Do things that will make a difference to your company.*
**CMMI Structure**

▲ "Super-Structure"
  ▼ Representations
    ➢ Staged / Continuous
  ▼ Constellations
    ➢ DEV / ACG / SVC / ...
  ▼ Additions

▲ Categories
  ▼ Process Areas related to each other
    ➢ Engineering / Proj Mgmt / Proc Mgmt / Support

▲ Process Areas
  ▼ Specific Goals
    ➢ Specific Practices
  ▼ Generic Goals
    ➢ Generic Practices

**CMMI “Representations”**

▲ Staged
  ▼ Familiar levels…
  ▼ Do these cumulative \( m \) processes for level \( x \),
  Do these cumulative \( n \) processes for level \( y \)…
  ▼ Results in **Maturity Level Rating**

▲ Continuous
  ▼ New level structure
  ▼ Do your pick of processes to this extent for level \( p \),
  Do your pick of processes to this extent for level \( q \)…
  ▼ Results in a **Capability Level Rating**
“ADDITIONS” & 
CONSTELLATIONS

▲ Additions
▼ Currently, the only “additions” are for IPPD.
▼ Implementing IPPD was once done by including 2 
PAs and some goals.
▼ PAs denoted by “+”s
▼ In the future there may be other additions.

▲ Constellations
▼ Core PAs [16]
▼ Development [Currently the only one out.]
▼ Acquisition
▼ Services
▼ May be others in the future.

CMMI COMPONENTS

▲ Process Areas (PA)
▲ Specific Goals (SG)
▲ Specific Practices (SP)
▲ Generic Goals (GG)
▲ Generic Practices (GP)
Process Areas (PAs)

▲ There are 22 Process Areas in the entire CMMI.

▲ Each PA describes:
  ▼ One set of goals and practices that make up the process area: **Specific Goals** and **Specific Practices**
  ▼ And one set of practices that are shared across all process areas: **Generic Goals** and **Generic Practices**

Specific Goals (SG)

▲ Each Process Area has at least 1 Specific Goal

▲ All the Specific Practices are organized by which Specific Goal they help organizations achieve.

▲ The Goals are what organizations are required to pursue.

▲ The Practices are what organizations are expected to perform, but can be swapped with alternative practices.
**Specific Practices (SP)**

▲ What organizations are expected to actually do in order to achieve a Goal is described in some number of Specific Practices.

▲ Most Goals have several practices.

▲ The straightest line to achieving a goal is to perform the practices.

▲ The “straightest line” may a matter of perspective. Do not assume every practice is right for you.

---

**Generic Goals (GG)**

▲ Every Process Area has the same Generic Goals with “fill-in-the-blank” differences for each PA.

▲ Choice of “Staged” or “Continuous” representation determines which Generic Goals are required for a level rating.

▲ “Capability Level N” implies that you are performing all the SG/SPs in a PA + all the GPs in through GG N

▲ GGs imply how “deeply institutionalized” your practices are...
Generic Practices (GP)

▲ GPs in each GG describe what you’re doing to “institutionalize” the SGs and SPs.

▲ @ GG 1 you are barely executing the PA’s SPs from project to project.

▲ @ GG2 you are making a conscious effort to plan, track, and ensure the success of each PA’s SPs. It may look different from project to project, but you’re doing enough work each time to get it right.

GP Stuff Continued

▲ @ GG3 you have a single set of defined processes that each project uses and tailors to their specific instantiation. With a single set, you can now start to collect and feed-back improvement data on the processes.

▲ @ GG 4 you will be using the data in GG 3 to manage the processes using numbers, not just management oversight. “Quantitatively Managed”

▲ @ GG 5 you’re able to use computational methods to predict process performance, to anticipate process issues, and to create an environment in which you can really get creative with what you improve, how you improve, and when.
**Ratings Ingredients**

▲ Maturity Levels [Staged]

▼ Level X =
- All PAs in the LEVEL
- All SGs in the PA
  - All SPs in the SG
- All GGs in the PA
  - All the GPs in the GG

▲ Capability Levels [Continuous]

▼ Level X =
- All GG-Xs in the PAs you’ve chosen
  - All the GPs in the GG
- All the SP-Xs in the PAs you’ve chosen
  - SPs still do add up to SGs

**Confusing?**

**An Example: (Part 1)**

**Maturity Levels**

ML 5
- OPP
- QPM

ML 4
- OPF
- OPD+
- RSKM
- DAR

ML 3
- RD
- TS
- PI
- OT
- IPM+

ML 2
- REQM
- PP
- PMC
- MA
- SAM
- PPQA
- CM

ML 1
## Capability Levels

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**CL1**
- G_1: G_1
- G_2: G_2
- G_3: G_3
- G_4: G_4
- G_5: G_5
- G_6: G_6
- G_7: G_7
- G_8: G_8
- G_9: G_9
- G_10: G_10

**CL2**
- G_1: G_1
- G_2: G_2
- G_3: G_3
- G_4: G_4
- G_5: G_5
- G_6: G_6
- G_7: G_7
- G_8: G_8
- G_9: G_9
- G_10: G_10

**CL3**
- G_1: G_1
- G_2: G_2
- G_3: G_3
- G_4: G_4
- G_5: G_5
- G_6: G_6
- G_7: G_7
- G_8: G_8
- G_9: G_9
- G_10: G_10

**CL4**
- G_1: G_1
- G_2: G_2
- G_3: G_3
- G_4: G_4
- G_5: G_5
- G_6: G_6
- G_7: G_7
- G_8: G_8
- G_9: G_9
- G_10: G_10

**CL5**
- G_1: G_1
- G_2: G_2
- G_3: G_3
- G_4: G_4
- G_5: G_5
- G_6: G_6
- G_7: G_7
- G_8: G_8
- G_9: G_9
- G_10: G_10

---

### What the Appraisal Is and Isn’t

Certification?
RATINGS?

▲ You perform an APPRAISAL

▲ You get a RATING

▲ You **do not** get CERTIFIED

---

NOT ONE MORE SEAFOOD JOKE!

▲ SCAMPI

▲ **S** tandard

▲ **C** MMI

▲ **A** ppraisal

▲ **M** ethod

▲ **P** rocess

▲ **I** mprovement
EVEN THIS HAS A HIERARCHY

▲ ANSI/ISO 15504 (“SPICE”)

▲ Appraisal Requirements for CMMI

▲ SCAMPI Method Definition Document

▲ Appraisal Plan

▲ Appraisal Results

MORE ON WHAT IT IS AND IS NOT

▲ Not a Test

▲ Is a benchmark
  ▼ for where you are for yourselves,
  ▼ not relative to others

▲ Can be used for many purposes, not just ratings

▲ DOES NOT require special documentation

▲ DOES NOT intrinsically impose any tools or work(!)
**HOW THE APPRAISAL WORKS**

Appraisal Mechanics You Must Know

**LEVEL RATINGS, 1**

Process Area

Goal

Practice

Practice

Practice

Fully or Largely Implemented

Goal

Satisfied

Goal

Practice

Practice

Practice

Fully or Largely Implemented

Goal

Practice

Practice

Practice

Fully or Largely Implemented
Level Ratings, 2

Process Area
Goal
Practice
Practice
Practice

Partially or Not Implemented
Partially or Not Implemented
Partially or Not Implemented

NOT Satisfied

Goal
Practice
Practice
Practice

Goal
Practice
Practice
Practice

Level Ratings, 3

Process Area
Goal
Practice
Practice
Practice

Partially or Not Implemented

NOT Satisfied

Goal
Practice
Practice
Practice

Goal
Practice
Practice
Practice

Fully or Largely Implemented
Fully or Largely Implemented

Goal

Alternative Practice

Practice

Alternative Practice

Fully or Largely Implemented

Alternative practices must be qualified, and supported by Objective Evidence

HOW WE DETERMINE
FI, LI, PI AND NI

▲ Objective Evidence

▼ Direct Artifact

➢ Direct output of a process/practice,
  e.g., the process says “write a plan” and the DE is the plan

▼ Indirect Artifact

➢ Some item that clearly shows a process was being followed
  e.g., meeting minutes in which a process/practice was addressed

▼ Affirmations

➢ Verbal (written or oral) communication to the appraisal team that provides positive corroboration of a process.
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DEFINITIONS OF
FI, LI, PI (NI AND NR)

▲ Fully Implemented =
All required OE and no weaknesses

▲ Largely Implemented =
All required OE and qualified weaknesses, or consistency among weaknesses.

▲ Partially Implemented =
Missing OE and/or weaknesses that prevent the practice from being implemented.

WHAT’S A WEAKNESS?*

▲ Practices that are not, or are only partially, performed.

▲ Evidence that must be massaged to fit the expected practice, or, that you did it looks like a coincidence.

▲ Evidence that is out of synch with practices definitions.

▲ Evidence that looks like it was created for the appraisal.

*not a complete list
**Putting it all together**

- Objective Evidence (2 types) provide indicators of practice implementation.

- Goals are met when all projects are found to be performing (in aggregate) all practices.

- Process Areas are met when all goals are met.

- Level Ratings are “awarded” when all level requirements are met (i.e., PAs for MLs and SGs/GGs for CLs).

**Picture is worth...**

- Maturity / Capability Level
  - Process Area
  - Process Area
  - Process Area
  - Process Area

- Goal
  - Practice
  - Practice
  - Practice

- Satisfied
  - Fully or Largely Implemented
  - Practice
  - Practice
  - Practice

- Fully or Largely Implemented
  - Practice
  - Practice
  - Practice
A HIDDEN REALITY*

Compare:

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<td>Project 3</td>
<td>yellow</td>
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What does that tell you?

*WARNING: don’t make this your goal!
NOT SEI-Condoned!

HOW YOU NEED TO QUALIFY AND PREPARE

Are you ready? When are you ready? Should you bother?
**Basics**

▲ Have policies and processes.

▲ Follow them.

▲ Can show (objectively) that you follow them.

---

**Preparation Basics**

▲ Any company staff on the Appraisal Team **must** have completed an SEI-Licensed course of *Introduction to CMMI*

▼ [Team consists of a leader + 3 people]

▼ [Can include internal and external members]

▲ Team members (and leaders) must have certain minimum experience

▼ In Engineering, Management and Life Cycle

▼ Sticking junior staff on the team is not a good plan
MORE PREP

▲ Lead-in to the Appraisal includes:
   ▼ Readiness Review[s]
   ▼ Appraisal Team Training (not the same as “Intro…”)

▲ Lead Appraiser writes an Appraisal Plan
   ▼ Registers the appraisal with SEI

▲ These two slides outline what’s required by the SEI, not what may needed for YOU.

TYPICAL SPI PLAN

Getting Started to Getting Done
**Typical Road Map**

- **Gap Analysis**
  - Where are you relative to the CMMI?

- **Training**

- **Process Improvement**
  - Assuming you “ain’t all that”
  - Process creation and deployment

- **Process Institutionalization and Normalization**

- **Appraisal Prep**

**Factors that affect Time and Cost**

- Where you are w.r.t. CMMI? (i.e., Gap Analysis Results)

- How “process-oriented” is your company?

- How much work will your company do on its own?

- How much work will your company need help doing?

- How much progress do you think you’ll be able to make?

- How quickly?
STOP!

▲ You really must answer some questions of yourself before you even embark upon the SCAMPI journey.
▼ Why do you want one?
▼ Can your reason be justified in business goals?
▼ Can your business goals be qualified in ROI?
▼ If you're not the one who calls the shots, who is and will that person give you the resources to get through this successfully?

Opinion: The most common way is the worst way. The “path of least resistance” usually means you hit the wall faster.
**Process Silos**

- PAs in a vacuum.
- Each PA is self-contained in its own silo.
- For each PA instance, practices are planned, performed to its plan.
- Can be implemented w/out affecting 'real' work.
- Adds layers of process overhead & paperwork.
- Makes appraisers' jobs easier.
- Makes developers' jobs harder.
- Least “Institutionalization”

**A Word About the GPs**

- Generic Practices:
  - Establish an Organizational Policy & a Defined Process
  - Plan the Process
  - Provide Resources
  - Assign Responsibilities
  - Train People
  - Manage Configurations
  - Involve Stakeholders
  - Monitor & Control the Process
  - Objectively Evaluate Adherence & Collect Improvement Information
  - Review Status w/Higher Level Mgmt
GP Discussion

▲ Generic Practices
  ▼ Same in every PA
  ▼ Refer to the SPs of the respective PAs

▲ The Silo’d Approach:
  ▼ Is mechanical and simple (minded)
  ▼ Good for companies with lots of overhead
  ▼ Requires these be done for every project
  ▼ Often unrelated to:
    ➢ what the actual work is
    ➢ when the actual work is done
    ➢ when practices are used
  ▼ Most often, very disruptive
  ▼ Too easy to “get wrong”

In Our Opinion

Translating technology dollars into business sense™
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Instead...

Life Cycle Approach

Cascading Life Cycles™

CMMI Process Areas

Expectation/BizDev/Corporate Life Cycle

Engagement/Management/Technical Life Cycle (menu)

Daily Management

Process Flow-Down

Establishes that company projects will adhere to formal processes and states company’s policy for quality values, quality work, and how these align with the company’s mission and vision.

Outlines what company does to ensure on-time, on-budget, fully featured/functional projects.

Outlines the phases of every project © company and scopes activities and deliverables within each phase. Establishes each project’s parameters.

A menu of management or technical activities that each project can choose from as appropriate. Each project is required to identify a life cycle. This menu provides the list of what can be in a life cycle.

Specifies how projects are managed.
**Process Flow-Down (cont'd)**

- Policy
- Quality Manual
- Company Fulfillment Life Cycle
- Mgmt/Tech Life Cycle (menu)
- Daily Management

**Key Feature**

▲ Process definition//description documents define where in YOUR reality practices take place.
**What’s in the Quality Manual?**

▲ Explains how on each project, all company Processes:

- are planned-out and tailored from a single set of company processes
- are assigned as someone’s responsibility
- are provided resources to be done
- are assured of having people trained in them
- have their work products configuration controlled
- involve relevant stakeholders
- are monitored & controlled
- are objectively evaluated against applicable standards,
- have performance reviewed with higher management, and
- incorporate lessons learned for improvement

---

**Work-Product Generation**

Flowchart showing the process from Company Fulfillment Life Cycle, through Mgmt/Tech Life Cycle, Daily Management, to Templates, Mgmt/Tech Life Cycle, Tasks, Backlog...
**Work-Product Interactions**

- Templates
- Mgmt/Tech Life Cycle
- Filled-in on
- Tasks, Backlog, …
- Carries out

**Summary 2**

CMMI Happens Here:

- Requirements Management
- Project Planning
- Project Monitoring & Control
- Measurement & Analysis
- Process & Product Quality Assurance
- Configuration Management
- Templates
- Engineering Life Cycle
- Backlogs & Peer Reviews
WHAT’S NOT HERE

- Templates
- Engineering Life Cycle
- Backlogs & Peer Reviews

AT THE APPRAISAL

- Templates
- Engineering Life Cycle
- Backlogs & Peer Reviews

Process Implementation Indicator Descriptions come from here:
... AND WITH

▲ Keeping an eye on profit when designing processes.

▲ Ensures processes are not over-designed.

▲ Ensures processes are tied to business needs.

▲ Ensures processes affecting profit are included.

Benefits

▲ Uses realistic life cycles.

▲ Puts recurring practices in one place.

▲ Distributes practices into life cycles.

▲ Invokes relevant practices at their point of use.

▲ Causes \( \lim \Delta \delta[\text{productivity}] = 0 \)

▲ Most likely to still be in-place after a time = long-term ROI
Silver Lining?

▲ Less Disruption and More Productivity Requires:
   ▼ More up-front process design.
   ▼ Deep understanding of Company Context:
     ➢ Technology
     ➢ Processes/Practices
     ➢ Culture
     ➢ Project types and style
     ➢ Customers
   ▼ Deep understanding of CMMI.
   ▼ Deep understanding of SCAMPI process.
   ▼ More work by the appraiser.

▲ Lasting results and real ROI require real investment and real discipline.

Approach Summary

▲ Process Silos =
   Overlaying a process onto work you’re doing, thus adding overhead and disruption to productive/billable work. Increased production without necessarily increasing productivity.

▲ Cascading Life Cycles™ =
   Using the underlying processes you’re already doing and tweaking them [only as needed] to map them to CMMI. Where practices or alternatives aren’t done, they are not added as overhead, they’re added in line with productive work.
**Designed Process vs. Appraisal Prep**

▲ Designed Processes
- Lasting Benefits and ROI.
- Can be appraised repeatedly without re-inventing evidence.
- Requires up-front process engineering.
- Requires expertise in CMMI and company’s operations.
- Can cost more up-front.
- Establishes foundation of improvement.
- Appraisal simply looks at ordinary output of processes.

▲ Appraisal Prep
- Focused on getting through the appraisal (only).
- Short-term results.
- Requires less expertise.
- Can be cheaper (short term).
- Each appraisal requires renewed preparations.
- Staff perceives effort as “make work” with no value added.
- Difficult to connect appraisal results to actual improvements.
- Appraisal looks at data created just for the appraisal.

**We call it**

Agile CMMI®

CMMI® is a registered mark of the Software Engineering Institute

Translation technology dollars into business sense.
Costs

You always have to ask, don't you?

Reminder...

▲ Where you are w.r.t. CMMI? (i.e., Gap Analysis Results)

▲ How “process-oriented” is your company?

▲ How much work will your company do on its own?

▲ How much work will your company need help doing?

▲ How much progress do you think you'll be able to make?

▲ How quickly?
**Nonetheless...**

▲ Most Aggressive Scenario:*  
▼ Maturity Level 2 in 7 months  
▼ Maturity Level 3 in 10 months  
▼ * Assumes  
➢ Very process-oriented company  
➢ Minimal gap  
➢ Tight ship  
➢ Executive Imperative & Clear Business Need  
➢ Active Management Role  
➢ Dedicated Internal Project Leader  
➢ Persistent Consultant/Expert Involvement, 4-8 hours/week  
➢ NO DISRUPTIONS  
   (like actual project work and client needs)

**More Reasonable...**

▲ Aggressive Scenario:**  
▼ Maturity Level 2 in 9-12 months  
▼ Maturity Level 3 in 12-18 months  
▼ ** Assumes  
➢ Process-oriented company or internal process champions  
➢ Minimal-to-Moderate gap  
➢ Tight [enough] ship  
➢ Executive Sponsorship & Articulate Business Need  
➢ Active Management Role  
➢ Strong Part-Time Internal Project Leader  
➢ Persistent Consultant/Expert Involvement, 8+ hours/week  
➢ Minimal Disruptions
Most Reasonable...

Most Realistic Scenario:***
- Maturity Level 2 in 12+ months
- Maturity Level 3 in 18-24 months
- *** Assumes
  - Process-orientation is new concept to company culture
  - Typically significant gap and few true processes
  - Ad-hoc ship operations – projects just seem to “get done”
  - Executive Buy-In & Rational Business Need
  - Periodic and Event-driven Management Role
  - Part-Time Internal Project Contact
  - Persistent Consultant/Expert Involvement, 12+ hours/week
  - Ordinary Disruptions

Gap Analysis
How we run it & What we look for
How it Works

▲ Start w/a Kick-Off

▼ Explain what we’re up to and why

▼ Provide CMMI® Crash Course™ (if needed)

▼ Describe the Gap Analysis process

▼ Describe what the Gap Analysis leads-to

▼ On-site 1-4 days

Conduct Interviews

▲ Not focused as much on:

▼ ‘evidence’ as much as on existence or absence of practices

▼ Not focused as much on process areas as on practices

▲ Looking for your “hidden” processes.

▲ Starting the search for your underlying process architecture.
**Interviews to Find**

1. Do you have a written process that calls out a practice and is there indication that you follow it?

2. Are you performing a practice even though you don’t have it formally defined?

3. Neither 1 nor 2.

4. It’s not formal, and it’s not exactly “done” but if you talk a lot and we look in enough haystacks it starts looking like you’re doing it.

**Gap Analysis Outputs**

- ▲ Gap Analysis report
- ▲ Strategy
- ▲ Road Map
- ▲ Action Plan
- ▲ Cost Proposal
Questions?

It's QUESTION TIME!!

Don’t forget to write!

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