CMMI for Development V2.0: Outline View
INTRODUCTION

This document contains an outline of the CMMI for Development V2.0 model view Practices, organized by Category, Capability Area, and Practice Area. Within each Practice Area, this outline contains only the intent statement of the PA and a summary table of the practice statements.

NOTE: This outline alone will not provide enough information to understand or interpret the model content accurately or consistently.
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**Category: Doing**

**Capability Area: Ensuring Quality (ENQ)**

**REQUIREMENTS DEVELOPMENT AND MAINTENANCE (RDM)**

Elicit requirements, ensure common understanding by stakeholders, and align requirements, plans, and work products.

**Level 1**

1.1 Record requirements.

**Level 2**

2.1 Elicit stakeholder needs, expectations, constraints, and interfaces or connections.
2.2 Transform stakeholder needs, expectations, constraints, and interfaces or connections into prioritized customer requirements.
2.3 Develop an understanding with the requirements providers on the meaning of the requirements.
2.4 Obtain commitment from work effort participants that they can address the requirements.
2.5 Develop, record, and maintain bidirectional traceability among requirements, activities, and work products.
2.6 Ensure that plans, activities, and work products remain consistent with requirements.

**Level 3**

3.1 Develop and keep updated requirements for the solution and its components in accordance with the organizational process.
3.2 Develop operational concepts and scenarios.
3.3 Allocate the requirements to be implemented.
3.4 Identify, develop, and keep updated interface or connection requirements.
3.5 Ensure that requirements are necessary and sufficient.
3.6 Balance stakeholder needs and constraints.
3.7 Validate requirements to ensure the resulting solution will perform as intended in the target environment.
PROCESS QUALITY ASSURANCE (PQA)

Verify and enable improvement of the quality of the performed processes and resulting work products.

Level 1

1.1 Identify and address process and work product issues.

Level 2

2.1 Develop, keep updated, and follow a quality assurance approach and plan based on historical quality data.
2.2 Throughout the work effort, objectively evaluate selected performed processes and work products against the recorded process.
2.3 Communicate quality and non-compliance issues and ensure their resolution.
2.4 Record and use results of quality assurance activities.

Level 3

3.1 Identify and record opportunities for improvement during quality assurance activities.

VERIFICATION AND VALIDATION (VV)

Implementation will:

- Verify that selected solutions and components meet their requirements
- Validate that selected solutions and components fulfill their intended use in their target environment

Level 1

1.1 Perform verification to ensure the requirements are implemented and record and communicate results.
1.2 Perform validation to ensure the solution will function as intended in its target environment and record and communicate results.

Level 2

2.1 Select components and methods for verification and validation.
2.2 Develop, keep updated, and use the environment needed to support verification and validation.
2.3 Develop, keep updated, and follow procedures for verification and validation.

Level 3

3.1 Develop, keep updated, and use criteria for verification and validation.
3.2 Analyze and communicate verification and validation results.
PEER REVIEWS (PR)

Identify and address work product issues through reviews by the producer’s peers or subject matter experts (SMEs).

Level 1
  1.1 Perform reviews of work products and record issues.

Level 2
  2.1 Develop and keep updated procedures and supporting materials used to prepare for and perform peer reviews.
  2.2 Select work products to be peer reviewed.
  2.3 Prepare and perform peer reviews on selected work products using established procedures.
  2.4 Resolve issues resulting from peer reviews.

Level 3
  3.1 Analyze results from peer reviews.

Capability Area: Engineering and Developing Products (EDP)

TECHNICAL SOLUTION (TS)

Provides a cost-effective design and solution that meets customer requirements and reduces rework.

Level 1
  1.1 Build a solution to meet requirements.

Level 2
  2.1 Design and build a solution to meet requirements.
  2.2 Evaluate the design and address identified issues.
  2.3 Provide guidance on use of the solution.

Level 3
  3.1 Develop criteria for design decisions.
  3.2 Develop alternative solutions for selected components.
  3.3 Perform a build, buy, or reuse analysis.
  3.4 Select solutions based on design criteria.
  3.5 Develop, keep updated, and use information needed to implement the design.
  3.6 Design solution interfaces or connections using established criteria.
PRODUCT INTEGRATION (PI)
Assemble and deliver the solution that addresses functionality and quality characteristics.

**Level 1**
1.1 Assemble solutions and deliver to the customer.

**Level 2**
2.1 Develop, keep updated, and follow an integration strategy.
2.2 Develop, keep updated, and use the integration environment.
2.3 Develop, keep updated, and follow procedures and criteria for integrating solutions and components.
2.4 Evaluate assembled components to ensure conformance to the solution’s requirements and design.
2.5 Confirm, prior to assembly, that each component has been properly identified and operates according to its requirements and design.
2.6 Assemble solutions and components according to the integration strategy.

**Level 3**
3.1 Review and keep updated interface or connection descriptions for coverage, completeness, and consistency throughout the solution’s life.
3.2 Confirm, prior to assembly, that component interfaces or connections comply with interface or connection descriptions.
3.3 Evaluate assembled components for interface or connection compatibility.

**Capability Area: Selecting and Managing Suppliers (SMS)**

**SUPPLIER AND AGREEMENT MANAGEMENT (SAM)**
Establish an agreement with suppliers. Ensure that the supplier and the acquirer perform according to the terms of the supplier agreement. Over the course of the agreement, evaluate the supplier’s technical solution.

**Level 1**
1.1 Develop and record the supplier agreement.
1.2 Accept or reject the solution.
1.3 Pay supplier invoices.
Level 2

2.1 Develop, record, monitor, and keep the supplier agreement updated.
2.2 Perform activities as specified in the supplier agreement.
2.3 Verify that the supplier agreement is satisfied before accepting the acquired solution.
2.4 Manage invoices submitted by the supplier to ensure supplier agreements are met.

Level 3

3.1 Select supplier technical solutions to be analyzed and conduct technical reviews.
3.2 Select and monitor supplier processes based on criteria in the supplier agreement.

Level 4

4.1 Select measures and analytic techniques to quantitatively manage supplier performance to achieve quality and process performance objectives.
Category: Managing

Capability Area: Planning and Managing Work (PMW)

ESTIMATING (EST)
Estimate the size, effort, duration, and cost of the work and resources needed to develop, acquire, or deliver the solution.

**Level 1**
1.1 Develop a rough order of magnitude estimate.

**Level 2**
2.1 Develop and keep updated the scope of what is being estimated.
2.2 Develop and keep updated estimates for the size of the solution.
2.3 Based on size estimates, derive effort, duration, and cost estimates for the solution.
2.4 Record rationale for the estimates.

**Level 3**
3.1 Develop and keep updated a recorded estimation method.
3.2 Use the organizational measurement repository and process assets for estimating work.

PLANNING (PLAN)
Planning includes developing budget and schedules based on estimates; developing and getting commitment to the work plan; and determining the necessary resources.

**Level 1**
1.1 Develop a list of tasks.
1.2 Assign people to tasks.

**Level 2**
2.1 Develop and keep updated the approach for accomplishing the work.
2.2 Plan for the knowledge and skills needed to perform the work.
2.3 Based on recorded estimates, develop and keep updated the budget and schedule.
2.4 Plan the involvement of identified stakeholders.
2.5 Plan transition to operations and support.
2.6 Ensure plans are feasible by reconciling available and estimated resources.
2.7 Develop the work plan, ensure consistency among its elements, and keep it updated.
2.8 Review plans and obtain commitments from affected stakeholders.
Monitor and Control (MC)

Level 3
3.1 Develop and keep updated the defined work process by using the organization’s set of standard processes and tailoring guidelines.
3.2 Plan work using the defined work process, the organization’s process assets, and the measurement repository.
3.3 Identify and negotiate critical dependencies.
3.4 Develop and keep updated the work environment based on the organization’s standards.

Level 4
4.1 Develop and keep updated a defined work process that enables achievement of the quality and process performance objectives, using statistical and other quantitative techniques.

MONITOR AND CONTROL (MC)

Provide an understanding of the work progress so appropriate corrective actions can be taken when performance deviates significantly from plans.

Level 1
1.1 Identify task completions.
1.2 Resolve issues.

Level 2
2.1 Track actual results against estimates for size, effort, schedule, resources, knowledge and skills, and budget.
2.2 Track the involvement of identified stakeholders and commitments.
2.3 Monitor the transition to operations and support.
2.4 Take corrective actions when actual results differ significantly from planned results and manage to closure.

Level 3
3.1 Manage the work effort using the work plan and the defined work process.
3.2 Manage the critical work dependencies and activities.
3.3 Monitor the work environment to identify issues.
3.4 Manage and resolve issues with affected stakeholders.
Capability Area: Managing Business Resilience (MBR)

RISK MANAGEMENT (RSK)
Identify, record, and analyze potential problems and opportunities and manage them.

Level 1
1.1 Identify, record, and keep updated risks.

Level 2
2.1 Analyze identified risks.
2.2 Monitor identified risks and communicate status to affected stakeholders.

Level 3
3.1 Identify and use risk categories.
3.2 Define and use parameters for risk analysis and handling.
3.3 Develop and keep updated a risk management strategy.
3.4 Develop and keep updated risk management plans.
3.5 Manage risks by implementing the planned risk management activities.

Capability Area: Managing the Workforce (MWF)

ORGANIZATIONAL TRAINING (OT)
Develop the skills and knowledge of personnel to perform their roles effectively and efficiently.

Level 1
1.1 Train people.

Level 2
2.1 Identify training needs.
2.2 Train personnel and keep records.

Level 3
3.1 Develop and keep updated the organization’s strategic and short-term training needs.
3.2 Coordinate training needs and delivery between the work effort and the organization.
3.3 Develop, keep updated, and follow organizational strategic and short-term training plans.
3.4 Develop, keep updated, and use a training capability to address organizational training needs.
3.5 Assess the effectiveness of the organization’s training program.
3.6 Record, keep updated, and use the set of organizational training records.
Category: Enabling

Capability Area: Supporting Implementation (SI)

CAUSAL ANALYSIS AND RESOLUTION (CAR)

Identify causes of selected outcomes and take action to either prevent recurrence of undesirable outcomes or ensure recurrence of positive outcomes.

Level 1
1.1 Identify and address causes of selected outcomes.

Level 2
2.1 Select outcomes for analysis.
2.2 Analyze and address causes of outcomes.

Level 3
3.1 Determine root causes of selected outcomes by following an organizational process.
3.2 Propose actions to address identified root causes.
3.3 Implement selected action proposals.
3.4 Record causal analysis and resolution data.
3.5 Submit improvement proposals for changes proven to be effective.

Level 4
4.1 Perform root cause analysis of selected outcomes using statistical and other quantitative techniques.
4.2 Evaluate the effect of implemented actions on process performance using statistical and other quantitative techniques.

Level 5
5.1 Use statistical and other quantitative techniques to evaluate other solutions and processes to determine if the resolution should be applied.

DECISION ANALYSIS AND RESOLUTION (DAR)

Make and record decisions using a recorded process that analyzes alternatives.

Level 1
1.1 Define and record the alternatives.
1.2 Make and record the decision.
Level 2

2.1 Develop, keep updated, and use rules to determine when to follow a recorded process for criteria-based decisions.
2.2 Develop and use criteria for evaluating alternatives.
2.3 Identify alternative solutions.
2.4 Select evaluation methods.
2.5 Evaluate and select solutions using criteria and methods.

Level 3

3.1 Develop, keep updated, and use a description of role-based decision authority.

CONFIGURATION MANAGEMENT (CM)

Manage the integrity of work products using configuration identification, version control, change control, and audits.

Level 1

1.1 Perform version control.

Level 2

2.1 Identify items to be placed under configuration management.
2.2 Develop, keep updated, and use a configuration and change management system.
2.3 Develop or release baselines for internal use or for delivery to the customer.
2.4 Manage changes to the items under configuration management.
2.5 Develop, keep updated, and use records describing items under configuration management.
2.6 Perform configuration audits to maintain the integrity of configuration baselines, changes, and content of the configuration management system.
Category: Improving

Capability Area: Improving Performance (IMP)

PROCESS MANAGEMENT (PCM)

Manages and implements the continuous improvement of processes and infrastructure to:

- Support accomplishing business objectives.
- Identify and implement the most beneficial process improvements.
- Make the results of process improvement visible, accessible, and sustainable.

Level 1

1.1 Develop a support structure to provide process guidance, identify and fix process problems, and continuously improve processes.
1.2 Appraise the current process implementation and identify strengths and weaknesses.
1.3 Address improvement opportunities or process issues.

Level 2

2.1 Identify improvements to the processes and process assets.
2.2 Develop, keep updated, and follow plans for implementing selected process improvements.

Level 3

3.1 Develop, keep updated, and use process improvement objectives traceable to the business objectives.
3.2 Identify processes that are the largest contributors to meeting business objectives.
3.3 Explore and evaluate potential new processes, techniques, methods, and tools to identify improvement opportunities.
3.4 Provide support for implementing, deploying, and sustaining process improvements.
3.5 Deploy organizational standard processes and process assets.
3.6 Evaluate effectiveness of deployed improvements in achieving process improvement objectives.

Level 4

4.1 Validate selected performance improvements against proposed improvement expectations, business objectives, or quality and process performance objectives using statistical or other quantitative techniques.
PROCESS ASSET DEVELOPMENT (PAD)

Develop and keep updated the process assets necessary to perform the work.

**Level 1**
- 1.1 Develop process assets to perform the work.
- 2.1 Determine what process assets will be needed to perform the work.

**Level 2**
- 2.1 Develop, buy, or reuse process assets.
- 2.3 Make process assets available.

**Level 3**
- 3.1 Develop, keep updated, and follow a strategy for building and updating process assets.
- 3.2 Develop, record, and keep updated a process architecture that describes the structure of the organization’s processes and process assets.
- 3.3 Develop, keep updated, and make processes available for use.
- 3.4 Develop, keep updated, and make tailoring criteria and guidelines for the set of standard processes available for use.
- 3.5 Develop, keep updated, and make the organization’s process asset library available for use.
- 3.6 Develop, keep updated, and make work environment standards available for use.
- 3.7 Develop, keep updated, and make organizational measurement and analysis standards available for use.

MANAGING PERFORMANCE AND MEASUREMENT (MPM)

Manage performance using measurement and analysis to achieve business objectives.

**Level 1**
- 1.1 Collect measures and record performance.
- 1.2 Identify and address performance issues.

**Level 2**
- 2.1 Derive and record measurement and performance objectives from selected business needs and objectives and keep them updated.
- 2.2 Develop, keep updated, and use operational definitions for measures.
- 2.3 Obtain specified measurement data according to operational definitions.
- 2.4 Analyze performance and measurement data according to the operational definitions.
- 2.5 Store measurement data, measurement specifications, and analysis results according to the operational definitions.
- 2.6 Take actions to address identified issues with meeting measurement and performance objectives.
2.7 Communicate results of performance and measurement analysis activities to stakeholders.

**Level 3**

3.1 Develop, keep updated, and use organizational measurement and performance objectives traceable to business objectives.
3.2 Develop, keep updated, and use the organization’s measurement repository.
3.3 Develop, keep updated, and follow a data quality process.
3.4 Following organizational processes and standards, develop and use operational definitions for measures and keep them updated.
3.5 Analyze organizational performance using measurement and performance data to determine performance improvement needs.
3.6 Periodically communicate performance results to the organization.

**Level 4**

4.1 Using statistical and other quantitative techniques, develop, keep updated, and communicate quality and process performance objectives that are traceable to business objectives.
4.2 Select measures and analytic techniques to quantitatively manage performance to achieve quality and process performance objectives.
4.3 Using statistical and other quantitative techniques, develop, keep updated, and use process performance baselines.
4.4 Using statistical and other quantitative techniques, develop, keep updated, and use process performance models.
4.5 Using statistical and other quantitative techniques, determine or predict achievement of quality and process performance objectives.

**Level 5**

5.1 Using statistical and other quantitative techniques, ensure that business objectives are aligned with business strategy and performance.
5.2 Analyze performance data using statistical and other quantitative techniques to determine the organization’s ability to satisfy selected business objectives and identify potential areas for performance improvement.
5.3 Select and implement improvement proposals, based on the statistical and quantitative analysis of the expected effect of proposed improvements on meeting business, quality, and process performance objectives.
Capability Area: Building and Sustaining Capability (BSC)

GOVERNANCE (GOV)

Provides guidance to senior management on their role in the sponsorship and governance of process activities.

**Level 1**

1.1 Senior management identifies what is important for doing the work and defines the approach needed to accomplish the objectives of the organization.

**Level 2**

2.1 Senior management defines, keeps updated, and communicates organizational directives for process implementation and improvement based on organization goals, needs, and objectives.

2.2 Senior management ensures resources are provided for developing, supporting, performing, improving, and evaluating adherence to expected processes.

2.3 Senior management identifies their information needs, and uses the collected information to provide governance and oversight of effective process implementation and improvement.

2.4 Senior management holds people accountable for adhering to organization policies and achieving process implementation and improvement objectives.

**Level 3**

3.1 Senior management ensures that measures supporting goals and objectives throughout the organization are collected, analyzed, and used.

3.2 Senior management ensures that competencies and processes are aligned with the goals and objectives of the organization.

**Level 4**

4.1 Senior management ensures that selected decisions are driven by statistical and quantitative analysis related to performance and achievement of goals and quality and process performance objectives.
IMPLEMENTATION INFRASTRUCTURE (II)

Ensure that the processes important to an organization are persistently and habitually used and improved.

**Level 1**
1.1 Perform processes that address the intent of the Level 1 practices.

**Level 2**
2.1 Provide sufficient resources, funding, and training for developing processes and ensuring adherence to them.
2.2 Develop, keep updated, and verify that processes are being followed.

**Level 3**
3.1 Use organizational processes and process assets to plan, manage, and perform the work.
3.2 Evaluate the adherence to and effectiveness of the organizational processes.
3.3 Contribute process related information or process assets to the organization.