Measuring Maturity Level On The Process Of Developing An Online Presence System With CMMI Framework

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Abstract The development of information technology has spurred new ways of life that meet people's electronic needs, such as e-commerce, e-government, e-education, and so on. IT involvement in an institution or organization causes system changes that have an impact on changes in the way of performance [1]. Good use of technology is important for local governments [2]. In addition to facilitating the reporting process, information systems can support the main tasks and functions of government. The online presence system is one of the supporting tools in government to support the implementation of e-government. To support the quality of the system and increase the trust of interested parties, it is necessary to conduct an audit of the online presence system development process. Measuring the level of maturity of the online presence system development process using the CMMI framework. The percentage of maturity level in the presence system development process is 73.33 at level 2. Each process area of CMMI can be achieved through a questionnaire that has been distributed to the team involved in the online presence system development process.

***Index Terms*—CMMI Framework, Information Technology, Online Presence System Development, SCAMPI Model.**

Note: There should no nonstandard abbreviations, acknowledgments of support, references or footnotes in in the abstract.

I. INTRODUCTION[1]

Attendance is one important thing in measuring discipline. Attendance or attendance is one of the routines performed by employees before starting and leaving work. Attendance can also be used as a measure of the performance of an employee in local government. Performance appraisal is one of the references for the process of salary increases, promotions, demotions, and dismissal of employees [3]. The work performance appraisal approach is a method of appraising employee performance by combining assessments of work targets and work behavior of employees [4]. By utilizing information technology, personnel can easily assess employee performance.

The development of information technology has spurred new ways of life that meet people's electronic needs, such as e-commerce, e-government, e-education, and so on. As a result, IT interactions within an organization lead to system changes that have an impact on performance [1]. Implementation of systems in information technology has been regulated in Instruksi Presiden Nomor 3 Tahun 2003. The use of information technology in realizing good governance is important for local governments [2]. IT Governance is a structure of relationships and processes that can guide an organization to achieve its goals and by taking into account the risks and results obtained through the use of information technology [5]. In addition to facilitating the reporting process, information systems can support the main tasks and functions of government. The application of information systems is also very helpful in terms of effectiveness and efficiency in the reporting process. With an integrated system, it can assist the government in implementing e-government.

The online presence system is one of the supporting tools in government to implement e-government. The online attendance system is able to manage attendance and display the disciplinary achievements of employees in government. This system is also able to be integrated with the additional employee allowance system as one of the supporting variables for the amount of allowances that employees receive. In addition, this system has been developed based on regulations issued by the central government.

This paper discusses the audit of the online presence

system development process. The purpose of conducting an audit is to maintain the quality of the system and increase the trust of client. An internal evaluation is needed in the form of an audit so that the manager can plan for the repair and improvement and development of the infrastructure that has been built [6]. The audit in this paper uses the CMMI framework to measure the maturity level of the online presence system. In the first stage, the CMMI process area to be audited will be determined. The second stage, the questionnaire will be distributed to the teams involved in developing the online presence system. The third stage will be calculating the questionnaire using the SCAMPI method (Standard CMMI Appraisal Method for Process Improvement). The calculation of the SCAMPI model can be used to assess the level of maturity of the online presence system development process.

II. METHODOLOGY

A. Audit Information System

Information system auditing is a process for collecting and evaluating evidence in determining whether the system has been built so that data maintenance, maintaining assets, making organizational goals can be achieved effectively, and using resources effectively [1].

B. CMMI (Capability Maturity Model Integration)

Capability Maturity Model Integration (CMMI) is an approach model for assessing the scale of capability and maturity in a software organization. CMMI was originally named CMM (Capability Maturity Model) which was built and developed by the Software Engineering Institute in Pittsburgh in 1987 [2].

CMMI has a tiered assessment process. The assessment is obtained based on a questionnaire developed specifically to obtain software that supports process improvement [2]. The maturity level of CMMI, namely:

1) Level 1 – Initial

Process that is executed is uncontrollable and reactive.

2) Level 2 – Managed

Process that is well planned, measured, implemented and controlled.

3) Level 3 – Defined

Processes that have been clarified with understandable procedures and methods.

4) Level 4 – Quantitatively Managed

Processes that already have measurable and purposeful goals for product quality are well managed.

5) Level 5 – Optimizing

Already focused on improving processes in a sustainable manner and using better technological innovations.

Each level in CMMI has a different process area. There are 22 process areas that must be met to reach the desired maturity level. The following is a process area which can be seen in the table 1.

Table 1 Process Area CMMI

Process Area	Abbreviation	Maturity Level
Configuration Management	CM	2
Measurement and Analysis	MA	2
Process and Product Quality Assurance	PPQA	2
Project Monitoring and Control	PMC	2
Project Planning	PP	2
Requirements Management	REQM	2
Supplier Agreement Management	SAM	2
Decision Analysis and Resolution	DAR	3
Integrated Project Management	IPM	3
Organizational Process Definition	OPD	3
Organizational Process Focus	OPF	3
Organizational Training	OT	3
Product Integration	PI	3
Requirements Development	RP	3
Risk Management	RSKM	3
Technical Solution	TS	3
Validation	VAL	3
Verification	VER	3
Organizational Process Performance	OPP	4
Quantitative Project Management	QPM	4
Causal Analysis and Resolution	CAR	5
Organizational Innovation and Deployment	OID	5

C. SCAMPI (Standard CMMI Appraisal Method for Process Improvement)

SCAMPI is a standard method for evaluating the process in auditing using CMMI [7]. SCAMPI consists of a series of activities including interviews, checking documents, receiving and giving presentations, and analyzing the results of questionnaires and surveys. The weighting can be seen in the table 2.

Table 2 SCAMPI Weight Criteria

Abbreviation	Criteria	Weight
NI	Not Implemented	0
PI	Partially Implemented	1
LI	Largely Implemented	2
FI	Fully Implemented	3

Figure 1 shows the calculation process with the SCAMPI model. The total process area (PA) is obtained from the total answers divided by the total respondents. The criterion value in each process area to measure the level of maturity is not achieved (0-1.9) and achieved (2-3).

$$total\ PA = \frac{total\ answer}{total\ respondents}$$

Figure 1 SCAMPI Calculations

III. Result and Discussion

A. Determination of the CMMI Process Area

In the level 2 maturity level audit in the online presence system development process, 7 process areas from CMMI are used. The process areas include CM (Configuration Management), MA (Measurement and Analysis), PMC (Project Monitoring and Control), PP (Project Planning), PPQA (Process and Product Quality Assurance), REQM (Requirements Management), and SAM (Supplier). Agreement Management). Furthermore, the process of making a questionnaire will be carried out with a predetermined process area. Following table 3 are some questionnaires based on a predetermined process area.

Table 3 Questionnaire Sample

Process Area	Description	Action			
		NI	PI	LI	FI
PMC - Project Monitoring and Control	Provide appropriate actions that can be taken when project performance deteriorates from original planning.				
PP – Project Planning	Build and maintain plans defined into activities in the project.				
REQM - Requirements Management	Manage needs in the project and identify consistency between needs and project planning.				

B. Questionnaire Results

The questionnaire was distributed to the teams involved in the development of the online attendance system. The distribution of the questionnaires was assessed based on calculations using the SCAMPI model. Furthermore, the value of respondents' answers will be recapitulated according to the criteria chosen by the respondent. Table 4 is the result of the recapitulation of the questionnaire scores based on the criteria of the SCAMPI model.

Table 4 Questionnaire Result

Process Area	System Analyst	Team Leader	Prog. 1	Prog. 2	Prog. 3
CM	3	2	2	2	2
MA	2	2	3	2	1
PMC	2	2	2	3	3
PP	2	2	3	2	2
PPQA	2	2	2	2	2
REQM	3	2	3	2	2
SAM	2	3	2	2	2

C. Calculation Results

After getting the results of the weight recap of the answers from the questionnaire, then the calculation is carried out in each process area. Still with the SCAMPI method, this calculation will show whether maturity is achieved or not in each process area. Judging from table 5, the values of all process areas show that the maturity level of all process areas has been achieved.

Table 5 Process Area Result

Process Area	PA Result	Criteria
CM	2.2	Reached
MA	2	Reached
PMC	2.4	Reached
PP	2.2	Reached
PPQA	2	Reached
REQM	2.4	Reached
SAM	2.2	Reached

D. Measuring the Level of Maturity

To measure the level of maturity, calculations are carried out by finding the percentage of the total value resulting from the process area. Calculating the percentage is done by first calculating the number of process areas at the level being sought, then multiplied by the highest value of the weighted answers to the questionnaire [8]. It is known that the total process area weighting value gets 21 results. The next step is to add up all the values from the process area multiplied by 100 and divided by the total process area weighted value. It is found from the calculation results in Figure 2, namely the level of maturity in the online presence system development process valued at 73.33%.

$$maturity\ (73{,}33\ \%) = \frac{15{,}4 * 100}{21}$$

Figure 2 Maturity Result

IV. Conclusion

From the results of the online attendance system audit using the CMMI framework, several conclusions were found, namely:

- With the SCAMPI calculation, the value for each process area at CMMI is reached at the level of maturity level 2.
- The level 2 maturity level in the online presence system development process is 73.33%.

From these results, it can then be done to increase the process of measuring the level of maturity at level 3.

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