LarkDetect

[CMMI1.3 maturity level 2 definition]

Version 1.0

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Table of Contents

Executive Summary

Purpose

Capability Maturity Model Integration (CMMI) is a framework of best practices. The purpose of CMMI is to provide guidance for setting up and improving CoronaSG's process areas.

Summary of definition

In LarkDetect, the CMMI1.3 Level 2 model ensures characteristics such as Commitment to Perform, Ability to Perform, Activities Performed, Measurement and Analysis, and Verifying Implementation. Focusing on the six features mentioned, we are able to identify the Key Process Areas for the project.

There are six key process areas for the CMMI Level 2 model, they are:

1. Requirements Management
2. Software Project Planning
3. Software Project Tracking and Oversight
4. Software Subcontract Management
5. Software Quality Assurance
6. Software Configuration Management

Description

LarkDetect is an online platform developed by the CoronaSG team that aims to provide early diagnosis for dementia. To ensure that every product that CoronaSG created is consistent, we are committed to the CMMI1.3 Level 2 processes.

Level 2 KPAs

Requirements Management (REQM)

The REQM establish a common understanding between the customer and the software project of the customer's requirement to be addressed by the project. The REQM will form the basis for planning and managing the software project.

Software Project Planning (SPP)

The SPP will establish reasonable plans for performing the software engineering and for managing the software project. This planning includes reasonable plans based on realistic estimates for the work and establishing necessary commitment to perform the work. These estimates could come from experience or past projects. The SPP start with the Scope of Work (SOW), constraints and goals that define and bound the project. This will ensure that we do not go out of the required scope.

Software Project Tracking and Oversight

This will establish adequate visibility of actual progress so that management can take effective actions when the software project's performance deviates significantly from the software plans. Management of the project based on the software development plan.

Software Subcontract Management

This guideline will ensure that only qualified software subcontractors are selected and how to manage them effectively. Subcontractor selection should be based on ability to perform the work. Consideration of other factors such as strategic business alliances, process capability, technical considerations should be weighed when choosing the subcontractors.

Software Quality Assurance (SQA)

The Software Quality Assurance should provide management with appropriate visibility into the process being used by the software project and of the products being built. The visibility could be achieved by reviewing and auditing the software products and activities to verify that they comply with the standards and procedures listed in the SQA document.

Software Configuration Management (SCM)

The SCM establish and maintain the integrity of the products of the software project throughout the project's software life cycle. It identifies configuration of the software at given point in time, systematically controlling changes to the configuration, and maintaining the integrity and traceability of the configuration through the software life cycle.

Generic goals and practices

Commitment to perform

Commitment to perform describes the actions taken by the organization to ensure the process is established and will endure.

Generic practices

- Establish organizational-wide policy to enforce on the whole organization to ensure that everyone is following the same direction. These will be reviewed by software managers and other affected groups to ensure they are able to meet the policy requirements.

Ability to perform

The ability to perform describe the preconditions that must exist in the project or organization to implement the software process competently.

Generic practices

- Review plans that affect the projects
- Reconcile Work and Resource Levels (reconciliation consist of finding out ways to increase productivity such as outsourcing or negotiating with stakeholders)
- Only to work on qualified project, i.e. personnel who do not have the required training should not be performing the job.

Activities to perform

The roles and procedures necessary to implement a key process area.

Generic practices

- From the Work Breakdown Structure (WBS), we need to identify the work packages to provide an estimation for the project tasks.
- Following the schedule in Project Plan, the team need to follow the deadline closely.

Measurements and Analysis

Measurement and Analysis describes the need to measure the process and analyse the measurement.

Generic Practices

- Parameters and matrix required to follow to ensure that everyone

Verifying Implementation

Describe the steps to ensure that the activities are performed in compliance with the process that are established.

Generic Practices

- Regular audits and review

- Software Quality Assurance

Specific goals and practices

Requirement Management

Specific Goal

The goal of Requirement Management is to manage requirement by establishing a common understanding between the customer and the software project requirements. This is achieved by defining a set of procedures and activities.

Key Practices

a. Manage Requirement
    i. Understand Requirements
        1. The proposed requirement criteria need to establish a common understanding between the customer and developer these should be written in the Software Requirement Specification (SRS).
        2. The requirements in SRS needs to fulfil these criteria: Clear, Complete, Consistent, Uniquely identified, Verifiable and Traceable**.**
    ii. Obtain Commitment to Requirement
        1. To access the impact on the project should there be any changes
        2. To revise the SRS based on the new requirements.
    iii. Manage Requirement Changes
        1. All changes in document are to be recorded in the Revision History to ensure traceability.
    iv. Maintain Bidirectional Traceability of Requirement
        1. Traceability can be established when the requirement are managed well. This is to ensure that all source requirement is completely documented.
    v. Ensure Alignment Between Project Work and Requirement
        1. When any inconsistency highlighted, the source and reasoning needed to be identified.

Software Project Planning

Specific Goal

The goal of software project planning is to ensure deadline are met and to establish a reliable estimation that define the project schedules. These estimations need to be reasonable and realistic for the work.

Key Practices

a. Establish Estimates

i. Estimate the Scope of the Project
    1. From the Work Breakdown Structure (WBS), we need to identify the work packages to provide an estimation for the project tasks.
ii. Establish estimates of Work product and Task attributes
    1. The estimate should be consistent with the project requirement to determine effort, cost and schedule.
    2. Validated models or historical data can be use as methods for determining size and complexity. Models include the use of line of code or function points.
iii. Define Project Lifecycle Phases
    1. Defining depend on the scope of requirement and estimates for project resources.
iv. Estimate Effort and Cost
    1. Using historical data to estimate project effort and cost, attributes such as supporting infrastructure and tools are needed to take into consideration.

b. Develop a Project Plan
    i. Establish the Budget and Schedule
        1. Document the project budget and schedule to ensure that everyone is on track. The budget and schedule should be based on major milestones, constraints and task dependencies.
    ii. Identify Project Risks
        1. Risk Management Plan to be established and review with stakeholders on the correctness of the risk.
    iii. Plan Data Management
        1. Plan Data Management where only authorised users can have access to the data. All information should be presented in an understandable form to ensure traceability.
    iv. Plan the Project Resources
        1. Perform project activities which are from the initial estimate from the project plan to ensure efficient operations
    v. Plan Needed Knowledge and Skills
        1. Identify the required knowledge and skills of the staff.
        2. Assess the knowledge and skills to ensure they are able to execute the project.
        3. If there is a gap in knowledge, send the staff to the required training, be it in-house or external.
    vi. Plan Stakeholder Involvement
        1. From the plan needed knowledge and skills, here we identify the responsibilities of the stakeholders with the valid expertise.
    vii. Establish the Project Plan
        1. A documented plan which include all but not limited to the above mention pointers. This is necessary to ensure a mutual understanding to execute the plans.

c. Obtain Commitment to the Plan
    i. Review Plan that Affect the Project
    ii. Reconcile Work and Resource Levels
        1. Reconcile the difference between the estimate and available resources.
    iii. Obtain Plan Commitment
        1. Identify negotiate commitment with relevant stakeholders.
        2. Ensure a consistent mutual understanding for tracking and traceability.

Software Project Tracking & Oversight

Specific Goal

The goal of Software Project Tracking & Oversight is to track, reviewed the project process to ensure the desired results are delivered.

Key Practices

a. Monitor the Project Against the plan
    i. Monitor Project Planning Parameters
        1. Periodically monitor progress against the schedule by comparing the work done and schedule in the project plan, which include the cost and expended effort.
    ii. Monitor Commitments
        1. Monitoring stakeholder's commitments and involvement highlight those that have not been completed and update any delay as soon as possible.
    iii. Monitor Project Risks
        1. Periodically review the documentation of risk in Risk Management Plan, risk may change over a period.
    iv. Monitor Data Management
        1. Identity and review data periodically.
        2. Document the impacts when not being complied.
    v. Monitor Stakeholder Involvement
        1. Periodically identify and review the status of stakeholder involvement and progress.
    vi. Conduct Progress Reviews
        1. Identify and document significant issues.
        2. Refer to Configuration Management Report as guideline for more information about how changes are managed.
    vii. Conduct Milestone Reviews
        1. Conduct Milestone reviews and progress reviews according to the project schedule. Identify and document significant review and decision.
b. Manage Corrective Action to Closure
    i. Analyse Issues
        1. Issues are collected from reviews.
        2. Determine the corrective actions needed to solve the issue

ii. Take Corrective Action
    1. When modifying requirements or revising estimates, the stakeholders need to be informed and get the agreement from them.
iii. Manage Corrective Actions
    1. Analyse any impact on the corrective actions done.
    2. Document any corrective action to ensure traceability.

Software Subcontract Management

Specific Goal

The goal of Software Subcontract Management is to select qualified software subcontractors and manage them effectively.

Key Practices

a. Define Work of Subcontract
    i. Perform balanced assessment of technical and nontechnical characteristics of the project
        1. Analyse and perform appropriate partitioning of system and software requirements
        2. Establish the specification of software products and activities to be subcontracted
        3. Assess important characteristics or skills required by work to be subcontracted
    ii. Specification of the work to be subcontracted and the standards and procedures to be followed
        1. Identify the statement of work, system requirements, software requirements, software development plan, software standards and procedures
    iii. Prepare a plan for selecting subcontractor
        1. Determine a list of criteria to be met by the potential subcontractors

b. Selection of Subcontractors
    i. Evaluation of proposals submitted for the planned subcontract
        1. Review proposals received and make sure their vision is in line with the project aims
    ii. Evaluation of geographic locations of subcontract bidder's organisations
        1. Ensure that the location of the subcontractor is in a range such that communication will be effective, and work can be delivered efficiently
    iii. Evaluation of software engineering and management capabilities
        1. Assess the subcontractor's expertise and proficiency in their experience in similar applications
        2. Use methods such as SEI Software Capability Evaluation method to evaluate subcontractor's ability

iv. Evaluation of staff available to perform the work
    1. Estimate the manpower required for the subcontract and whether there are enough people to complete the work such that deadlines could be met
v. Evaluation of available resources
    1. Analyse resources such as facilities, hardware, software and training required for the subcontract

c. Establishing Commitments with the Subcontractor
    i. Document the contractual agreement
        1. Prepare the relevant details for the agreement such as terms and conditions, product requirements, dependencies between subcontractor and prime contractor, products to be delivered, acceptance procedures and evaluation criteria used to monitor and evaluate the subcontractor's performance
    ii. Review and revise the subcontract agreement
        1. The contractor evaluates the agreement and make appropriate changes to fit project requirements if necessary
        2. Ensure that contractor, subcontractor and stakeholders have established a common understanding regarding the agreement and all parties agree to it
        3. Contractor approves the subcontract agreement
d. Tracking and reviewing the subcontractors' performance and results
    i. Monitor subcontractor's software quality assurance activities according to a documented procedure
        1. Periodically review subcontractor's plans, resources, procedures and standards for software quality assurance to ensure that they meet the requirements
        2. Periodically audit subcontractor's software quality assurance activities to assess how well procedures are being followed
    ii. Perform reviews and hold interchanges with subcontractor
        1. Provide subcontractor with feedback from the end users and customers regarding their needs
        2. Monitor subcontractor's technical activities
        3. Review subcontractor's technical, cost, staffing and schedule performance
        4. Verify that work done by subcontractor conforms to the prime contractor's requirements
    iii. Conduct acceptance testing
        1. Define acceptance procedures and criteria, after which it is reviewed and approved by prime contractor and subcontractor
        2. Document results of acceptance test
        3. Establish action plan for products that do not pass the acceptance test

Software Quality Assurance (SQA)

Specific Goal

The purpose of Software Quality Assurance is to provide management to assure quality in the software products and activities.

Key Practices

a. Prepare SQA plan
    i. Identify roles and responsibilities of SQA team
        1. Review and evaluate the quality of project activities to meet SQA criteria
        2. Coordinate with project teams to assess requirements and engage in project review and meetings
        3. Distribute roles and responsibilities to members of the SQA team and ensure that they understand their tasks
    ii. Specify work products to review and audit
        1. List all work products of each Test Management Process
        2. Define which facilities of equipment the SQA Auditor can access to perform SQA tasks
    iii. Create schedule to perform SQA tasks
        1. Describe tasks to be performed with emphasis on SQA activities and work product for each task
        2. Form the schedule consisting of SQA tasks, start and end dates, person in charge, description of task and output
    iv. Define standards/methodology
        1. Define the policies and procedures intended to prevent defects from occurring in
        2. Document the policies and procedures
        3. Train the staff on the SQA procedures and standards to follow
b. Evaluation of Processes and Work Products
    i. Objectively Evaluate Processes
        1. Promote employee participation in identifying and reporting quality issues
        2. Establish and maintain the stated criteria and standards
        3. Evaluate work products before they are delivered to the customer
        4. Identify each case of noncompliance found in the evaluation
    ii. Objectively Evaluate Work Products
        1. Establish and maintain the stated criteria and standards
        2. Evaluate work products before they are delivered to the customer
        3. Identify each case of noncompliance found in the evaluation
c. Provide Objective Insight
    i. Communicate and Resolve Noncompliance Issues
        1. Resolve each noncompliance with the appropriate team members
        2. Document noncompliance issues when they cannot be resolved within the project

3. Ensure that stakeholders are aware of the evaluation results

ii. Establish Records
   1. Record the SQA activities and processes done in detail
   2. Revise the status of the SQA activities as necessary

Software Configuration Management (SCM)

Specific Goal

The goal of Software Configuration Management is to establish and maintain integrity of the products of the software project throughout the project's software lifecycle.

Key Practices

a. Prepare SCM plan
   i. Identify software work products to be placed under configuration management
      1. Analyse all current design specifications and break down the software into subsystems
      2. Specify important characteristics to configuration items
   ii. Define the organisational structure of the Configuration Management
      1. Define roles and responsibilities for staff involved in the SCM
   iii. Create baselines
      1. Create baselines from the configuration items
      2. Document the set of configuration items that are contained in a baseline

b. Establish a configuration management library system as a repository for software baselines
   i. Store, update and retrieve configuration items in a configuration management system
   ii. Create configuration management reports from the configuration management system for traceability and auditing
   iii. Archiving and backups and of configuration management items

c. Track and Control Changes
   i. Track Changes Requests
      1. Initiate and record change requests in the change request database
      2. Review change requests that will be addressed in the next baseline with the team
   ii. Control Configuration Items
      1. Control changes to configuration items throughout the life of the product
      2. Obtain appropriate authorisation before configuration items that are changed are entered into the configuration management system

d. Establish Integrity
   i. Establish Configuration Management Records

1. Record configuration management actions in detail such that content and status of each configuration item is known, and previous versions can be recovered
2. Ensure that stakeholders are aware of the configuration status of the configuration items

ii. Perform Configuration Audits

1. Assess the integrity of the baselines
2. Confirm that the records correctly identify the configuration items
3. Review the structure and integrity of the items in the configuration management system

Approvals

The above document has sought concurrence from various stakeholders from CoronaSG and approval from the Project Manager.

CMMI audit checklist

CMMI Level 2 Audit Checklist				
Process Area	**Specific Goal**	**Specific Practice**	**Comply**	**Remarks**
Requirements Management	Manage Requirement	Obtain an Understanding of Requirement		
		Manage Requirement Changes		
		Maintain Bidirectional Traceability of Requirement		
		Obtain Commitment to Requirements		
		Identify inconsistencies between Project Work and Requirement		
Software Project Planning	Establish Estimates	Estimate the scope of the project		
		Establish Estimates of Work Product and Task Attributes		
		Define Project Life Cycle		
		Determine Estimates of Effort and Cost		
	Develop a Project Plan	Establish the Budget and Schedule		
		Identify Project Risks		
		Plan for Data Management		
		Plan for Project Resources		
		Plan for Needed Knowledge and Skills		
		Plan Stakeholder Involvement		
		Establish the Project Plan		
	Obtain Commitment to the Plan	Review Plans that Affect the Project		
		Reconcile Work and Resource Levels		
		Obtain Plan Commitment		
Software Project Tracking & Oversight	Monitor Project Against Plan	Monitor Project Planning Parameters		
		Monitor Commitments		
		Monitor Project Risks		
		Monitor Data Management		
		Monitor Stakeholder Involvement		

		Conduct Progress Reviews		
		Conduct Milestone Reviews		
	Manage Corrective Action to Closure	Analyse Issues		
		Take Corrective Action		
		Manage Corrective Action		
Software Subcontract Management	Define Work of Subcontract	Perform balanced assessment of technical and nontechnical characteristics of the project		
		Specification of the work to be subcontracted and the standards and procedures to be followed		
		Prepare a plan for selecting subcontractor		
	Selection of Subcontractors	Evaluation of proposals submitted for the planned subcontract		
		Evaluation of geographic locations of subcontract bidder's organisations		
		Evaluation of software engineering and management capabilities		
		Evaluation of staff available to perform the work		
		Evaluation of available resources		
	Establishing Commitments with the Subcontractor	Document the contractual agreement		
		Review and revise the subcontract agreement		
	Tracking and reviewing the subcontractors' performance and results	Monitor subcontractor's software quality assurance activities according to a documented procedure		
		Perform reviews and hold interchanges with subcontractor		
		Conduct acceptance testing		
Software Quality Assurance	Prepare SQA Plan	Identify roles and responsibilities of SQA team		
		Specify work products to review and audit		

		Create schedule to perform SQA tasks		
		Define standards/methodology		
	Evaluation of Processes and Work Products	Objectively Evaluate Processes		
		Objectively Evaluate Work Products		
	Provide Objective Insight	Communicate and Resolve Noncompliance Issues		
		Establish Records		
Software Configuration Management	Prepare SCM plan	Identify software work products to be placed under configuration management		
		Define the organisational structure of the Configuration Management		
		Create baselines		
	Establish a configuration management library system as a repository for software baselines	Store, update and retrieve configuration items in a configuration management system		
		Create configuration management reports from the configuration management system for traceability and auditing		
		Archiving and backups and of configuration management items		
	Track and Control Changes	Track Changes Requests		
		Control Configuration Items		
	Establish Integrity	Establish Configuration Management Records		
		Perform Configuration Audits		

CMMI interview affirmation questions

Process Areas	Questions
Requirement Management	How do you ensure that there is a mutual understanding of the requirement between the customer and the software developer?
	What is your procedure when you face with a change with the requirement?
	How do you ensure a bidirectional traceability of requirement? Where is it documented?
Software Project Planning	Where and how is the framework to plan, organised and control the work done on the project documented?
	Do you have a WBS? Where is it documented?
	What parameters do you use to estimate work products and tasks?
	How do you determine the project's lifecycle phases so you can scope the planning of the project?
	How was the estimation of the project effort and cost calculated?
	How do you manage your data from preventing unauthorised user from accessing the data?
	What type of test do you perform on your staff to ensure that they are competent in the scope of work?
	Where is the documentation indicating the plan stakeholder involvement?
	What is the process of obtaining commitment to the plan?
Software Project Tracking & Oversight	What parameters do you use to monitor the project?
	How long do you review your project risk? Where are the history logs?
	Where is the documentation on the status of the stakeholder involvement?
	What are the guidelines for conducting progress reviews?
	What is the process of the team managing corrective action? Where is it documented?
Software Subcontract Management	What is the procedure that you should follow before signing a subcontractor agreement?
	What are the factors that should be used to select a subcontractor?
	How should you review your subcontractor's performance?
Software Quality Assurance	What are the items required in the Software Quality Assurance plan?
	What methodologies should be followed and used in Software Quality Assurance?
	What are the guidelines on evaluating work products?
	How should you manage noncompliance issues if they cannot be resolved?

Software Configuration Management	Where should software baselines be stored?
	How should change requests be handled?
	What should be done if configurations items are changed?
	What can be done such that the integrity of the baselines are preserved?