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 P-I Plan

▲ Different macro-level ways to get everything set-up
About You

- **What** is your name?
- **What** is your purpose?
- **What** is the airspeed velocity... never-mind..
- What is your knowledge/experience with CMMI?
- What would you like to get out of CMMI?
- What would you like to get out this session?
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
CMMI

▲ Capability
▲ Maturity
▲ Model
▲ Integration

P-CMM
SA-CMM
SE-CMM
IPD-CMM
Security-CMM
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 is:

A model for business process improvement for the management of development processes.
IT’S NOT WHAT IT’S NOT...

▲ CMMI is NOT:

A life cycle

for developing products

for the standards of

development processes.
Model Structure, Terminology and Actual Requirements
Improvement not Definition

▲ The *model* is not the *process*!
▲ CMMI is full of practices to IMPROVE your processes, not to DEFINE your processes.
▲ You likely have practices of your own in most/all process areas.
   ▼ Probably by other names.
   ▼ Likely generating their own appropriate work products.
▲ CMMI’s practices are meant to improve *those* activities.
▲ If you’re not doing an activity, it’s probably a good idea to be doing so anyway.
MODEL PRACTICES VS. YOUR PRACTICES

YOUR practices for DOING activities of a given process area

CMMI’s practices for IMPROVING activities of a given process area

Diagrams not to scale.
CMMI Structure

“Super-Structure”
- Constellations
  - Development / Acquisition / Service
- Representations
  - Staged / Continuous
- Additions

Categories
- Process Areas related to each other
  - Engineering / Project Management / Process Management / Support
CMMI Structure (Focus)

▲ Process Areas

▼ Specific Goals
- Specific Practices

▼ Generic Goals
- Generic Practices

Required

Expected
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
  ▼ Acquisition
  ▼ Services
  ▼ May be others in the future.

(Currently the only ones published.)
Representations: The PA Mix

▲ Process improvement path

or

▲ Level ratings

▲ Representations:
  ▼ How you mix and match the choice of PAs, and
  ▼ How you plan to grow your capability and maturity.

▲ Growing Maturity = # of PAs
▲ Growing Capability = Depth of Institutionalization
What is Institutionalization?

▲ Let’s talk about products and projects for a moment.

▲ You’re the PM.

▲ What would be expected of you to manage the product/project?

▼ ...

▼ ...

▼ ...

▼ ...

▼ ...

▼ ...

▲ We like to call it **acculturation**
CMMI Components

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

Maturity*

Capability/Institutionalization/(Acculturation)

*Not strictly speaking
Process Areas (PAs)

▲ There are 22 Process Areas in the entire CMMI-Dev.

▲ 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.

▲ While the Practices are what organizations are expected to perform, they 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.

▲ @ GG 2 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.
What’s “Required”?

▲ Goals are **required**

▲ Practices are **expected** not required

▼ You’ve ‘got’ to be doing “something” to be achieving a goal.

▼ If you don’t already have good ideas for how to achieve a goal, the practices are a good place to start.

▲ Everything else is “commentary”

▼ Which can be helpful if the goals or practices aren’t self-explanatory.

▲ *Don’t assume you and CMMI use terms the same way.*
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 GGs
Ratings Ingredients, 2

▲ 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
Ratings Implications

▲ Saying “ML” 2, 3, etc. carries clear implications.
  ▼ People who know, know which PAs and GGs you are performing.

▲ Saying “CL” 2, 3, etc. is incomplete.
  ▼ Must be qualified by stating which PAs you are CLx in.
Confusing?

An Example: (part 1)

Maturity Levels

ML 1
- REQM
- PP
- PMC
- MA
- SAM
- PPQA
- CM

ML 2
- RD
- TS
- PI
- VER
- VAL

ML 3
- OPF
- OPD+
- OT
- DAR

ML 4
- IPPM+
- RSKM

ML 5
- OID
- CAR
## Confusing?
### An Example: (Part 2)

### Capability Levels

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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
SEI Eats its own Dog food

- 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

Satisfied

Goal

Goal

Practice

Practice

Practice

Fully or Largely Implemented

Fully or Largely Implemented

Fully or Largely Implemented
Level Ratings, 2

Process Area

Goal

NOT Satisfied

Goal

Goal

Goal

Practice

Practice

Practice

Practice

Practice

Practice

Practice

Practice

Practice

Practice

Practice

Practice

Practice

Practice

Partially or Not Implemented

Partially or Not Implemented

Partially or Not Implemented

Partially or Not Implemented

Partially or Not Implemented
Level Ratings, 3

Process Area

Goal*

Practice
Practice
Practice

Partially or Not Implemented

Goal

Practice
Practice
Practice

Fully or Largely Implemented

Goal

Practice
Practice
Practice

Fully or Largely Implemented

NOT Satisfied
Goal

Alternative Practice → Fully or Largely Implemented
Alternative Practice

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.
### FI, LI, PI and NI

<table>
<thead>
<tr>
<th>Goal</th>
<th>Practice</th>
<th>Project 1</th>
<th>Project 2</th>
<th>Project 3</th>
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<tr>
<td>Practice</td>
<td>Project 3</td>
<td></td>
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</tbody>
</table>

**Goals are just**

- **LI**
- **or**
- **FI**

**Can only be LI**

- **FI**

**Can’t be FI**

- Could be PI

**Can only be LI**
Minimum Objective Evidence

1 Direct Artifact

+ 

1 Indirect Artifact or 1 Affirmation

(with a calculated minimum # of affirmations)
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
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.
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.
Getting Started to Getting Done
Typical Road Map

▲ Gap Analysis
   ▼ Where are you relative to the CMMI?

▲ Training/Knowledge Transfer

▲ 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
Instead...

Life Cycle Approach

Cascading Life Cycles™

Expectation/BizDev/Corporate Life Cycle

Engagement/Management/Technical Life Cycle (menu)

Daily Management

CMMI Process Areas
Process Flow-Down

Policy

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.

Quality Manual

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

Expectation/Corp /BizDev Fulfillment Life Cycle

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

Engagement/ Mgmt/Tech Life Cycle (menu)

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.

Daily Management

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

Particular Process Area Process Policies

Particular Process Area Process Descriptions

Policy

Quality Manual

Company Fulfillment Life Cycle

Mgmt/Tech Life Cycle (menu)

Daily Management

Satisfy

Practices Found In, and Goals Satisfied By

Execute

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Key Feature

Process definition/description documents define where in YOUR reality practices take place.

- CMMI Process Areas
  - Particular Process Area Process Descriptions
  - Expectation/BizDev/Corporate Life Cycle
    - Engagement/Management/Technical Life Cycle (menu)
    - Daily Management
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

Company Fulfillment Life Cycle

Mgmt/ Tech Life Cycle (menu)

Daily Management

Templates

Mgmt/ Tech Life Cycle

Tasks, Backlog...

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Work-Product Interactions

Templates

Mgmt/ Tech Life Cycle

Tasks, Backlog, ...

Filled-in on

Carries out
**Summary 2**

**CMMI**
- Requirements Management
- Project Planning
- Project Monitoring & Control
- Measurement & Analysis
- Process & Product Quality Assurance
- Configuration Management

**Happens Here:**
- Templates
- Engineering Life Cycle
- Backlogs & Peer Reviews

**CMMI Happens Here:**
What’s Not Here

- Particular Process Area Process Descriptions
- Templates
- Engineering Life Cycle
- Backlogs & Peer Reviews
At the Appraisalal

Templates

Process Implementation Indicator Descriptions come from here:

Engineering Life Cycle

Backlogs & Peer Reviews
... 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 $\lim_{\Delta \to 0} \text{(productivity)} = 0$.

▲ 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** = *Chasing the Needle*, or Overlaying a process onto work you’re doing for the purposes of generating evidence, thus adding overhead and disruption to productive/billable work. Increased production without necessarily increasing productivity.

▲ **Cascading Life Cycles™** = *Designed Processes*, or Mapping your “reality” to CMMI. Wherever practices or alternatives aren’t done, they are added consistent with value-added productive work.
**Designed Process vs. “Chasing the Needle”**

### 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.

### Chasing the Needle
- 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” w/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®
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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