

## Homework 2

# Software Development Process: CMMI

By: Team OC (Group 3)

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# Revision History

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Date:	Name:	Actions:
10/1/2016	Team	Team Charter Document
10/5/2016	John Crisanto	Introduction
10/6/2016	Kevin Tran	Initiating Phase: Stimulus for Change
10/6/2016	Danny Zhang	Initiating Phase: Context
10/6/2016	Alex Liao	Initiating Phase: Sponsorship
10/6/2016	Eric Lyv	Initiating Phase: Charter Infrastructure
10/12/2016	John Mai	Diagnosing Phase: Characterize Current and Desired Status
10/15/2016	Team	Diagnosing Phase: MDD 1
10/16/2016	Team	Diagnosing Phase: MDD 2 - SCAMPI Appraisal
10/22/2016	Team	Diagnosing Phase: MDD 2 - SCAMPI Appraisal
10/23/2016	Team	Diagnosing Phase: MDD 2 - SCAMPI Appraisal
10/29/2016	Team	Diagnosing Phase: Appraisal Findings Review
10/30/2016	Team	Diagnosing Phase: Appraisal Findings Review
11/5/2016	Danny Zhang, Eric Lyv, John Crisanto	Diagnosing Phase: MDD 3: Report Results
11/5/2016	John Mai, Alex Liao, Kevin Tran	Diagnosing Phase: Develop Recommendations
11/12/2016	Team	Establishing Phase: Set Priorities, Develop Approach, Plan Actions
11/19/2016	Team	Establishing Phase: Plan Actions
11/27/2016	Team	Lessons Learned and Report Review
11/29/2016	Team	Final Review, Finalize Report, Team Evaluation

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# Introduction

The purpose of this project was to perform a process assessment and build a process improvement plan for our organization to improve our capability level from 0 to 2 for the following four process areas: 1) Measurement Analysis (MA), 2) Organizational Process Definition (OPD), 3) Project Planning (PP), and 4) Requirements Management (REQM). Our organization used both Scrum & Extreme Programming (XP) processes for implementing HW#1 (Insertion Sort App) and we examined our process against Capability Maturity Level Integration (CMMI) for Development Version 1.3. The process assessment was based on the SCAMPI (Standard CMMI Appraisal Method for Process Improvement) appraisal and the entire process improvement is based on the IDEAL model for software process improvement. After reviewing our process, we found the gaps between the Scrum and XP standards in comparison with the CMMI (v1.3) standards. Based on the outcome of the gap analysis and rating each process, we used the IDEAL model for process improvement standards to derive an action plan so our organization can achieve a capability level 2 for the four process areas. The table below describes the phases of process improvement based on the IDEAL model.

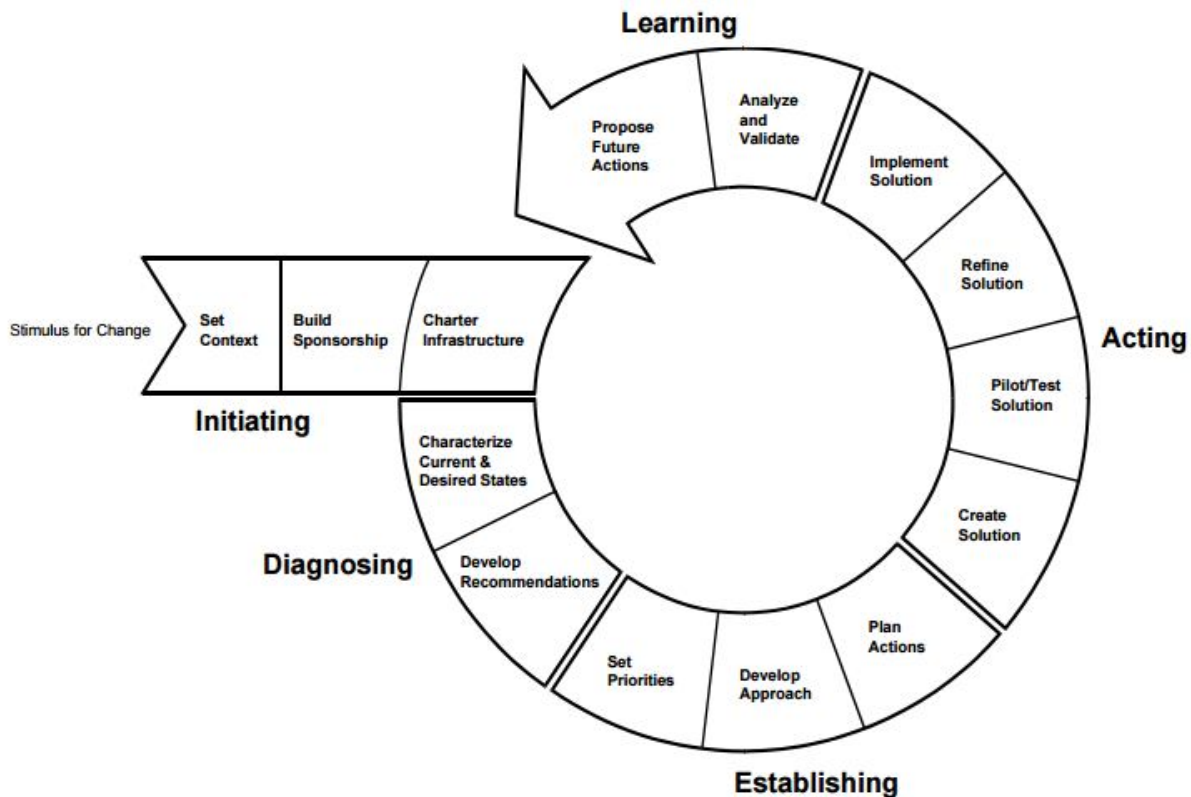


Figure 1: Phases of Process Improvement

Based on Figure 1, the following phases are required for process improvement.

**Phase 1: The Initiating Phase**

**Phase 2: The Diagnosing Phase**

**Phase 3: The Establishing Phase**

Phase 4: The Acting Phase

Phase 5: The Learning Phase

To properly perform process improvement within the organization, all the phases and activities within each phase should be followed. However, for HW#2, we only focus on Phase 1 through Phase 3. Phase 4 and 5 will be briefly mentioned in the homework outline for future reference because it is outside of the scope for this homework. The following sections will cover activities and work associated with initiating the change, diagnosing the desired status, and establishing action plans to set priorities and develop an approach for process improvement.

## Phase 1: The Initiating Phase

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### Stimulus for Change

The stimulus for change was the requirement imposed by the customer upon the organization to follow CMMI (v1.3) and advance the organization's capability level from the level 0 to level 2. With the organization being at capability level 0, projects do not follow a defined process but are able to still get work done. Without a meaningful way to quantitatively measure and analyze project data, the organization is unable to know and improve upon existing processes. Advancing to capability level 2 would help to ensure that projects follow a more controlled process and are more effectively managed.

### Context

The organization is currently at capability level 0 and has not fully satisfied the goals of these process areas: measurement and analysis (MA), organizational process definition (OPD), project planning (PP), and requirements management (REQM). A challenge to implementing MA would be determining how many measurement factors would be needed since data measurements can be expensive in terms of storage and time. A risk that could be encountered while implementing OPD would be the difficulty in enforcement of a defined process. A lack of enforcement could derail the defined process and revert the organization to their undefined processes from the Initial level. A challenge to PP would be under or overestimates at the initial phase of gathering estimations. However, this would level out over time with proper data management. Another challenge to PP would be in obtaining plan commitment and ensuring that the appropriate parties retain their commitment to the process. A challenge to REQM would be ensuring that

requirements gathered are detailed enough so that developers would not be forced to make assumptions and thereby reduce the amount of effort involved.

## Sponsorship

The sponsor for this process improvement initiative is the VP of the organization. Since they are in a senior management position and have provided their approval for the improvement process, they would be the most ideal “champion” to ensure the project’s successful completion. With their position in the organization, they would be able to secure funding and provide the necessary resources required for this effort.

## Charter Infrastructure

The charter infrastructure is made up of the sponsors, the appraisal leader, and the appraisal team. The chart below shows their responsibilities during the improvement process.

<b>Roles:</b>	<b>Responsibilities:</b>
<b>Sponsor</b>	<ul style="list-style-type: none"><li>• Make sure assessment team has all the resources they need to conduct the assessment</li><li>• Make sure the assessment is being conducted properly</li><li>• Select appraisal leader and team members and ensure they are qualified for the job</li></ul>
<b>Appraisal Leader</b>	<ul style="list-style-type: none"><li>• Collect information</li><li>• Help sponsor match appraisal objectives to the business objectives</li><li>• Assure appraisal team are appropriately informed for the process</li></ul>
<b>Appraisal Team</b>	<ul style="list-style-type: none"><li>• Perform assessment activities such as planning, inspecting, collecting data, validating data, reporting data, rating the process areas</li></ul>

## Organization’s Business Goals

Our business goals are to:

1. Meet our customer’s expectation of the product
2. Build brand loyalty by improving our business values and the quality of our product
3. Increase competitiveness of our product in the market that we are currently in

Our organization’s first business goal is to meet our customer’s expectation of the product. We want to provide a product that our customer will be satisfied with. Getting feedbacks from our customers, can ensure us to build a quality product that meets their expectation and that they will be satisfied with. Creating a quality product will allow us to build brand loyalty as well. Our second business goal is to build brand loyalty by improving our business values and the quality of our product. We want to build business values that we know our customer can share with and we want to keep the quality of our product high

so that our customers will always have a reason to return. In order to increase our competitiveness within the market, we will closely analyze and examine our product and find ways to improve our developmental process. This will not only allow us to build a quality product but it will also help us cut back the time it would take to make this product as well. By decreasing the time to produce the product we will be able to deliver our product to the market faster than our other competitions.

## Scope of Appraisal

The scope of the appraisal is to achieve a capability level 2 (CL2) in our organization. Our organization implemented the Scrum and XP process to produce the Insertion Sort App. This process ran against CMMI to see if it meets CMMI practices since that is what our client expects from us. SCAMPI (Standard CMMI Appraisal Method for Process Improvement) will be used to make an assessment on our organization process areas and determine their capability level. The 4 process areas that are going to be targeted are: measurement and analysis (MA), organizational process definition (OPD), project planning (PP), and requirement management (REQM). The improvement process will help us achieve and maintain a CL2 for the 4 processes mentioned.

# Phase 2: The Diagnosing Phase

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## Characterization of Current and Desired Status

Our organization's desired status for our process is a level 2 capability level for the MA, OPD, PP, and REQM process areas. As part of the diagnosing phase, and prior to performing an assessment of our organization's current process against CMMI, we first made sure that we characterized our organization's current capability. This involved describing the process that we used to develop the Insertion Sort Application for HW#1. Throughout the software development life cycle (SDLC) for HW#1, our process conformed to the fundamental practices of Scrum and XP. Once our organization had fully understood Scrum and XP processes through practice, we then moved onto performing an assessment of our process against CMMI.

## SCAMPI-Compliant Appraisal

### MDD 1: Plan and Prepare for Appraisal

#### 1.1 Analyze Requirements

##### Determine Appraisal Objectives

Analyzing the requirements for the appraisal, which is the initial part of the planning and preparation for appraisal phase, began by our organization holding a preliminary meeting to provide a base for the appraisal. The attendees to the meeting included a set of experienced, trained, and qualified employees of the organization (including the selected



appraisal team leader and members), and the vice president of the organization, who was determined as the relevant stakeholder and sponsor for the appraisal. The business needs of the organization revolved around reducing costs, increasing efficiency, and improving overall process quality.

The business-related objectives that drove the sponsor's choice to conduct an appraisal included involving employees in improving the performance of its current process, evaluating areas of weaknesses and potential risk that may influence the performance of the organization, and supporting future business decisions related to the direction of a new improvement program. The overall usage mode for the appraisal was determined to be for internal process improvement and for satisfying customer criterion. Apart from these business needs and objectives, the specific appraisal objectives were finding the gaps between the organization's current process and CMMI processes and identifying what activities needed to be performed to improve the capability level to 2 for four process areas, specifically MA, OPD, PP, and REQM.

#### Determine Data Collection Strategy

This was the first time that our organization has undergone a SCAMPI-compliant assessment. It was decided that the utilization of a managed discovery data collection approach best fits the given situation. A managed discovery data collection approach allowed the appraisal team to begin the assessment of the organization without having to wait for all the data to be gathered. For the purposes of the appraisal, the main source of data that was used was the HW#1 report document, which refers to development of the Insertion Sort Application (project 1 of the organization). The initial call and initial review was performed prior to the beginning of the Conduct Appraisal phase. Throughout the appraisal, the collection technique that was employed for objective evidence types, specifically artifacts and affirmations, were mainly interviews and project reviews.

Since the appraisal is being performed to improve the capability level to 2 for the MA, OPD, PP, and REQM process areas, the initial review involved the appraisal team looking through the specific goals and practices as well as the general goals and practices associated with each respective process area. The appraisal team then performed the initial review to map those specific and general practices listed within the CMMI (v1.3) against the organization's practices using the HW#1 report document as a source. When gaps were listed and/or additional information and evidence in relation to certain practices were needed, it was the responsibility of the organization to help with the appraisal process and address those needs. Therefore, individuals that were involved in implementing those specific practices assisted by participating in interviews with the appraisal team.

#### Determine Appraisal Constraints

All the appraisal constraints set forth within this section was negotiated between the vice president of the organization and the appraisal team leader. The sponsor had clearly defined the resource requirements, the restrictions, and preferences for the appraisal to properly set the appraisal plan parameters prior to conducting the assessment on the organization. It was established that all appraisal activities should take approximately six weeks. Furthermore, all appraisal activities should only be directed towards the

assessment of four process areas, specifically MA, OPD, PP, and REQM. The sponsor also provided the guidelines to handle the work interruption due to the performance of appraisal activities.

### Determine Appraisal Scope

The appraisal scope was determined by the appraisal team leader in conjunction with the vice president of the organization. The reference model scope included four process areas, specifically MA, OPD, PP, and REQM. Within the organization, resources are shared to perform the different functions mentioned (MA, OPD, PP, and REQM), therefore, the organizational unit that was subject to the appraisal included the entire organization. Its practices were compared to CMMI models and a continuous representation was selected for this appraisal. All practices and goals that are associated with each process area listed in the CMMI models were included in the appraisal.

Per the appraisal standard, the sampling factors that were taken into consideration for its potential effect on the conditions under which work is performed within the organization include: location (if work is performed differently based on location), customer (if work is performed differently per customer), size (if work is performed differently within basic units or support functions), organizational structure (if work is performed differently within different parts of the organization), and type of work (if work is performed differently based on the project). For the case of our organization, the only sample data available is from one instance, the development of the Insertion Sort Application (project 1).

### Determine Appraisal Outputs

Prior to selecting the specific appraisal outputs, the required outputs as well as the optional outputs for SCAMPI A were reviewed by the appraisal team leader and the sponsor. For this specific appraisal, the outputs were determined to be the following:

- Appraisal records
- SEI data

The appraisal records included the final findings of the appraisal for all four process areas assessed (MA, OPD, PP, and REQM), which involves the strengths and weaknesses of the organization's current process in those areas. The ratings planned for and generated by the appraisal team is also included. Typically, the appraisal disclosure statement will be included as an appraisal output, however, it is not listed within the scope of this assignment.

For the purposes of this appraisal, recommendations were also created to address the appraisal results. These recommendations were created to aid in the construction of an action plan that suggests activities to resolve weaknesses found within the organization's current process based on the CMMI models.

### Obtain Commitment to Initial Appraisal Plan

To obtain commitment to the initial appraisal plan, the sponsor (vice president of organization) met with the appraisal team leader, who requested the organization's commitment to provide resources and funding to the appraisal activities. The vice

president formally approved the initial appraisal plan, which is placed under change management. Any additional modifications to this plan had to be approved and negotiated with the sponsor.

## 1.2 Develop Appraisal Plan

Once the Appraisal sponsor and appraisal team leader have sat down and agreed upon an appraisal plan to be executed, we moved on to developing the plan. In this section we have identified the resources, developed a data collection plan, determined the cost and schedule for the appraisal, planned and managed logistics and as well as documented any anticipated risks for the appraisal.

### Identify Needed Resources

In this activity we have identified and estimated the resources that were needed to carry out the appraisal. The resources that were needed included:

- Appraisal team members: Appraisal team members need to be experienced or trained for the appraisal. Since we did not have a lot of members in our organization some team members were expected to multi-task while also performing their own responsibilities as well. There are 6 appraisal team members which are mentioned here:
  - Danny Zhang
  - Alex Liao
  - Eric Lyv
  - John Crisanto
  - John Mai
  - Kevin Tran
- We used Slack and google hangouts to communicate with one another.
- All our documents were stored and shared on Google drive.

### Develop Data Collection Plan

For our data collection plan we used the Managed discovery data collection to collect our data. HW1, the Stack App, was where most of our data came from. We assigned each team member a process area that were mentioned (MA, OPD, PP, REQM). Kevin Tran was responsible for process area MA, Eric Lyv was responsible for process area OPD, John Mai and Alex Liao were responsible for process area PP, and John Crisanto was responsible for process area REQM. We also conducted a readiness review to ensure that our teams, and our objective evidence is ready for the appraisal.

## Determine Cost and Schedules

Activities to do:	Checkpoints:
<b>Document and Verify Practices/ Validate Findings/ Derive Findings (MA)</b>	<b>11/08/16</b>
<b>Document and Verify Practices/ Validate Findings/ Derive Findings (OPD)</b>	<b>11/11/16</b>
<b>Document and Verify Practices/ Validate Findings/ Derive Findings (PP)</b>	<b>11/14/16</b>
<b>Document and Verify Practices/ Validate Findings/ Derive Findings (REQM)</b>	<b>11/17/16</b>
<b>Rate Findings</b>	<b>11/19/16</b>
<b>Document Findings</b>	<b>11/21/16</b>
<b>Recommendations</b>	<b>11/22/16</b>
<b>Set Priorities</b>	<b>11/26/16</b>
<b>Develop Approach</b>	<b>11/26/16</b>
<b>Plan Actions</b>	<b>11/27/16</b>

Table 1: Activities that need to be done during the appraisal and their tentative deadlines.

Activities	Amount of Practices (SPs and GPs)	Estimated Effort per practices (Hrs)	Total Estimated Effort (Hrs)
Verifying Objective Evidence	MA	22	0.30
	OPD	22	0.30
	PP	27	0.30
	REQM	18	0.30
	<b>TOTAL</b>	<b>89</b>	<b>2.00</b>
Validate Preliminary Findings	MA	22	0.15
	OPD	22	0.15
	PP	27	0.15
	REQM	18	0.15
	<b>TOTAL</b>	<b>89</b>	<b>1.00</b>
Derive Findings	MA	22	0.20
	OPD	22	0.20
	PP	27	0.20
	REQM	18	0.20
	<b>TOTAL</b>	<b>89</b>	<b>1.20</b>

Table 2: Estimated hours that will be needed to document and verify objective evidence and to validate the findings.

### Plan and Manage Logistics

The appraisal was done through virtual methods via video conferencing. We prepared a google hangout when all respective team members were available. We worked on the appraisal together which allowed us to collaborate by answering questions or taking part in any discussion that were needed during the appraisal process. By working effortlessly together at the same time through video conference, our appraisal team leader was able to ensure that the integrity of the appraisal's activities was not being compromised by any member.

### Document and Manage Risks

This section will list the potential risks that we may face during the appraisal.

**Risk:** Project due date- 11/30/2016

**Severity:** Medium

**Mitigation:** In order to make sure we meet the due date, we assigned all the tasks to everyone within our team. We made sure to check in with one another to ensure everyone was doing their tasks in a timely manner. We also started the project early to ensure there would be ample time to finish it before the due date.

**Risk:** Are the data/evidence collected of quality or properly derived

**Severity:** High

**Mitigation:** We had multiple peer reviews during the process to ensure that everyone is collecting the right information.

**Risk:** Objectives and instructions being unclear

**Severity:** Low

**Mitigation:** We would discuss and review the objectives and instructions to make sure everyone understood what is being asked of them. We also had the professor for clarification.

**Risk:** Losing data collected

**Severity:** Low

**Mitigation:** to ensure this doesn't happen we backed up our data in multiple places such as google drive, personal hard drive and Microsoft office.

**Risk:** Conflicts of Interest

**Severity:** Medium

**Mitigation:** assigned process areas to appraisal team members that had not or minimally worked on the area.

### Obtain Commitment to Appraisal

Once the Appraisal plan was developed and ironed out accordingly, it was presented to the sponsor. Both the sponsor and the appraisal leader agreed with the appraisal plan and signed off on it.

### 1.3 Select and Prepare Team

#### Identify Appraisal Team Leader

Our project's appraisal sponsor selected Danny Zhang to be the appraisal team leader. In that role, he was responsible for ensuring that the appraisal was being conducted in accordance with SCAMPI A requirements. He also delegated important tasks to each of the team members and followed-up with each person's progress towards completing those tasks. He also made sure that the appraisal sponsor was notified of all scheduling concerns and that they agreed to proceed with the appraisal.

#### Select Team Members

Five appraisal team members were selected to join the appraisal team: Alex Liao, Eric Lyv, John Mai, John Crisanto, and Kevin Tran. Kevin Tran was responsible for process area MA, Eric Lyv was responsible for process area OPD, John Mai and Alex Liao were responsible for process area PP, and John Crisanto was responsible for process area REQM. We also conducted a readiness review to ensure that our teams, and our objective evidence is ready for the appraisal. All team members possessed good written and oral communication skills, as well as the ability to work well in a team. One potential risk that has been documented in the Risk Management section is that all team members are from the organization being appraised.

#### Document and Manage Conflicts of Interest

A potential conflict of interest was present since each appraisal team member was a part of the organization being appraised, and had contributed to each of the processes being appraised. The appraisal team leader communicated this risk to the appraisal sponsor, but received permission to move forward with the appraisal. To avoid these conflicts of interest, the appraisal team leader assigned process areas to appraisal team members that had not or minimally worked on those areas.

#### Prepare Team

To ensure that each appraisal team member was sufficiently prepared to execute the appraisal, there were given two weeks to review CMMI-DEV v1.3 and SCAMPI A documentation, as well as any relevant lecture material for their assigned process areas prior to beginning the appraisal. An appraisal method training session was also held for the entire appraisal team one week prior to the appraisal. During this training session, appraisal team members were provided with the appraisal plan and conducted a readiness review. An outline of the meeting format is shown below.

#### Method Training Agenda

- Introduction
- Appraisal Plan
- Tools
- Readiness Review
- Closing

Following this meeting, the team discussed communication protocols and documentation procedures. For this, the team decided to use Google Hangouts for communication and

Google Drive for documentation storage. The only people allowed to join these meetings were the appraisal team members to uphold confidentiality.

Appraisal team members were also assigned roles for the appraisal. John Mai and Eric Lyv were assigned the role of Appraisal Coordinators, and were responsible for handling logistics and providing support to the appraisal team leader. John Crisanto was assigned the role of Librarian, and was responsible for managing appraisal documentation. Kevin Tran was assigned the role of Facilitator, and was responsible for conducting interviews. Alex Liao was assigned the role of Timekeeper, and was responsible for tracking time and managing schedules.

## 1.4 Obtain and Inventory Initial Objectives Evidence

### Obtain Initial Objective Evidence

At the request of the appraisal team leader, our organization provided a set of high-leverage objective evidence to the appraisal team for further review and planning. This objective evidence was related to the process areas being appraised. Since our organization had chosen a managed discovery data collection approach, the appraisal team was able to proceed with the evidence that had been provided to them.

### Inventory Objective Evidence

The appraisal team leader created an inventory of the objective evidence that the organization had provided, which would allow the appraisal team to keep track of the information that was available and that was needed. Prior to meeting with the appraisal team, the appraisal sponsor planned to conduct a readiness review. The appraisal sponsor was notified by the appraisal team leader that the schedule estimate would be based on the results of this review.

	MA	Available (Y/N)	OPD	Available (Y/N)	PP	Available (Y/N)	REQM	Available (Y/N)
	Acceptance Test Results	Y	Change management process	Y	Burndown chart	Y	Approved requirements	Y
	Measurement objectives	Y	Code repository	Y	Iteration velocity chart	Y	Change control process	Y
	Product backlog	Y	Configuration management plan	Y	Planning phase	N	Lessons learned	N
	Spring backlog	Y	Functional requirements	Y	Process definition	Y	Process definitions	Y

Direct Artifacts	Spring burndown chart	Y	Goals and objectives	Y	Product backlog	Y	Process roles	Y
			Lessons learned	Y	Project monitoring table	Y	Product backlog	Y
			Lifecycle definition	Y	Risk management	Y	Requirements acceptance criteria	Y
			Nonfunctional requirements	Y	Role definitions	Y	Requirements provider criteria	Y
			Product backlog	Y	Staging phase	N	Scrum meeting	Y
			Quality assurance plan	Y	Stakeholder list	Y	Sprint backlog	Y
			Sprint backlog	Y	System context diagram	Y	Sprint planning meeting	Y
			Team charter	Y	Team charter	Y	Sprint review	Y
							Stakeholder list	Y
Indirect Artifacts	Google drive	Y	Common room practice	N	Architectural spikes	Y	Meeting minutes	N
	Iteration review	Y	Iteration review	Y	Project plan review	Y	Project plan review	Y
	Pre-game planning	Y	Scrum meeting	Y	Sprint review	Y	Requirements baseline definition	Y
	Scrum meeting	Y	Technology preparation	Y	Team size	Y	Requirements provider characterization	Y
	Sprint review	Y			Technology preparation	Y		



Affirmation	Common goals created	Y	Meetings	Y	Meetings	Y	Requirements analysis	Y
	Collected data	Y	Reviews	Y	Reviews	Y	Requirements reviewed	Y
	Reports	Y						

Table 3: Inventory Objective Evidence

## 1.5 Prepare for Appraisal Conduct

### Perform Readiness Review

Before the appraisal, the appraisal team leader held a readiness review to ensure that all requirements had been met and that all roadblocks had been addressed. This review was important to prevent potential setbacks during the Conduct Appraisal phase. During this review, the appraisal team went over the objective evidence inventory and verified the availability of each artifact. The appraisal team leader also made sure that each team member was well-equipped to perform their responsibilities and had reviewed the relevant material in CMMI-DEV v1.3 for their assigned process areas. All documented risks were also presented and discussed during this review, and mitigation efforts were updated accordingly. Since the appraisal followed a managed discovery data collection plan, the objective evidence available at the time was sufficient to proceed with the appraisal process.

### Re-Plan Data Collection

We made sure to update the data collection plan whenever we discovered objective evidence that had not been accounted for, or when existing objective evidence was no longer available. This could occur if assumptions proved to be inaccurate, information gathered was insufficient, or participants were absent. Keeping the plan up-to-date was important in case the schedule needed to be re-negotiated with the appraisal sponsor.

## MDD2: Conduct Appraisal

### 2.1 Prepare Participants

The sponsor approved the appraisal plan that was presented. We prepared the HW1 document for examination by the appraisal team. The appraisal team came together and read through the HW2 document thoroughly to understand what we had to do before the appraisal was conducted. We also reviewed other documents such as the CMMI, SCAMPI and IDEAL lecture notes to fully understand what is expected of us during the appraisal process. Other documents such as the CMMI for Development Version 1.3 and the SCAMPI A version 1.3 documents were also reviewed as well.

## 2.2 Examine Objective Evidence

Each member from the appraisal team were assigned a process area to gather data for. The HW1 document was a data source used to gather the objective evidence. The objective evidence was placed into its respective sections on the findings template. The team reviewed the objective evidence that was gathered for the artifacts sections and made sure that the evidence matches with the respective practice. When examining objective evidence from affirmation, team members would ask questions and discuss with one another as to whether the specific evidence is appropriate for the practice in question.

## 2.3 Document Objective Evidence

Notes and highlighting were done on the HW1 document during the data collection process. Evidence that was present were recorded onto the findings template while evidence that was absent were noted so that gaps could be filled in later. After the evidence was gathered and recorded the team went back to each practice and filled in the gaps. The gaps showed why the practice's status is not fully implemented. The team constantly reviewed the evidence and gaps that were recorded in the findings document.

## 2.4-2.5 Verify Objective Evidence/ Validate Preliminary Findings

For this process we used the mapping template for Agile Process (Scrum and XP) to CMMI for 4 process areas: MA, OPD, PP, REQM to document our findings.

### Mapping Template for the Agile Process (Scrum & XP) to CMMI (MA, OPD, PP, REQM)

MA						
Goal	Practice	Instance	DA	IA	Affirmation	Gaps
SG1	SP1.1	ORG				
		P1	Measurement Objective: To monitor project velocity and productivity		Measurement objectives created a set of common goals for all team members.	
		P2				
		P3				
		P4				
	SP1.2	ORG				
		P1	a) Number of hours estimated	Scrum meetings were held daily to track hours spent	Measures developed to satisfy measurement objectives	

MA						
Goal	Practice	Instance	DA	IA	Affirmation	Gaps
			b) Number of hours spent on tasks c) Acceptance test success rate	on tasks and to determine whether new estimates were necessary.	stated in SP 1.1.	
		P2				
		P3				
		P4				
	SP1.3	ORG				
		P1	Hours and estimates collected during Scrum meetings and pre-game planning  Measurement data and analysis results stored in product backlog		Data collected during meetings and at the end of each iteration. Storage procedures involved the product backlog.	
		P2				
		P3				
		P4				
	SP1.4	ORG				
		P1	Project velocity and productivity analyzed during Scrum meetings and through usage of sprint burndown charts. Acceptance test results analyzed at		Project data analysis was based on collected hours, estimates, and acceptance test results.	

MA						
Goal	Practice	Instance	DA	IA	Affirmation	Gaps
			the end of each iteration.			
		P2				
		P3				
		P4				
SG2	SP2.1	ORG				
		P1	Pre-game planning and Scrum meetings to record hours and estimates in product backlog.			An automated data collection method, such as a task tracking tool, would have been a good way to maintain better data integrity.
		P2				
		P3				
		P4				
	SP2.2	ORG				
		P1	The burndown charts and iteration velocity charts were built from the collected data. These charts were presented to stakeholders at the end each iteration during Sprint reviews.	Sprint reviews were held to review analysis results.		
		P2				
		P3				
		P4				
	SP2.3	ORG				
		P1	The product backlog was used to list tasks, their estimates, and	The product backlog was updated during each	Product backlog and Google Drive served as stored	

MA						
Goal	Practice	Instance	DA	IA	Affirmation	Gaps
			progress being made towards their completion.	Scrum meeting.	data inventories.	
		P2				
		P3				
		P4				
	SP2.4	ORG				
		P1	Sprint reviews held to communicate measurement results to project members and stakeholders. Scrum meetings held to communicate progress.	New requirements, tasks, and/or project estimates could be created during these meetings.		
		P2				
		P3				
		P4				
GG1	GP1.1	ORG				
		P1	Work products from SP 1.1 to SP 2.4 were mostly completed		Measurement and analysis work products supported the process.	A few SPs had gaps between CMMI and the project's processes that were recorded.
		P2				
		P3				
		P4				
GG2	GP2.1	ORG				
		P1	a) Estimates kept up-to-date b) Progress tracked in product/sprint backlog	Followed XP phases: planning, managing, designing, coding, and testing.		Some XP and Scrum practices omitted from phases, such as Work Breakdown Structure.

MA						
Goal	Practice	Instance	DA	IA	Affirmation	Gaps
			c) Burndown charts updated after each iteration d) Sprint meetings held daily to review progress			
		P2				
		P3				
		P4				
	<b>GP2.2</b>	ORG				
		P1	a) Estimates (in hours) generated after generating tasks b) Progress tracked and reviewed daily	a) Burndown charts and iteration velocity charts available for analysis during daily Scrum meetings. b) Analysis reports presented to stakeholders at end of each iteration.		
		P2				
		P3				
		P4				
	<b>GP2.3</b>	ORG				
		P1	Scrum team and product owner responsible for gathering and analyzing data.	Pre-game planning and Scrum meetings held to collect and analyze data.	The measurement group consisted of the Scrum team and product owner.	No separate team designated for this practice.
		P2				
		P3				

MA						
Goal	Practice	Instance	DA	IA	Affirmation	Gaps
	GP2.4	P4				
		ORG				
		P1	Scrum team and product owner responsible for gathering and analyzing data.	Pre-game planning and Scrum meetings held to collect and analyze data.		
		P2				
		P3				
		P4				
	GP2.5	ORG				
		P1				No formal training performed for data measurement and analysis. Project team members expected to know how to use a product backlog and to view burndown charts.
		P2				
		P3				
		P4				
	GP2.6	ORG				
		P1	a) Measurement data tracked in hours for consistency b) Hours and estimates tracked in a product backlog for visibility c) Burndown charts used for every iteration	Scrum meetings, iteration planning (pre-game) meetings, and Sprint reviews held throughout the project.	Enabled consistency amongst every iteration.	
		P2				

MA						
Goal	Practice	Instance	DA	IA	Affirmation	Gaps
	GP2.7	P3				
		P4				
		ORG				
		P1	Stakeholders provided feedback during Sprint reviews, which influenced backlog tasks and estimates.		Stakeholders were involved by participating in the Sprint reviews.	
		P2				
		P3				
		P4				
		ORG				
		P1	Estimates and task progress reviewed and adjusted during Scrum meetings based on analysis of burndown charts and product backlog.	Scrum meetings held daily		Monitoring actual progress was difficult without the use of an automated system such as a task tracker.
		P2				
	GP2.8	P3				
		P4				
		ORG				
		P1	a) Analysis results reviewed during sprint reviews b) Task estimates and efforts reviewed		Consistent work product reviews ensured that the team followed the project plan.	
		P2				
		P3				
		P4				
	GP2.9	ORG				
		P1				



MA						
Goal	Practice	Instance	DA	IA	Affirmation	Gaps
			during Scrum meetings			
		P2				
		P3				
		P4				
	GP2.10	ORG				
		P1	Measurements and analysis reports presented to higher-management during iteration review meetings.	Iteration review meetings held and backlog tasks modified accordingly.	These reviews gave management visibility into the process.	
		P2				
		P3				
		P4				
GG3	GP3.1	ORG				
		P1	Measurement and analysis process developed at the beginning of the project.		A defined measurement and analysis process allowed data to be analyzed consistently, which could serve as references in future projects.	
		P2				
		P3				
		P4				
	GP3.2	ORG				
		P1	Analysis reports stored and readily available for future reference.	Reports were available on Google Drive for all team members.	These reports could be used in future projects following a similar process.	
		P2				

MA						
Goal	Practice	Instance	DA	IA	Affirmation	Gaps
		P3				
		P4				

OPD						
Goals	Practice	Instance	DA	IA	Affirmation	Gaps
SG1	SP1.1	ORG				
		P1	Responsibilities delegated to product owner and team members. Requirements development process at the beginning of the project to determine estimates. Change management process to control changes and estimates throughout project life cycle. Scrum meetings held daily to review progress. Review process held at end of each iteration.	Meeting records stored on Google Drive. Slack and Google Hangouts used for meetings.		
		P2				
		P3				
		P4				
	SP1.2	ORG				
		P1	Iterative life cycle with three 4-week iterations. Each involved iteration planning,	Scrum meetings held daily	Iterative lifecycle model used to ensure that a stable, integrated, and tested system was delivered.	

OPD						
Goals	Practice	Instance	DA	IA	Affirmation	Gaps
			common-room coding, designing, coding, testing, and a review.			
		P2				
		P3				
		P4				
	SP1.3	ORG				
		P1	Planning, development, and review processes listed in SP 1.1, and life cycle from SP 1.2 used for project with minor modifications			Formal tailoring guidelines not used, but XP and Scrum used as templates for the project.
		P2				
		P3				
		P4				
	SP1.4	ORG				
		P1	a) Measures recorded in product backlog and sprint backlog b) Analysis and meeting notes recorded for each occurrence and stored in Google Drive c) Code stored in GitLab repository.		Common repositories made it easier to track data and changes, and serve as references for future projects.	
		P2				
		P3				
		P4				
	SP1.5	ORG				
		P1	Process-related documentation stored on		Using Google Drive eases future project	

OPD						
Goals	Practice	Instance	DA	IA	Affirmation	Gaps
			Google Drive for consistency and ease-of-access.		implementation that may also rely on an iterative development process.	
		P2				
		P3				
		P4				
	SP1.6	ORG				
		P1	Development performed in common rooms to support peer programming, which in turn support open communication.			
		P2				
		P3				
		P4				
		ORG				
		P1	Development performed in common rooms to support peer programming, which in turn support open communication.			
		P2				
		P3				
		P4				
	SP1.7	ORG				
		P1	Development performed in common rooms to support peer programming, which in turn support open communication.			
		P2				
		P3				
		P4				
		ORG				
		P1	some of the specific practices for process area OPD were performed and documented			implement the gaps listed for PA:OPD
		P2				
		P3				
		P4				
GG1	GP1.1	ORG				
		P1	some of the specific practices for process area OPD were performed and documented			implement the gaps listed for PA:OPD
		P2				
		P3				
		P4				

OPD Goals	Practice	Instance	DA	IA	Affirmation	Gaps
GG2	GP2.1	ORG	Team charter which sets the ground rules and guidelines for organization			
		P1	Team charter which sets the ground rules and guidelines for team members to follow during the project.		Team members sat down together and came up with a set of rules that everyone agreed upon.	
		P2				
		P3				
		P4				
	GP2.2	ORG				
		P1	scrum and XP process and work products clearly defined. Plan is clearly defined and documented.			Review plans with stakeholders to see if it aligns with what we are supposed to do.
		P2				
		P3				
		P4				
	GP2.3	ORG				
		P1	configuration management and quality assurance plan were made	Gitlab used for configuration management		implement project management and appropriate engineering disciplines. Implement a database management system.
		P2				
		P3				
		P4				
	GP2.4	ORG				
		P1	team charter displays team members' role		Each team member was assigned	

OPD						
Goals	Practice	Instance	DA	IA	Affirmation	Gaps
			in the organization		specific roles and duties that they are responsible for.	
		P2				
		P3				
		P4				
	GP2.5	ORG				implement training program for new people at the organization
		P1	Technology preparation for the android development environment.			implement tailorable process standards and work environment standards.
		P2				
		P3				
		P4				
	GP2.6	ORG				
		P1	work products, roles and practices were clearly defined.			
		P2				
		P3				
		P4				
	GP2.7	ORG	Team charter used to establish and maintain organization's rules for structuring and forming team.			
		P1		a.) stakeholders were involved during small releases and acceptance tests for the project	stakeholders reviewed products to see if it met the goals.	

OPD						
Goals	Practice	Instance	DA	IA	Affirmation	Gaps
		P2				
		P3				
		P4				
	GP2.8	ORG				
		P1		a.) stand up meetings were performed daily to see everyone's progress. B.) sprint review were conducted at end of iterations to track and plan iterations		implement measurements and monitoring of projects using process architectures and process elements of organization's standards.
		P2				
		P3				
		P4				
	GP2.9	ORG				
		P1	description of Scrum and XP processes			establish an organizational process asset. Establish rules and guidelines for teams.
		P2				
		P3				
		P4				
	GP2.10	ORG				Need to report all activities and statuses with higher level management. Currently only peer review with one another.
		P1				reporting of project statuses and activities to

OPD						
Goals	Practice	Instance	DA	IA	Affirmation	Gaps
GG3						upper management
		P2				
		P3				
		P4				
	GP3.1	ORG	team charter clearly defined organization's goals and objectives			
		P1	project goals and objectives are clearly defined			
		P2				
		P3				
		P4				
	GP3.2	ORG				
		P1	lesson learned were submitted to talk about the experience of the process			
		P2				
		P3				
		P4				

PP						
Goal	Practice	Instance	DA	IA	Affirmation	Gaps
SG1	SP1.1	ORG				
		P1	Product backlog was used to list tasks and tasks were further broken down in the sprint backlog.		how were the tasks created and further broken down into smaller tasks?	Need to properly implement a Work breakdown structure (WBS) with work package descriptions.
		P2				
		P3				
		P4				
	SP1.2	ORG				



PP						
Goal	Practice	Instance	DA	IA	Affirmation	Gaps
		P1	a) product backlog was used to establish and maintain estimates of tasks	a) Iteration velocity chart was used to measure how much time it took us to work during each iterations. b) Sprint Burndown chart was used to measure the time it took for us to finish the assigned tasks for the iteration.	how were the tasks established? How were tasks estimated?	implement estimating models
		P2				
		P3				
		P4				
	SP1.3	ORG				
		P1	a.) Process definition was used to define the scrum project lifecycle.		Used scrum timed-box development for project lifecycle.	
		P2				
		P3				
		P4				
	SP1.4	ORG				
		P1	a.) product backlog was used to estimate the efforts needed for the tasks.			There was no historical data to go off of since its team's first project. Implement historical data for future projects
		P2				
		P3				
		P4				
SG2	SP2.1	ORG				

PP						
Goal	Practice	Instance	DA	IA	Affirmation	Gaps
		P1	project monitoring table uses checkpoints to identify milestones and estimate the amount of resources that may be needed.		Team agreed on checkpoints/deadlines and how much resources were needed for each checkpoint.	identify the tasks dependencies and corrective action criteria.
		P2				
		P3				
		P4				
	SP2.2	ORG				
		P1	section 6.6 risk management discussed about potential risks involved.	the team addressed architectural spikes.	team came together to discuss possible risks we may face during the project.	
		P2				
		P3				
		P4				
	SP2.3	ORG				
		P1				Implement a data management plan that would help show logistics of the project
		P2				
		P3				
		P4				
	SP2.4	ORG				
		P1	team members and resources were clearly defined.	a.) teams of 6 members. b.) Gitlab, slack and google hangouts /google drive were used.		
		P2				

PP						
Goal	Practice	Instance	DA	IA	Affirmation	Gaps
	SP2.5	P3				
		P4				
		ORG				
		P1	Team charter displays team's skill set and knowledges.	Technology preparation was used to familiar team with android development environment.	Members of the team were given or volunteered for different responsibilities based on their skill set and knowledge.	
		P2				
		P3				
		P4				
	SP2.6	ORG				
		P1	a.) Roles were defined. b.) stake holders were listed during the planning and staging phase.	system context diagram shows different roles interactions with the project.	stakeholders were listed. How are they involved with the project?	Implement new hire/training plan for the projects.
		P2				
		P3				
		P4				
	SP2.7	ORG				
		P1	the planning and staging phase helped establish the overall project plan.			
		P2				
		P3				
		P4				
SG3	SP3.1	ORG				
		P1		sprint review allowed us to review project plan after every iteration.		
		P2				
		P3				

PP						
Goal	Practice	Instance	DA	IA	Affirmation	Gaps
	SP3.2	P4				
		ORG				
		P1	product backlog and sprint backlog to keep track of tasks for each iterations	sprint reviews were used to go over the recent iteration and what needs to be adjusted for next iteration.	teams met up during daily standup for sprint reviews to go over the next iterations.	
		P2				
		P3				
		P4				
	SP3.3	ORG				
		P1	Team charter listed team's responsibilities and commitments.	system context diagram shows internal and external stakeholders and their responsibilities for the project.		implement reviewing commitments with senior management.
		P2				
		P3				
		P4				
GG1	GP1.1	ORG				
		P1	some of the specific practices for process area PP SG1-SG3 were performed and documented			implement the gaps listed for PA: PP SG1-SG3
		P2				
		P3				
		P4				
GG2	GP2.1	ORG				
		P1	a.) Agile Scrum and XP process were clearly defined.			

PP						
Goal	Practice	Instance	DA	IA	Affirmation	Gaps
			b.) product backlog, sprint backlog and release planning table used to maintain and manage the project plan.			
		P2				
		P3				
		P4				
	GP2.2	ORG				
		P1	a) HW#1 report document defines the project planning process.	a) Review of project plan		
		P2				
		P3				
		P4				
	GP2.3	ORG				
		P1			Resources needed for completing HW#1 included time and effort by the team. Project planning activities using Agile and Scrum were performed to an extent that the organization felt was necessary.	a) May need to allocate resources for special expertise to help in project planning such as experienced estimators, schedulers, technical experts
		P2				
		P3				
		P4				
	GP2.4	ORG				
		P1	a) HW#1 Report document defines the		Scrum and XP were used so there are roles such as the product owner, scrum	

PP						
Goal	Practice	Instance	DA	IA	Affirmation	Gaps
			process and includes the plan on performing the project planning process and the roles and responsibilities of the people involved in the process		master, and scrum team, however project planning was conducted as a group within the organization	
		P2				
		P3				
		P4				
	<b>GP2.5</b>	ORG				
		P1			Lecture notes on the Scrum and XP fundamental practices were distributed to all members of the organization.	a) Training on project planning activities needs to be performed (estimating, budgeting, negotiating, identifying and analyzing risks, managing data, planning, and scheduling).
		P2				
		P3				
		P4				
	<b>GP2.6</b>	ORG				
		P1	a) Product backlog with estimates, b) sprint backlog are placed under control based on product backlog	a) Minutes of meetings related to user story estimation, b) Release planning meeting to estimate release dates of user stories	In Scrum and XP, the items in the product backlog are estimated in terms of hours of effort to complete. Release planning meetings were held to estimate when user stories will be completed and which user stories belong to which iteration.	a) May need to place following work products under appropriate levels of control when implemented in the future: work breakdown structure, data management plan (currently set as gaps)

PP						
Goal	Practice	Instance	DA	IA	Affirmation	Gaps
	GP2.7	P2				
		P3				
		P4				
		ORG				
		P1	a) List of relevant stakeholders, b) HW#1 report document defines the pre-game planning and staging which involves interaction with stakeholders, c) Sprint Review involves showing what was done during the sprint to the relevant stakeholders			a) Need to involve stakeholder in the reviewing and resolving of issues on the completeness and correctness of project risks b) Need to involve stakeholder in the reviewing of data management plans in future implementation
	GP2.8	P2				
		P3				
		P4				
		ORG				
		P1				Need to perform monitoring and controlling using work products and measures such as number of revisions to project plan, cost, schedule, and effort variance per plan revision, and schedule for development and

PP						
Goal	Practice	Instance	DA	IA	Affirmation	Gaps
						maintenance of program plans
		P2				
		P3				
		P4				
	GP2.9	ORG				
		P1	a) Review of estimates within product backlog and sprint backlog		In Scrum and XP, estimation is conducted and reviewed as a team	a) Need to objectively evaluate adherence of the process and selected work products against the process description, standards, and procedures, and address noncompliance, b) Need people not directly responsible for managing/performing the activities of the process to evaluate adherence
		P2				
		P3				
		P4				
	GP2.10	ORG				
		P1				a) Need higher level management to review the activities, status, and results, of project planning activities and resolve potential issues
		P2				
		P3				
		P4				
GG3	GP3.1	ORG				
		P1	a) HW#1 report document defines the			



PP						
Goal	Practice	Instance	DA	IA	Affirmation	Gaps
			process that is tailored to fit the project's needs (section 3 discusses planning activities) using Scrum and XP			
		P2				
		P3				
		P4				
	GP3.2	ORG				
		P1	a) HW#1 report document lists what was done for risk management throughout the project life cycle (section 6.6),			a) Need to document experiences in PP activities, specifically risk impacts and probability of occurrence of risks, project attribute estimates, and project data library structures
		P2				
		P3				
		P4				

REQM						
Goal	Practice	Instance	DA	IA	Affirmation	Gaps
SG1	SP1.1	ORG				
		P1	a) Criteria for distinguishing appropriate requirements providers, b) Criteria for evaluation and acceptance of requirements, c) Approved	a) Minutes of meetings to analyze and fully understand set of requirements, b) Characterization of requirements providers	Requirements are analyzed and evaluated against criteria to avoid requirements creep.	

REQM						
Goal	Practice	Instance	DA	IA	Affirmation	Gaps
			set of requirements	authorized to provide direction		
		P2				
		P3				
		P4				
	SP1.2	ORG				
		P1	a) Requirements (user stories) are placed in the product backlog, b) Commitments to requirements are recorded in the Sprint backlog (user stories + tasks) for each sprint	a) Sprint planning meetings are performed to create tasks for project participants and assess impacts of requirements changes	At the beginning of the sprint, top priority requirements from the product backlog are placed into the sprint backlog and are broken down into tasks for developers to commit to. Status of tasks are constantly updated from "defined" to "in-progress" and eventually to "completed".	
		P2				
		P3				
		P4				
	SP1.3	ORG				
		P1	a) The product backlog contains the approved set of requirements including changes, b)	a) Review of change requests, b) Definition of a requirements baseline	Change requests are reviewed to ensure that proposed changes do not differ largely from the	

REQM						
Goal	Practice	Instance	DA	IA	Affirmation	Gaps
			Requirements change history and reason for changes		original set of requirements and project goals.	
		P2				
		P3				
		P4				
	SP1.4	ORG				
		P1				a) Need to utilize a requirement traceability matrix, b) Need to utilize a requirement tracking system
		P2				
		P3				
		P4				
	SP1.5	ORG				
		P1	a) Sprint planning involves ensuring work products are in alignment with requirements, b) Sprint review covers if work products and products were aligned with requirements during the sprint		Keeping the customer's requirements and the project goals in mind throughout the entire development process is important but Scrum and XP processes do not have a formal document for keeping track of inconsistencies between requirements and project plans and work products.	a) Need to have documentation of inconsistencies between requirements and project plans and work products

REQM						
Goal	Practice	Instance	DA	IA	Affirmation	Gaps
GG1	GP1.1	P2				
		P3				
		P4				
		ORG				
		P1	See direct artifacts produced by performing SP 1.1 through SP 1.5	See indirect artifacts produced by performing SP 1.1 through SP 1.5		Gaps were found on SP 1.4 and SP 1.5 and those gaps are listed on this table (see above)
		P2				
		P3				
		P4				
		ORG				
		P1				a) Need to include a specific policy on managing requirements and identification of inconsistencies between requirements and project plans and work products
GG2	GP2.1	P2				
		P3				
		P4				
		ORG				
		P1				
		P2				
		P3				
	GP2.2	P4				
		ORG				
		P1	a) HW#1 report document defines the plan for the requirements management process.	a) Review of project plan, which includes requirements management through online meetings		
		P2				
		P3				
		P4				
		ORG				
	GP2.3	ORG				

REQM						
Goal	Practice	Instance	DA	IA	Affirmation	Gaps
		P1			Resources needed for completing HW#1 included time and effort by the team. Requirements management activities were performed to an extent that the organization felt was necessary. Requirements tracking systems and traceability tools were not used.	a) Need resources to create a requirements traceability matrix, and b) Need resources for a requirements tracking system
		P2				
		P3				
		P4				
	GP2.4	ORG				
		P1	a) HW#1 Report document defines the process and includes the plan on performing the process and the roles and responsibilities of the people involved in the process.		Scrum and XP were used so there are roles such as the product owner, scrum master, and scrum team and they each have their respective responsibilities. Requirements Management is typically done by the product owner but	

REQM						
Goal	Practice	Instance	DA	IA	Affirmation	Gaps
					involves the team as well.	
		P2				
		P3				
		P4				
	<b>GP2.5</b>	ORG				
		P1			Lecture notes on the Scrum and XP fundamental practices were distributed to all members of the organization.	a) Training on requirements management activities needs to be performed.
		P2				
		P3				
		P4				
	<b>GP2.6</b>	ORG				
		P1	a) Prioritized product backlog, b) Sprint backlog are placed under control based on product backlog	a) Minutes of meetings related to prioritizing the product backlog, b) Sprint planning is used to control which requirements are worked on during the sprint	In Scrum and XP, the product backlog is consistently being prioritized by the product owner, especially in the events where the customer requests modifications or new requirements.	
		P2				
		P3				
		P4				
	<b>GP2.7</b>	ORG				

REQM						
Goal	Practice	Instance	DA	IA	Affirmation	Gaps
		P1	a) List of relevant stakeholders, b) Product backlog shows the involvement of relevant stakeholders through the requirements for which it contains, c) Sprint Review involves showing what was done during the sprint to the relevant stakeholders		In Scrum and XP, the product owner communicates with customers. It is the product owner that acts as the representative for the customers and it is the product owner that prioritizes the product backlog. There needs to be an understanding between the set of requirements are placed in the product backlog. Communication between the product owner, as a relevant stakeholder, and the team is continuous throughout the process.	
		P2				
		P3				
		P4				
	<b>GP2.8</b>	ORG				
		P1	a) Daily stand-up meeting,			

REQM						
Goal	Practice	Instance	DA	IA	Affirmation	Gaps
			b) Sprint planning, and c) Sprint review are all performed to monitor and control the process against the plan			
		P2				
		P3				
		P4				
	GP2.9	ORG				
		P1			In Scrum and XP, it is the team as a whole that ensures that everyone is following the process, however they might not evaluate adherence objectively.	a) Need to objectively evaluate adherence of the process and selected work products against the process description, standards, and procedures, and address noncompliance, b) Need people not directly responsible for managing/performing the activities of the process to evaluate adherence
		P2				
		P3				
		P4				
	GP2.10	ORG				
		P1				a) Need higher level management to ensure that all commitments can be accomplished by reviewing proposed



REQM						
Goal	Practice	Instance	DA	IA	Affirmation	Gaps
GG3						changes to commitments to be made external to the organization.
		P2				
		P3				
		P4				
	GP3.1	ORG				
		P1	a) HW#1 report document defines the process that is tailored to fit the project's needs (section 3 discusses REQM activities)			
		P2				
		P3				
		P4				
	GP3.2	ORG				
		P1	a) HW#1 report document lists the lessons learned by member of the organization who worked on the project (section 7)			a) Need to document experiences in REQM activities, specifically requirements traceability matrix, number of unfunded requirements, resolving ambiguous requirements
		P2				
		P3				
		P4				

## 2.6 Generate Appraisal Results

In this section we will determine ratings which includes: instance characterization, organization characterization, goal ratings and process area ratings. The following table displays the process area rating for REQM, specifically. We used check marks in place of direct artifacts, indirect artifacts and affirmation that were previously described in the table in findings.

Ratings for REQM										
Goals	Practice	Instance	DA	IA	Affirmation	Instance Characterization	Organization Characterization	Goal Rating	PA Rating	Capability Level
SG1	SP1.1	ORG					Fully Implemented	<u>Unsatisfied</u>	<u>Unsatisfied</u>	0
		P1	✓	✓	✓	Fully Implemented				
		P2								
		P3								
		P4								
	SP1.2	ORG					Fully Implemented			
		P1	✓	✓	✓	Fully Implemented				
		P2								
		P3								
		P4								
	SP1.3	ORG					Fully Implemented			
		P1	✓	✓	✓	Fully Implemented				
		P2								
		P3								
		P4								
	SP1.4	ORG					Not Implemented			
		P1				Not Implemented				
		P2								
		P3								
		P4								
	SP1.5	ORG					Largely Implemented			
		P1	✓		✓	Largely Implemented				
		P2								
		P3								
		P4								

GG1	GP1.1	ORG					Partially Implemented	Unsatisfied
		P1	✓	✓		Partially Implemented		
		P2						
		P3						
		P4						
GG2	GP2.1	ORG					Not Implemented	Unsatisfied
		P1				Not Implemented		
		P2						
		P3						
		P4						
	GP2.2	ORG					Fully Implemented	
		P1	✓	✓		Fully Implemented		
		P2						
		P3						
		P4						
	GP2.3	ORG					Partially Implemented	
		P1			✓	Partially Implemented		
		P2						
		P3						
		P4						
	GP2.4	ORG					Fully Implemented	
		P1	✓		✓	Fully Implemented		
		P2						
		P3						
		P4						
	GP2.5	ORG					Not Implemented	
		P1			✓	Not Implemented		
		P2						
		P3						
		P4					Fully Implemented	
GP2.6	ORG							
	P1	✓	✓	✓	Fully Implemented			
	P2							
	P3							
	P4							

	<b>GP2.7</b>	ORG					Fully Implemented			
		P1	✓		✓	Fully Implemented				
		P2								
		P3								
		P4								
	<b>GP2.8</b>	ORG					Fully Implemented			
		P1	✓			Fully Implemented				
		P2								
		P3								
		P4								
	<b>GP2.9</b>	ORG					Not Implemented			
		P1			✓	Not Implemented				
		P2								
		P3								
		P4								
	<b>GP2.10</b>	ORG					Not Implemented			
		P1				Not Implemented				
		P2								
		P3								
		P4								
<b>GG3</b>	<b>GP3.1</b>	ORG					Fully Implemented	<u>Unsatisfied</u>		
		P1	✓			Fully Implemented				
		P2								
		P3								
		P4								
	<b>GP3.2</b>	ORG					Partially Implemented			
		P1	✓			Partially Implemented				
		P2								
		P3								
		P4								

## Capability Level Profile



Figure 2: This is a Capability Level Profile. It shows the 4 Process areas that we are targeting and their targeted capability level. It also shows the level that our organizations were able to achieved which was a 0 for all 4 process areas.

## Document Appraisal Results

The appraisal team generated a report which documented all the findings in the appraisal. To aid in generating this report, the appraisal team utilized a mapping template document (Findings\_CMMI\_MA\_OPD\_PP\_REQM.doc) to document the final findings for all the functional areas that were included within the scope of the appraisal. The mapping document shows the findings, in table form, that includes the specific goals and practices as well as the generic goals and practices for each functional area based on the CMMI models.

In addition, the document also contains the instances (projects) that were used to assess the organization's process against the CMMI models and the objective evidence (direct artifacts, indirect artifacts, and affirmations) gathered from within those instances. Furthermore, the document contains the gaps in the implementation of the CMMI model practices by the organization. The final findings report contains the strengths and weaknesses and additional information that provides context for the findings within the organizational unit.

In addition to the mapping document template, the appraisal team also created a summary of results document (Appraisal\_Result.xlsx) to compile the overall process area ratings within the scope of the appraisal. The summary includes information such as the organization name, organization sponsor, the organizational unit being assessed, the lead appraiser, and other descriptions. Most importantly, the summary includes a table of the process areas that were assessed throughout the appraisal, the respective organizational unit's process area ratings, and the organizational unit's overall capability level rating.

## Appraisal Result

### Organization

Organization Name: Team OC

Organizational Unit: Entire organization

Appraisal Sponsor Name: Dr. Chang-Hyun Jo

Lead Appraiser Name: Danny Zhang

SEI Partner Name: Team OC

### Organizational Unit

Description: The organization consisted only of one unit.  
The unit was the team that worked on the Insertion Sort Application

Projects/Units/Support Groups: 1 unit

Organizational Sample Size: 1

% of people included: 100 (6 individuals)

% of projects/units included: 100 (1 project)

Org Scope Description: The Insertion Sort Application was selected in accordance with the

SCAMPI Version 1.3

Appraisal Description: Continuous Representation Appraisal

Appraisal End Date: 11/30/2016

Appraisal Expiration Date: 11/30/2019

Appraisal Method Used: SCAMPI Version 1.3 A

Model Information: CMMI-DEV Version 1.3

Appraised Functional Areas

Included: MA, OPD, PP, REQM

PAs	CL Rating
MA	0
OPD	0
PP	0
REQM	0

### Model Scope and Process Area Ratings

Level 2	Rating (Capability Level)	Level 3	Rating	Level 4	Rating	Level 5	
REQM	0	RD	Not Rated	OPP	Not Rated	OID	Not Rated

PP	0	TS	Not Rated	QPM	Not Rated	CAR	Not Rated
PMC	Not Rated	PI	Not Rated				
SAM	Not Rated	VER	Not Rated				
MA	0	VAL	Not Rated				
PPQA	Not Rated	OPF	Not Rated				
CM	Not Rated	OPD	0				
		IPM	Not Rated				
		RSKM	Not Rated				
		DAR	Not Rated				

## MDD3: Report Results

### 3.1 Deliver Appraisal Results

Before delivering the appraisal results to the organization sponsor, the appraisal team ensured that activities related to each item within the appraisal scope was performed diligently. The main activities included: 1) ensuring that objective evidence (artifacts) had been verified and the preliminary findings had been validated, 2) properly determining the process area ratings based on the chosen representation of the appraisal, and 3) creating the final findings report document and reviewing the final findings document thoroughly. After the performance of these activities, the appraisal team scheduled the delivery of the results and planned for the next step activities.

#### Deliver Final Findings

As mentioned, a document report was created that contained all the final findings of the appraisal. The document includes the documented strengths and weaknesses of the organizational unit's MA, OPD, PP, and REQM process areas based on the Insertion Sort Application project. The final document has been signed by the appraisal team and the appraisal team leader and a scheduled date was set to formally deliver the final findings to the organization.

#### Conduct Executive Session(s)

The appraisal team leader set up a meeting with the vice president of the organization where the final findings of the appraisal were presented. During the meeting, the appraisal team leader discussed that there were no issues with the appraisal. The appraisal team leader also elaborated on any questions that arose with regards to the appraisal results and provided guidance to the sponsor in terms of what the organization's priorities should be moving forward. Providing direction to the sponsor was very important especially since the organizational unit's process area ratings were found to be at capability level 0 for all four process areas that were included within the appraisal scope.

#### Plan for Next Steps

As mentioned, the organizational unit's process area ratings were at capability level 0 for the MA, OPD, PP, and REQM process areas so the sponsor required the performance of additional tasks. The sponsor requested from the appraisal team leader a recommendations report draft and a process improvement action plan for the organizational unit to act on the appraisal findings. It was requested that the process improvement action plan specified the necessary activities that the organizational unit needs to perform to improve on those process areas. Furthermore, the process improvement action plan also needed to provide, in detail, the assignment of responsibility, the schedule, and estimated resources for the implementation of the recommended actions.



## 3.2 Package and Archive Appraisal Assets

### Collect Lessons Learned

The execution of the appraisal activities was within the projected budget of the organization. The appraisal team completed the appraisal process on time, however, there were a few things that hindered the process. First was the lack of formal documentation by the organizational unit in relation to the specific and general practices that are defined within the CMMI models that were used in the assessment. This made some aspects of the appraisal more time consuming especially since the appraisal of the organizational unit was based on one instance (Insertion Sort Application Project). Whenever there was insufficient documentation or objective evidence that could be extracted from the supplied HW#1 document report or when the appraisal team required supplementary information to the objective evidence, they needed to perform multiple interviews with the individuals from the organizational unit that took part in the development of the Insertion Sort Application.

The second thing that slowed down the appraisal process slightly was the learning curve associated with the individuals from the organization unit that was being assessed. Since this is the organizational unit's, or entire organization's first time going through a SCAMPI-compliant appraisal, the individuals who partook in the interviews to help provide supplementary evidence in mapping the practices needed time to learn what was needed from them during the appraisal process. There were additional overhead costs related to familiarization with the SCAMPI appraisal as well as the type of objective evidence that is sufficient to substantiate goal-rating judgements based on CMMI models. Overall, after undergoing the appraisal process, the organizational unit now has a better idea on the types of documentation that are required from them for use in future appraisals.

### Generate Appraisal Record

The appraisal record consists of the entire data collection gathered throughout the appraisal. For the purposes of this appraisal, the appraisal record is this entire document report, which documents the appraisal conduct and results and summarizes the findings and their inferences. The appraisal team leader ensured that the appraisal team collected and created a baseline on the appraisal data, documented the satisfaction of all SCAMPI A requirements, generated the appraisal record from baselined planning and execution data collected throughout the appraisal, and delivered the appraisal record to the sponsor.

### Provide Appraisal Feedback to the SEI

The appraisal data that is required by the SEI was collected and reported for SEI to compile and analyze for reporting to the community and to monitor the quality of the appraisals that have been performed. The appraisal team leader ensured that the data package consists of the approved appraisal plan and the final findings report.

### Archive and/or Dispose of Key Artifacts

Archiving and disposing of key artifacts were performed after the appraisal team had delivered the necessary documents to the main stakeholder as part of the entire appraisal scope. All the key artifacts that were collected by the appraisal team from the organizational were archived and disposed of, and all objective evidence provided by the organization unit that was being assessed was returned. Other information such as meeting minutes that were generated during the appraisal are disposed of and it was ensured that the information collected and retrieved during the appraisal activities are only known to the sponsor the organization.

### Develop Recommendations

1. Implement a training program for data measurement and analysis (MA)
2. Utilize a requirements tracking system (MA and REQM)
3. Implement a training program for requirements management (REQM)
4. Create a separate team consisting of members who are not directly responsible for managing or performing the process activities to evaluate adherence (REQM)
5. Gather resources necessary to develop a requirements traceability matrix (REQM)
6. Implement a data management plan and system that would help organizations monitor each project's logistics. (PP)
7. Perform monitoring and controlling using work products and measures such as number of revisions to project plan, cost, schedule, and effort variance per plan revision, and schedule for development and maintenance of program plan (PP)
8. Implement a formal work breakdown structure (WBS). (PP)
9. Implement formal tailoring guidelines for each project. (OPD)
10. Allocate resources for special expertise to help in project planning such as experienced estimators, schedulers, technical experts (PP)

# Phase 3: The Establishing Phase

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## Set Priorities

While the top 10 recommendations are all important in helping our organization to achieve a level 2 capabilities, there are some suggestions that require immediate attention in our organization. We have prioritized the following top 10 recommendations and decided to focus our efforts on improving these 4 areas in our organization. The prioritization are as follows:

1. Utilize a requirements tracking system (MA and REQM)
2. Gather resources necessary to develop a requirements traceability matrix (REQM)
3. Implement a data management plan and system that would help organizations monitor each project's logistics. (PP)
4. Implement formal tailoring guidelines for each project. (OPD)

## Develop Approach

### *Utilize a requirements tracking system (MA and REQM)*

Implementing a requirements tracking system is useful for monitoring open items and progress towards overall project completion. With a requirements tracking system, organizations can monitor each requirement lifecycle to get a better sense of a project's overall status. This can be done by assigning statuses to each requirement, such as Proposed, In Progress, Drafted, Approved, Implemented, Verified, Deferred, Deleted, and Rejected. A requirements tracking system can also contain a feature to track requirements estimations and hours worked, which would assist with schedule development. The availability of this information can assist organizations in prioritizing requirements and allocating resources.

A requirements tracking system can be implemented manually using spreadsheets, or a commercially-available requirements management tool. Spreadsheets may be a viable option for smaller projects, but can be tedious and impossible to manage for larger projects that have much more complexity. A requirements management tool is recommended for this organization since it would provide them with the flexibility to manage requirements for large and small projects without additional effort. Requirements management systems typically rely on database systems such as PostgreSQL for data

storage, so a PostgreSQL implementation is also recommended for this process improvement approach.

#### *Gather resources necessary to develop a requirements traceability matrix (REQM)*

A requirements traceability matrix provides a number of benefits such as improved product quality and reduced maintenance costs. The availability of link information grants developers the ability to analyze the impact of changes, and also facilitates the ability of maintainers to make changes correctly and completely. It also improves testing effectiveness by pointing developers towards areas linked to failed tests. Although implementation can increase development costs due to extra effort required to manage trace information, it also has the ability to improve product maintainability. The best course of action to ease the effort required is to establish traceability link during the development phase.

A requirements traceability matrix can be created using spreadsheets or requirements management tools. Spreadsheets are more viable for smaller projects that have fewer requirements. As projects grow in size and complexity, maintaining spreadsheets becomes more difficult. For larger projects, it is better to utilize requirements management tools to generate requirements traceability matrices. For this process improvement plan, a requirements management tool is recommended since it provides more flexibility to an organization by enabling them to manage both smaller and larger projects without the need for significant process modifications.

#### *Implement a data management plan and system that would help organizations monitor each project's logistics. (PP)*

To implement a data management system and plan for the organization we need to show supporting evidence that a data management system would be beneficial to have. We need to determine all the end users and stakeholders that would be affected by this system that we want to implement. We need to determine the system functionalities such as:

- Track and report different data
- Document all data into database
- Create reports for analytical purposes
- Recall data from legacy files
- Monitor the data

#### *Implement formal tailoring guidelines for each project. (OPD)*

We want to implement tailoring guidelines that the organizations can use to aid its current and future project planning's. To approach this, we must bring this up to the sponsor to get their approval on implementing the new guidelines. Researching other organizations' tailoring guidelines will give us an idea of where to begin in order to implement this. Defining goals, tools that are necessary, and lifecycle models that are used will also help give us a direction as well. There are different tailoring options that should be looked into and metrics that should be analyzed to determine suitable tailoring guidelines for the organization.

## Plan Actions

### *Utilize a requirements tracking system (MA and REQM)*

Since a requirements tracking system implementation can be potentially costly, management and associated parties should be thoroughly educated on the long-term advantages of this endeavor. Once management has approved the initiative, then the implementation process can begin.

To begin the implementation process, the organization will need to host a PostgreSQL server either locally or remotely. During this time, a requirements management tool should also be selected and implemented. This tool can be hosted locally or through a third party depending on the business' interests and the capabilities of the tool selected. Implementing the requirements management tool and database should take no longer than one to two weeks to complete, depending on the levels of skill and experience of the people designated to perform the implementation.

Once the system is available for use, a training session will need to be held with the users that will be responsible for maintaining the system. These user groups must be selected prior to the start of the training session. This training session should cover how to use the system and what information will be tracked. The training coordinator will perform a demonstration using at least two sample requirements from a fictitious project. Then the users will be asked to perform the same tasks using two different requirements. At the end of the training session, users will be asked to sign a "Requirements Management Tool Training Completion" form. A training session should take one to two days, depending on the complexity of the requirements management tool implemented.

Requirements from active projects will need to be added to the newly implemented system for tracking moving forward, but the initial focus will be placed upon a smaller active project. Once 60% of the requirements from that project have been included into the system, another project can be added to the system.

### *Gather resources necessary to develop a requirements traceability matrix (REQM)*

The first step to implementing a requirements traceability matrix in a project is to educate management and the development team about the importance of requirements tracing. Due to potentially increased costs and effort, both parties have a greater likelihood of resisting this initiative if they are unaware of the long-term benefits. If management and developers are made aware of these benefits, they are more likely to support the change.

The next step is to select and implement a requirements management tool. These tools usually rely on databases such as PostgreSQL for data storage, so it is imperative to have a database implementation available. Implementation time may vary based on the skills and experience of the people performing the implementation, but it is important to complete as soon as possible.

While the requirements management tool and database are being implemented, the team should organize a meeting to determine the initial areas of focus. It is best to focus on

specific elements for link generation than to try to tackle it all at once since the latter option can be overwhelming in terms of effort required. A suggested method is for the team to brainstorm all potential areas of focus and to write each area onto a sticky note. These sticky notes can then be arranged on a wall in order of priority, and the top five high priority areas can be selected. It may also be useful to focus on a single project at a time while performing this activity.

Once the requirements management tool is available, a training session should be conducted with business analysts and developers. The purpose of this training session is to teach users how to use the requirements management tool and to explain the link generation and update procedure. Two roles will be defined at this time: Gatherer and Maintainer. The Gatherer is responsible for generating links and relaying those links to the Maintainer, and the Maintainer is responsible for generating a requirements traceability matrix using the updated link data. A Maintainer is also responsible for creating and updating a change log if the selected requirements management tool does not have that capability. Since developers are the prime candidates for generating links, they will be assigned the Gatherer role. Business analysts will be assigned the Maintainer role. When a Maintainer is unavailable to perform his/her duties, the Maintainer role should be temporarily assigned to a Gatherer. Because of this, it is important to ensure that developers attend this training session and are taught how to manage the link data and to generate requirements traceability matrices.

Requirements traceability matrices can be stored on Google Drive since that resource is currently being used by the organization. When doing so, it is important to keep older matrices for historical purposes. If a link becomes stale, having these documents will be easier to track down the source.

Once link data has been formed for 75% of the selected focus areas, another high priority focus area should be added based on priority list generated from the initial brainstorming activity. When potential focus areas are introduced within the organization, those areas can be prioritized using the suggested brainstorming method.

#### *Implement a data management plan and system that would help organizations monitor each project's logistics. (PP)*

The goal is to be able to implement a data management system and plan that would help the organization to monitor each project's logistics. The organization should start out by establishing a set of procedures that will require appropriate documentations through automation and having information being stored and reported properly. They have to clearly define all the stakeholders that will be involved with this data management system. Defining the stakeholders is important to iron out what this system needs to do in order to help alleviate some of the stakeholders' or end user's daily responsibilities. Also, the process areas must be defined to ensure that the data management system meets the standards that are set out by these process areas. Elicitation should be done to gather requirements for the system's functionality, design and development. With elicitation, the team would be able to gather enough requirements that would be needed in order for this data management system to be created and implemented. A cost and resource



estimation should also be performed in order to find out how much would be needed for the system to be implemented. Also, an estimation of how much it would cost to keep this running and maintained as well. Depending on the estimation the team would then need to allocate enough resources for system management and system maintenance. Once the system is built, training sessions will need to be held in order to teach the staff and end user's how to use the system.

Project manager should lead this project and ensure that the project is going according to schedule. The analysis team will be doing the gathering and documenting of the logistics of the system. The quality assurance team will verify and validate that the system is running properly. Should there be any issues they must notify the project manager immediately. The stakeholder and end users will be doing acceptance testing to make sure that the system meets their expectations and that all the requirements are being satisfied. Implementing a data management system will allow the organization to improve upon the project planning's capability level.

#### *Implement tailoring guidelines for each project. (OPD)*

The goal is to establish tailoring guidelines that would help aid the organization into tailoring both the standard processes and the lifecycle model that they will be using to fit the project's needs. The team needs to observe the organizations standards of processes that they currently use. This will help lay out the foundations of what they will be working with. The team needs to determine which processes works and which ones doesn't for the current project. There are many different processes and they do not all do the same things. Some processes will not work for certain projects. The tailoring guidelines should help determine what part of the process should be added, elaborated, changed or deleted from the project. They need to determine which processes are usually being tailored and which ones usually don't work well for the projects. This will help weed out all the processes so that the organizations won't have to waste time trying to make these processes work when they clearly don't work for any projects. Also, it would also be best to find out from upper management which processes are tailorable and which ones are mandatory for the project. There are certain processes that upper management deemed to be necessary for the project and therefore, should not be altered in any way. This is important so that the team do not end up messing with certain processes that are actually required.

Besides observing the standard processes, the team needs to also identify a few key aspects in order to implement tailoring guidelines to their projects. They need to determine stakeholder's involvement, needs and objectives. This is necessary to determine the tailoring guidelines. The team needs to know what stakeholders look for in every project, therefore the tailoring guidelines should be made to meet their expectations. The goals and scope of projects are also clearly defined so that the tailoring guidelines could be determined for the specific project. They must identify the lifecycle model that is to be used in comparison with the standard processes. This will help the team tailor both to fit the project's needs. The characteristics of the project should also be identified. By determining their characteristics, the team would know how to tailor the

processes to match up with the project's characteristics. This assures that each project has a specific set of processes tailored to their needs. Project strategies can be made base on the characteristics of the project. Tools that are necessary for each project should be identified to see how they would be beneficial to the project. Lastly, analyze project measurements to determine where in the processes being used is tailoring necessary and where it is not necessary to implement. By carrying out these action plans, tailoring guidelines will help the organizations improve their process for the current project and future projects as well.

## Phase 4: Acting Phase *(Not included in this homework)*

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Create Solution

Pilot/Test Solution

Refine Solution

Implement Solution

## Phase 5: Learning Phase *(Not included in this homework)*

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Analyze and Validate

Propose Future Actions



# Lessons Learned

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## Alex Liao

Going into the project, I had not worked with CMMI, the IDEAL model, or a SCAMPI appraisal. Throughout the project, I was able to become more familiar with the IDEAL model as we did a SCAMPI appraisal on Homework 1. It also allowed me to revisit our work on Homework 1 and place our Scrum and XP process within the context of CMMI. Based on lecture and reading, I knew that CMMI was very complex, detailed, and thorough. As I worked on Homework 2, I was able to truly realize how complicated CMMI is. There was a lot to become familiar with in order to be able to successfully and, more importantly, accurately perform a SCAMPI appraisal on Homework 1. After this homework assignment, I was able to get some experience with CMMI and confirm and validate my earlier beliefs that it is very complicated and thorough.

When I read the Homework 2 assignment, I had predicted that we would attain Capability Level 2, or at least very close to it. After working on the assignment more and seeing our Scrum and XP process in the CMMI context, I can understand where we fell short. I was initially surprised to find out we were actually at Capability Level 0, but the SCAMPI appraisal allowed me to understand why. Scrum and XP, when compared to CMMI, is a relatively simple and straightforward process. It gets the work done, as demonstrated by our team's completion of Homework 1. However, it does not necessarily demonstrate a high Capability Level in CMMI.

My ultimate takeaway is that CMMI is incredibly detailed and thorough. I went into this assignment believing that CMMI is best left for large organizations with teams that can help perform SCAMPI appraisals and help a company achieve and maintain certain Capability Levels. For an actual company that continually develops systems, I would imagine there being a full team with adequate resources dedicated to CMMI.

## Danny Zhang

Even though I have had some experience working in various corporate environments, I never had the chance to participate in process assessment and improvement. Through this assignment, I was given the opportunity to apply what I had learned about the software development process in the lectures. Specifically, learning how to assess and improve a process through the use of standard models. While the lectures talked about CMMI, the IDEAL model, and SCAMPI appraisal, I had no idea how those three came together in software process improvement. The hands on experience that came with doing this assignment was extremely beneficial in the learning process. The item that I found most interesting through this assignment was narrowing down the list of recommendations to just ten in IDEAL Phase 2. If given the time and chance, I would like to take more time to study these standard models. It took some time for me to understand these models, and I think getting an even better grasp of them would be incredibly helpful.

After some more studying, I plan to talk to my manager and see whether or not it would be a good idea to perform an assessment on the current project.

### Eric Lyv

Throughout this assignment, I learned the importance of each step of the SCAMPI appraisal process and the kinds of actions needed to perform and improve our current process areas. This assignment gave me the chance to experience and understand CMMI and IDEAL models at each stage and hopefully, apply what I learned from this assignment to real-world development projects. The CMMI is an excellent model for process improvement. The effectiveness and efficiency, however, may depend on the organization but the CMMI draws a nice starting path. I also learned that communication and working closely together is key in every successful project. This also relates to HW1. That is why before we all began, all members of the team helped each other understand each step of the appraisal process to ensure that everyone is performing the practices properly. For future projects, I would like to learn and be able to go more in depth with process improvement and other standard models.

### John Crisanto

In the beginning of this assignment, I was not entirely sure how a Scrum and XP process would map out in relation to the specific and generic practices defined within the CMMI models used for this assignment. After performing the required tasks and as my group progressed through the homework, I gained a much better understanding of the software development process that my group had used for the development of the Insertion Sort Application. All of the concepts related to process assessment and improvement is brand new to me so performing this assignment involved quite a steep learning curve and one of the things to note is the importance of doing the assignment early. Most of the concepts took time to sink in and iterating multiple times through the models within the CMMI-DEV document and the methods in the SCAMPI document help clarify the overall process.

By performing this assignment, I now find it obvious that software development processes are not perfect and there is always room for improvement. Upon performing the appraisal activities, I could see both the strengths and weaknesses of our process in relation to CMMI. This assignment opened my eyes especially in terms of Scrum and XP being a lightweight framework that is easy to use and the types of projects that can benefit more from the practices defined within the CMMI models, which seem to require extensive documentation. What I liked about the assignment was that we were given the opportunity to see the appraisal process from the perspective of the organization which was being appraised and the appraisal team conducting the appraisal activities. Overall, I would like to learn more about other process areas and gain a solid understanding of process improvement and recognizing weaknesses in a process.

### John Mai

Going into this project, the assignment was very confusing to me since I was still trying to get a handle of what CMMI, SCAMPI and IDEAL were about. As I worked through the

project and read up on lecture notes and pdf files many times I begin to piece together how all three of these work together. In the beginning I thought that our organization was at either a capability level 1 or 2 but performing all these tasks and finding out that we were at a capability level 0 made me realize how complex CMMI really is when compared to Scrum and XP processes. CMMI is not only good for big organizations but it helps any organization that wants to improve their process and their capability level. Using SCAMPI AND CMMI our team was able to determine what our organization needed to work on in order to improve our capability level. Overall, this project has helped us understand that there is always room for improvement when it comes to software development.

### Kevin Tran

Being that this was my first experience with process assessment and improvement, I faced a somewhat steep learning curve. After performing the assessment for the Scrum and XP process that we had implemented in Homework 1, I gained a deeper understanding of each process and strategies to improve those processes at an organizational level. I also learned the value in having well-defined processes, and how mapping associated work products to a model such as CMMI-DEV can lend a hand at identifying areas of improvement. Based on my experience with this assignment and the knowledge I gained, I am interested in exploring the process improvement strategies that my current organization has undergone. I plan to discuss process assessment and improvement strategies for our existing processes, and to learn from any past ones.

### Group Lessons Learned

As a group, we learned that working closely together as a single unit is crucial to conducting a successful process assessment and building an effective process improvement plan. It was very important for everyone in the group to understand each step of the appraisal process to help ensure that we are performing the practices properly. Furthermore, having everyone in the group involved was beneficial especially in identifying the objective evidences, affirmations, and determining gaps in our current process against the CMMI models. In addition, whenever there were any issues or confusion pertaining to the appraisal findings or the appraisal process, it was helpful having team members with various backgrounds and expertise that can provide unique perspectives especially during the group discussions that were held to effectively address those concerns.

Throughout this assignment, we learned about the strengths and weaknesses of our current process and after conducting the appraisal, our team was challenged in devising an effective process improvement plan. Since most of the concepts within this assignment were rather new to each member of our team, effectively prioritizing and reaching a consensus on the development of the process improvement action plan demanded a considerable amount of communication between our team. In the end, we were able complete the assignment within the assigned deadline and we also built a stronger level of trust among our team. Lastly, as a group, we have decided on key points of the assignment that we would like to gain more experience on including recognizing weaknesses in a process and developing efficient ways to bolster those weaknesses.

# References

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- [1] [http://resources.sei.cmu.edu/asset\\_files/Presentation/2001\\_017\\_001\\_23277.pdf](http://resources.sei.cmu.edu/asset_files/Presentation/2001_017_001_23277.pdf)
- [2] [http://resources.sei.cmu.edu/asset\\_files/TechnicalReport/2010\\_005\\_001\\_15287.pdf](http://resources.sei.cmu.edu/asset_files/TechnicalReport/2010_005_001_15287.pdf)
- [3] [http://resources.sei.cmu.edu/asset\\_files/TechnicalNote/2008\\_004\\_001\\_14924.pdf](http://resources.sei.cmu.edu/asset_files/TechnicalNote/2008_004_001_14924.pdf)
- [4] [http://resources.sei.cmu.edu/asset\\_files/Handbook/2011\\_002\\_001\\_15311.pdf](http://resources.sei.cmu.edu/asset_files/Handbook/2011_002_001_15311.pdf)
- [5] <http://seir.sei.cmu.edu/pml/>
- [6] CMMI Lecture Notes
- [7] SCAMPI Lecture Notes
- [8] IDEAL Lecture Notes
- [9] Team OC, "Homework 1, Insertion Sort Application", Fullerton, CA, September, 2016.

# Team Charter



## Team

### Charter

<b>Course Title</b>	CPSC 544 (Sect#50) Advanced Software Process	<i>All team members participated in the creation of this charter and agree with its content. <b>Date</b> 10/1/2016</i>
<b>Instructor</b>	Dr. Chang-Hyun Jo	
<b>Course Dates</b>	08/22/2016 – 12/09/2016	
<b>Team Name</b>	OC	

### Team Members (Contact Information)

Name	Address (city, state, country)	Phone	Cell	Email
John Mai	Irvine, CA	818-288-2745	818-288-2745	jmai1011@csu.fullerton.edu
Alex Liao	Irvine, CA	949-302-2774	949-302-2774	aliao@csu.fullerton.edu
Kevin Tran	Santa Ana, CA	714-878-2436	714-878-2436	kevintt@csu.fullerton.edu
Eric Lyv	Laguna Niguel, CA	949-690-4674	949-690-4674	lyveric@csu.fullerton.edu
John Crisanto	Long Beach, CA	562-704-8778	562-704-8778	jcrisanto1987@csu.fullerton.edu
Danny Zhang	Rowland Heights, CA	626-940-4672	626-940-4672	danny.zhang@csu.fullerton.edu

### Team Member Skill Inventory (Areas individual members can contribute)

John Mai	<ul style="list-style-type: none"> <li>Minimal experience in industry</li> <li>MS Word, Excel, PowerPoint, Access</li> <li>Database SQL, BigQuery</li> <li>HTML, C++</li> <li>Bitbucket Repositories and SourceTree</li> </ul>
Alex Liao	<ul style="list-style-type: none"> <li>Adobe Creative Suite</li> <li>Microsoft Office Suite</li> <li>Web Development (HTML, CSS, PHP, JavaScript)</li> <li>Programming Languages (C++, Java)</li> <li>Some project management experience</li> </ul>
Kevin Tran	<ul style="list-style-type: none"> <li>Enterprise Web Applications (primarily MVC)</li> <li>Programming Languages (Java, JavaScript)</li> <li>Database (PL/SQL, Oracle, MongoDB, PostgreSQL)</li> <li>Frameworks (ExtJS, NodeJS, Hibernate, Spring, JQuery)</li> <li>Unix (Bash), Git, AWS (minor experience), Jetty, Nginx</li> </ul>

Eric Lyv	<ul style="list-style-type: none"> <li>• Web Development - ASP.Net MVC/Web Forms</li> <li>• Database - MSSQL Server 2008R2/2012</li> <li>• C#/VB.net</li> </ul>
John Crisanto	<ul style="list-style-type: none"> <li>• No experience in industries</li> <li>• MS Word, Excel, PowerPoint, Access</li> <li>• Basic SQL</li> <li>• Basic HTML, Java</li> </ul>
Danny Zhang	<ul style="list-style-type: none"> <li>• Enterprise Web Applications (primarily MVC)</li> <li>• web Development (HTML, CSS, PHP, JavaScript)</li> <li>• programming Languages (C++, Java, Python)</li> <li>• database (mySQL, SQL Server 2013/2016)</li> <li>• frameworks (NodeJS, Spring)</li> <li>• Git, Bitbucket, SVN, Azure</li> <li>• MS Word, Excel, PowerPoint, Access</li> </ul>

#### **Team Goals** (Project goals, team process goals, quality goals, etc.)

##### Project Goals

- Have a clearly defined project scope and requirements
- clear milestones/deadlines
- Ensure equal contribution

##### Team Process Goals

- Improve existing software development processes
- Learn about the strengths and weaknesses of the team's software development processes
- Become better accustomed to working in an Agile XP environment
- Encourage collaborative effort
- follow and document a process

##### Quality Goals

- Meet/exceed project requirements / specifications
- Produce functional and error-free product
- Produce well written technical report

#### **Team Roles** (Define roles of each member to achieve goals)

Danny Zhang Appraisal Team Leader	<ul style="list-style-type: none"> <li>▪ Document tasks that needs to be done with dates, and completed by labeled.</li> <li>▪ Document any ideas and key points.</li> <li>▪ Remind team members about team purpose and overall goals.</li> <li>▪ Communicate with professor about team progress and/or any questions the team may have.</li> <li>▪ Ensure that appraisal participants are briefed on the purpose, scope, and approach of the appraisal.</li> <li>▪ Verify and document that the appraisal method requirements have been met.</li> </ul>
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John Crisanto Librarian	<ul style="list-style-type: none"> <li>▪ Ensure equal participation between all members in discussion and the project.</li> <li>▪ Provide agenda with enough time to allow team members to be able to review before any important meeting</li> <li>▪ Manage appraisal documentation.</li> </ul>
Kevin Tran Facilitator	<ul style="list-style-type: none"> <li>• Ensure all team members are allowed the opportunity to provide input during meetings</li> <li>• Help the lead with the agenda for meetings</li> <li>• Make sure meetings went over everything that was on the agenda in a timely manner</li> <li>• Remind team of their progress and ask for input.</li> <li>• Conduct interviews during appraisal.</li> </ul>
Alex Liao Timekeeper	<ul style="list-style-type: none"> <li>▪ Be able to alert team members of any changes that are made to the meeting scheduled.</li> <li>▪ Make sure all members are on schedule with tasks. <ul style="list-style-type: none"> <li>▪ Remind team member of the purpose and the tasks of the project.</li> </ul> </li> </ul>
John Mai Appraisal Coordinator	<ul style="list-style-type: none"> <li>▪ Read through HWs criteria and understand what needs to be done.</li> <li>▪ Give members know-hows for the HW project.</li> <li>▪ Responsible for having one team member turn in the assignments by the due date.</li> </ul>
Eric Lyv Appraisal Coordinator	<ul style="list-style-type: none"> <li>▪ Monitor the project from a technical standpoint.</li> <li>▪ Know how the process flows from one process to another throughout the project.</li> <li>▪ Handle logistics and provide support to the appraisal team leader.</li> </ul>

**Ground Rules** (Meeting schedule/locations, attendance expectations, agenda, assignment completion, communication methods, etc.)

- Be responsive to emails, messages, chats
- Attend weekly meetings (online or in person). Tentatively scheduled for every Saturday @ 9:30 AM
- Be prepared for meetings; have questions and insight to contribute
- Equal participation is expected from all team members, be it online or in person
- Respect all other members' suggestions and contributions by remaining constructive and encouraging
- Let other team members know in advance when you are unable to attend a meeting
- Develop clear agendas for meetings when necessary, adhere to agendas when meeting
- Ask others when you need help; help others when requested
- Complete all tasks on time and by due date(s)
- Absolutely no plagiarism.

**Time Commitments/Availability** (Pacific Time)

John Mai	<ul style="list-style-type: none"> <li>▪ M-F: 6pm-10pm</li> <li>▪ Saturday &amp; Sunday: All day</li> </ul>
Alex Liao	<ul style="list-style-type: none"> <li>▪ M-F: 7pm-10pm</li> <li>▪ Saturday: morning - 7pm</li> <li>▪ Sunday: morning - 10pm</li> </ul>

Kevin Tran	<ul style="list-style-type: none"> <li>▪ M-F: 6:30pm-9pm</li> <li>▪ Saturday: all day</li> <li>▪ Sunday: 11am-9pm</li> </ul>
Eric Lyv	<ul style="list-style-type: none"> <li>▪ Monday, Tuesday, Thursday, Friday: 6:30pm-10pm</li> <li>▪ Saturday &amp; Sunday: All day</li> </ul>
John Crisanto	<ul style="list-style-type: none"> <li>▪ M-F: 6pm-10pm</li> <li>▪ Saturday &amp; Sunday: All day</li> </ul>
Danny Zhang	<ul style="list-style-type: none"> <li>▪ M-F: 6:30pm-10:30pm</li> <li>▪ Saturday &amp; Sunday: 2pm - 10pm</li> </ul>

**Conflict Management** (What are potential conflicts that might arise among or between team members during this course? How will team members deal with these and other conflicts?)

- In order to avoid conflict, all members should adhere to their assigned roles.
- In the event of conflict, we will not finger point but rather fix the problem at hand. We will take measures to prevent conflict(s) from occurring again.
- Any issues or conflicts that arise should be brought to the group immediately so that we may settle the issue or conflict as quickly and peacefully as possible.

**Risk Management** (What are potential barriers to the achievement of these goals?)

- Lack of effective and responsive communication
  - o Possibility: High
  - o Consequence: The team's progress will be affected. Established goals might not be achieved within the desired time frame.
  - o Occurrence: High. Whenever something is unclear, it needs to be resolved through communication.
  - o Urgency: High. Any blocks need to be reported and resolved immediately.
  - o Manageability: The team has to make sure that everyone is stays in constant communication with each other. Whenever there are special needs that need to be addressed, it needs to be discussed immediately with the team so that it can be resolved.
  - o Dependencies: This risk is dependent on each team member following the communication practices set forth by the team.
- Inability of finding a time when people are available for scrum meetings, sprint reviews, and other events
  - o Possibility: Medium
  - o Consequence: The team will have a difficult time staying on the projected track. The team's progress is hindered especially when tasks have not been appropriately assigned.
  - o Occurrence: Low. Although most team members are working professionals, meetings can be scheduled after work hours. Also, with the convenience of the internet, the ability to set meetings are more flexible.
  - o Urgency: High. It is very important for all, or most, team members to be engaged in meetings so that decisions can be decided upon. If issues are left unresolved for a long time, the team can fall behind.



- o Manageability: The team has to keep constant communication with each other. This way, each member is constantly aware of each other's availabilities. Each team member has to put in more effort in prioritizing their schedules because in the end, the work has to be completed.
- o Dependencies: This risk is dependent on each team member's current work/life schedule. This is also dependent on each team member's ability to incorporate completing this assignment into their schedule.

#### Inadequate understanding of scope and requirements

- o Possibility: Low
- o Consequence: The application will not meet the minimum specifications and the team will not be able to prioritize tasks properly.
- o Occurrence: High. There is a chance of being off scope or doing something that does not follow the requirements every time a decision is made.
- o Urgency: High. This can occur whenever a decision needs to be made pertaining to the scope or requirements, which is very often.
- o Manageability: The team will read through the scope and requirements thoroughly prior to performing any implementation activities. The team will also frequently review the performed work against these established requirements.
- o Dependencies: The most difficult part about this risk is having the ability to identify when there is a lack of understanding in the scope and requirements. Team members should make an effort to understand the customer's needs.

#### Lack of understanding Agile and XP methodologies

- o Possibility: Low
- o Consequence: Without a proper understanding of the Agile and XP methodologies, the team will have a hard time following of managing the project flow. Some key steps may be skipped or done incorrectly, causing delays in the schedule or may defeat the purpose of following such techniques.
- o Occurrence: Infrequent. This risk can occur throughout the project. However, once the first iteration is complete, the chance of this occurring is much lower.
- o Urgency: Medium. The team needs to spend time to understand the Agile and XP methodologies before they can perform planning and staging.
- o Manageability: Each member of the team will take time to study Agile and XP. The team will spend time together to go over what process will be followed during the pre-game stage, where planning and staging will be done.
- o Dependencies: This depends on the team's ability to learn and understand the two methodologies. It also depends on the people who know them well to keep the team from falling off track.

#### Lack of understanding SCAMPI-compliant appraisal and CMMI models

- o Possibility: Low
- o Consequence: Without a proper understanding of the SCAMPI-compliant appraisal and CMMI models, the team will have a hard time following of managing the project flow. Some key steps may be skipped or done incorrectly, causing delays in the schedule or may defeat the purpose of following such techniques.
- o Occurrence: Infrequent. This risk can occur throughout the project. However, once the team begins to understand the methods, processes, and models, the chance of this occurring is much lower.

- o Urgency: Medium. The team needs to spend time to understand the SCAMPI appraisal process as well as the CMMI models before they can perform the appraisal activities.
  - o Manageability: Each member of the team will take time to study SCAMPI and CMMI. The team will spend time together to go over what process will be followed during the HW.
  - o Dependencies: This depends on the team's ability to learn and understand the appraisal process. It also depends on the people who know them well to keep the team from falling off track.
- We believe that the majority of these risks will be manageable or have minimal impact if we adhere to our ground rules of effective communication.
- During the estimating of tasks phase, we will try to be as thorough as we can to identify contingencies. In the event that the identified or unforeseen risks become problems, we plan to embrace Scrum and XP to handle the issues. We expect that as the project gains traction and iterations are completed, the likelihood of the risks occurring will decrease.

**Team Evaluation Criteria** (List evaluation criteria that will be used to evaluate team members objectively.)

- Adhere to Team Evaluation Template.
- The team members will be evaluated by their effort and overall contribution to the team.
- Based off efficacy of communication and attendance.
- Evaluate objectively by objective evidence as defined here (e.g., team meeting log, documents, email record, etc.), not by subjective opinions.

# Team Evaluation

CPSC 544 – Fall 2016

## Self-Evaluation of Team

Members	John Mai	Alex Liao	John Crisanto	Danny Zhang	Kevin Tran	Eric Lyv	Total	Comments on Your Evaluation on Team
<b>Evaluators</b>								
John Mai	100	100	100	100	100	100	600	All team members were responsible and did what was assigned to them in a timely manner.
Alex Liao	100	100	100	100	100	100	600	Everyone worked hard to complete the tasks they were assigned. We all collaborated together and communicated efficiently.
John Crisanto	100	100	100	100	100	100	600	All team members put in all the time and effort necessary to complete the assignment. They were a pleasure to work with and I am looking forward to working with them in the future.
Danny Zhang	100	100	100	100	100	100	600	Each team member worked hard on the assignment and exceeded expectations.
Kevin Tran	100	100	100	100	100	100	600	Team members were responsive to questions and diligent with their assigned tasks.
Eric Lyv	100	100	100	100	100	100	600	All members of the team did extremely well working together and collaborating. All work was completed in a timely manner.
<b>Total</b>	600	600	600	600	600	600	3600	
<b>Max</b>	600	600	600	600	600	600	600	
<b>Average</b>	100.00	100.00	100.00	100.00	100.00	100.00	600.00	
<b>Percent</b>	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	
<b>Signature</b>	John Mai	Alex Liao	John	Danny	Kevin Tran	Eric Lyv		
<b>Comments on Your Score Earned from Team</b>	I deserve the score my team has given me	I accept the score given to me by my team.	I accept my team's evaluation of my performance	I accept the score that my team members have given	I accept the score that I received from my team.	I accept my score from my team members.		