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Visualization for the Assessment Model of an Simplified Test Maturity Model (TMM)

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Abstract— For enhancing the test quality, it is required to something how to improve Test Maturity Model (TMM). However, the existing TMM has some inappropriate parts to apply TMM in domestic small and medium businesses. This model does not identify deficient documents for achieving test maturity goal of a company. To solve these problems, we suggest a Simplified Test Maturity Model (STTM) to customize a scale-down of TMM (Test Maturity Model) to Korean small and medium businesses. In this paper, we propose a visualized method (that is, *Vitamin Bucket model*) to measure an assessment process for a Simplified Test Maturity Model. This model can identify lack of activity and goal, and give a guideline how to achieve higher level of test maturity model through a visualized assessment process.

Keywords—Test Maturity Model; Vitamin Bucket Model; Software Test;

I. INTRODUCTION

The software tests is increasing more and more important. However, domestic developers must develop products within quick periods. That is a reason why the domestic software development has less time and interest on software tests [1].

Resultantly, it is increasing the costs of software tests and may not fix up the expected costs of initial development. To prevent these problems, we need to increase the quality of software, which requires measuring with software test maturity model. However, the existing model has some inappropriate parts to be applied in domestic small and medium businesses [2,3]. To solve these problems, we suggest a Simplified Test Maturity Model to customize TMM. This model provides to guide to assess test maturity model. However, if a company does not achieve the assessment criteria, the company is difficult to identify some parts of improvements for assessment achievement.

This paper mentions a visualization Method of Assessment Method. this visualization may be a method for effective communication between user and document. This method converts data into graphic based information [4]. Using *Vitamin Bucket Model* for visualizing assessment process. It will be used to help a company understand how to get a guideline for test maturity level achievement.

This paper is organized as follows. Chapter 2 shows related researches and mentions the Laws of Vitamin Bucket Model as a Simplified Test Maturity Model. Chapter 3 mentions the Assessment Model applied with Vitamin Bucket Model. Chapter 4 mentions a case study. Chapter 5 gives conclusion and future works.

II. RELATED RESEARCH

A. Simplified Test Maturity Model

The Simplified Test Maturity Model is a redefined TMM model to consider the current conditions of domestic small and medium businesses. Fig. 1 shows the structure of the model.

The maturity level includes several maturity goals. Maturity goals are supported by maturity subgoals. Maturity subgoals are reached by performing activities / tasks / responsibilities. Managers, developers, and testers definably play an important role in Activities / tasks / responsibilities in an organization. If the number of organization members is low, one person can perform several roles at the same time[5].
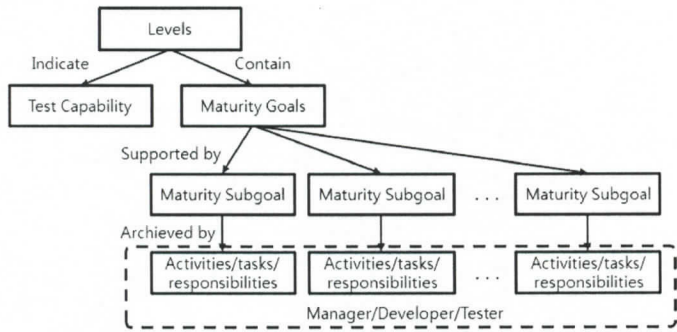

Fig. 1. Simplified Test Maturity Model

Simplified Test Maturity Model provides a guideline for assessment. The guideline of assessment process describes maturity level 2, 3 of assessment method. Maturity level 4, 5 are developing. Assessment method describes detail byproduct's preparation. This method describes activities and outputs of each maturity subgoals. If documents(or tools, activities) of a company is similar to outputs of maturity subgoals, documents can replace with outputs. Outputs required from maturity subgoal 2.1.1, 2.1.2 is the same as Table I, Table II.

TABLE I.   OUTPUTS IN MATURITY SUBGOALS 2.1.1

Level	Maturity Subgoal	Output Documents	Required items
2	2.1.1	Procedure for test and debuging, objective, policy development document	Test coverage, test objectives, test strategies, scheduling, risk and actions, test environment, test tools, test organizations, test deliverables, configuration management, fault management
		Important equipment list	Item, product name, price, application fields, the date of purchase
		Organizational training report	Processes, objectives, contents, destination, overview, time, personnel, cost, training schedule
		Resource Management Plan	Human Resources Management Plan, goods supply management plan
		Changes and amendments request	Requester information, priority level, reason for change, change, impact-platform, recovery planning, change contact information, change the date, approval date
		Organizational standard processes	Organizational structure, business scope, organization / project life-cycle model
		Remedial Action Plan	Status and Problems, Improvement, Benefit

TABLE II.   OUTPUTS IN MATURITY SUBGOALS 2.1.2

Level	Maturity Subgoal	Output Documents	Required items
2	2.1.2	Organized workforce planning	Field, manpower, additional plan
		Test Scenario	Test ID, testers, testing areas, test conditions, test outline, test cases, specific requirements, expected results
		Test Plan	For testing purposes, the test range, the necessary resources, schedules, test prior / completion criteria, fault/issues reporting procedure
		Test pass Criteria	test Start / end conditions, Test precedence criteria, Test completion criteria

B. Laws of Vitamin Buket Model

Laws of Vitamin Bucket Model visualizes laws of taking balanced nutrient for human body. This model shows to break the balance with even lacking of one element of all nutrients although over-abundance [6]. Certification of level in Simplified Test Maturity Model means achievement of all maturity subgoals in level. If one or more maturity subgoals is not achieved, level will not be Certificated. This is the same mean as Laws of Vitamin Bucket Model. Therefore, Simplified Test Maturity Model can be applied with *Vitamin Bucket Model*. The visualization applied to *Vitamin Bucket Model* will be able to increase user understands.

III.   VISUALIZATION FOR THE ASSESSMENT MODEL BASED VITAMIN BUCKET MODEL

Visualization for Assessment Model based Vitamin Bucket Model is same as Fig.2. Rows means five maturity level. Columns means maturity subgoals. If maturity subgoal has been achieved, the number is erased and filled with blue. Level 1 is filled with blue because initial level of all company is level 1. Level 4, 5 is not seen the number because of its developing level.

Fig. 2 is Assessment Model as Vitamin Bucket Model. The Bucket displays parts of maturity subgoals. Draw left and right arrows in the bucket. If click the arrows, bucket displays rest maturity subgoals.
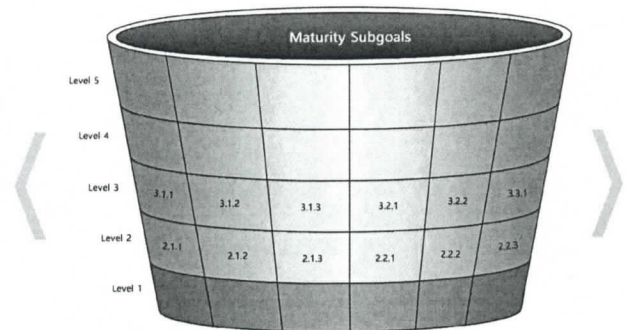

Fig. 2. Vitamin Bucket Model for Simplified Test Maturity Model Guideline

Assessment agency enters maturity subgoals achievement for outputs(and activities) of a company into a Bucket Model. If completely entered, a result is the same as Fig. 3. Fig. 3 shows to achieve all maturity subgoals of level 2, and not achieve maturity subgoals 3.1.1, 3.1.3, 3.2.2, 3.3.1 of level 3.
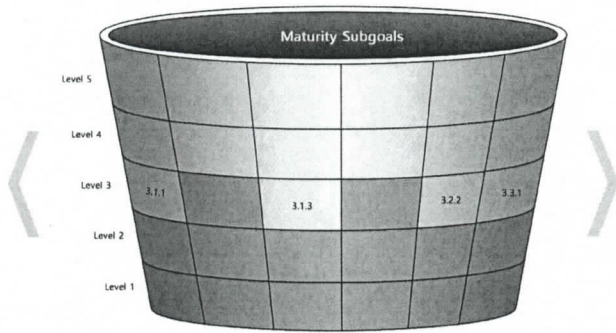

Fig. 3. Bucket Model applied Assessment

The company can check whether not achieve maturity subgoals or not, and show necessary outputs, and necessary activities. The Result is the same as Fig. 4.

For example, If the company selects maturity subgoal number, a window is opened for detail description of selected maturity subgoal.
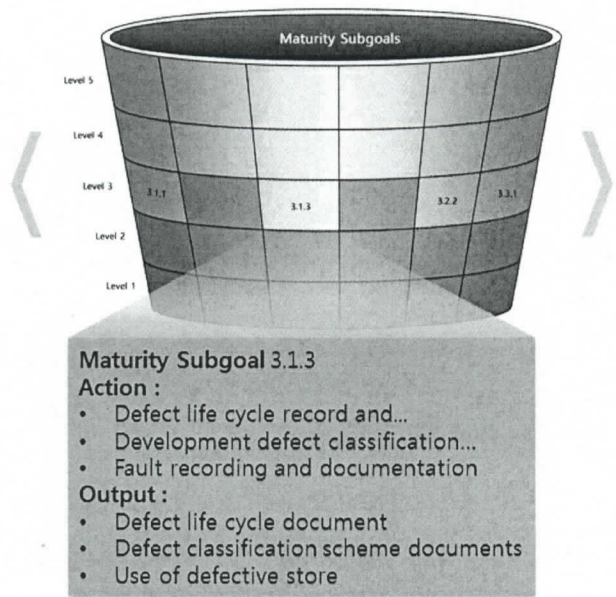

Fig. 4. Detail Description for Maturity Subgoal

IV. CASE STUDY

Our Assessment Model is developed based on Vitamin Bucket Model in Fig. 5. All functions are provided as a web services. Any assessment agent and company can check assessment information using any web browser.

Through inputting assessment result input, saving assessment result, we conform assessment result in developed with webpage bases PHP. We uses MySQL to access all data stored database in Database Environment.

Assessment agency enters assessment into assessment result in an input page, and then saves information to database. The company can check assessment result through assessment result in a confirm page.

We can show results of our proposed method with Bucket Image. But an case study of this paper is shown to draw bucket into a table. In future research, it will implement a bucket type image.
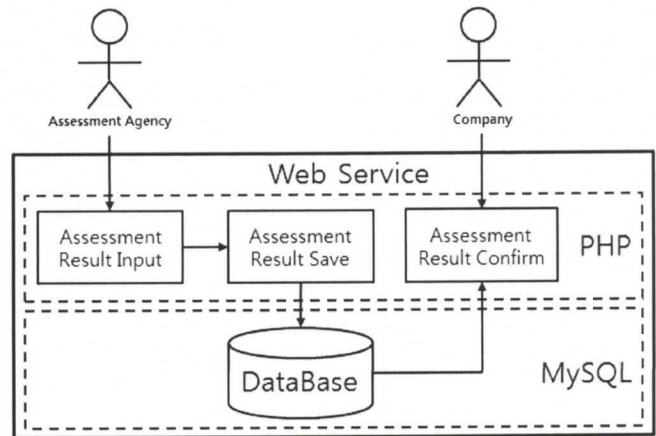

Fig. 5. Assessment Architecture

Developed Assessment Result in an Input page is the same as Fig. 6. Fig. 6 shows assessment result in an input page of maturity subgoal 2.1.1, 2.1.2, 2.1.3. If exists output of maturity subgoal, select Yes. If not exists output of maturity subgoal, select No. If one or more outputs is entered No, maturity subgoal will not be achieved. The Assessment Result in a Save Page, is entered information to store database.

Maturity Subgoal	2.1.1
Procedures, objectives, policy development documents	○ Yes ◉ No
Important equipment list	○ Yes ◉ No
Resource management plan	○ Yes ◉ No
Maturity Subgoal	2.1.2
Organized workforce planning	○ Yes ◉ No
Test scenario	○ Yes ◉ No
Test plan	○ Yes ◉ No
Based on test passed	○ Yes ◉ No
Maturity Subgoal	2.1.3
Defect life cycle document	○ Yes ◉ No
Defect classification scheme documents	○ Yes ◉ No
Use of defective store	○ Yes ◉ No

Save Cancel

Fig. 6. Assessment Result in an Input Page

Developed Assessment Result in a Confirm Page is the same as Fig. 7. If maturity subgoal has achieved, a number is erased and filled with blue. If maturity subgoal is not achieved, click a number to get more information.

Level	Maturity Subgoal												
Level 5	–	–	–	–	–	–	–	–	–	–	–	–	–
Level 4	–	–	–	–	–	–	–	–	–	–	–	–	–
Level 3	3.1.1	3.1.2	3.1.3	3.2.1	3.2.2	3.3.1	3.3.2	3.3.3	3.4.1	3.4.2	3.4.3	3.4.4	–
Level 2	2.1.1		2.1.3			2.2.3					2.3.2		
Level 1													

Fig. 7. Assessment Result Comfirm Page

Detail information of maturity subgoal not achieved is the same as Fig. 8. Describe maturity subgoal number, and show necessary activity and necessary output. Achieved outputs are checked by 'V'. Not achieved outputs are checked by 'X'.

Level	Maturity Subgoal												
Level 5	–	–	–	–	–	–	–	–	–	–	–	–	–
Level 4	–	–	–	–	–	–	–	–	–	–	–	–	–
Level 3	3.1.1	3.1.2	3.1.3	3.2.1	3.2.2	3.3.1	3.3.2	3.3.3	3.4.1	3.4.2	3.4.3	3.4.4	–
Level 2	2.1.1		**2.1.3**			2.2.3					2.3.2		
Level 1													

Maturity Subgoal	2.1.3
Action	• Defect life cycle record and definition • Development defect classification system and fault repository • Fault recording and documentation
Output	**v Defect life cycle document** • Required items: faulty identifier, testers, test date, test subject, title, likelihood, severity, fault details, fault handling results, handler, processing date, type of processing, process descriptions, process validation results, verifier, verification date, test results, validate description X Defect classification scheme documents • Required items: used to define the defect classification system to suit the company's test environment. **v Use of defective store** • Establish a defect related to data storage and staff to establish a plan to take advantage of using faulty data.

Fig. 8. Detail Assessment Result in a Comfirm Page

V. CONCLUSIONS

The paper proposes the visualization of Simplified Test Maturity Model in Assessment Process. For this, Assessment process is applied to the Vitamin Bucket Model, which supports assessment result to check a company, and describes outputs(and activities) of not achieved maturity subgoals. The company can check assessment result in web browser.

However, we do not apply assessment about maturity level 4, 5. In the future, it will assess level 4, 5 and visualize assessment result of bucket model.

REFERENCES

[1] Open Source Software, "Open Source Software Test Guide", http://www.oss.kr.

[2] Defense Acquisition Program Administration, "Information Business Process Review (CMMI) introduced Study Report", 2008.

[3] ZDNet Korea, "CMMI Certification", 2006.

[4] Byung-Geun Oh, Sung-Joon Kang, "Information Design Textbook", Ahn graphics, 2008.

[5] TTA, "A Study for Korea Test Maturity Model Development ", 2015.

[6] Ki-Du Kim, "Hongik University, Improving Heterogeneous Maturity Models Based on Assessing Good Software(GS) Certification Model", 2014.