

ISSN: 1738-9984

International Journal of Software
Engineering and Its Applications

IJSEIA

Vol.8, No.2, February, 2014



SCIENCE & ENGINEERING
RESEARCH SUPPORT SOCIETY

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Abstract

In our previous study on a Correlative Maturity between TMMi and TPI next [1], the correlation analysis method was a mapping with KPA on the empirical practice, but was insufficient to find how to deeply relate key elements between them. To solve this problem, we analyze correlations and intention across the measure items. With the analyzed results, we propose how to improve test process for test organization assessed with TMMi based on hybrid analysis in software engineering.

Keywords: TMMi, TPI next, Information Engineering, Clustering etc

1. Introduction

Testing Maturity Model (TMM) and TMMi are used to assess the testing maturity level, and improve testing capability [2-4]. But assessing test activities and complementing Capability Maturity Model (CMM) are not enough to improve test process. Therefore we adapt TMMi with Test Process Improvement (TPI), and TPI next offered by Sogeti. However, mapping TMMi and TPI next requires much resource due to totally different mechanism.

We mentioned to map the elements of TMMi and TPI next with correlation analysis. In "The Study On a Correlative Maturity Between TMMi and TPI next [1]", our method was based on empirical practices, which had insufficient with the basic mapping analysis. In this paper we propose the guideline of test process Improvement through mapping rules, correlation analysis, and clustering analysis based on information engineering. This paper is described as follows: Section 2 mentions related work. Section 3 mentions how to identify the common/uncommon elements of TMMi and TPI next to improve the test process. Section 4 describes a case study of Test Process Improvement of Test Organization. Section 5 describes a conclusion.

2. Related Works

The TMM was based on the CMM, and developed by the Illinois Institute of Technology. Just like the CMMi, the TMMi also uses the concept of maturity levels for process evaluation and improvement. The TMMi framework has been developed by the TMMi Foundation as a guideline and reference framework for test process improvement and is positioned as a complementary model to the CMMi Version 1.2. The process areas for each maturity level of the TMMi are shown in Figure 1.

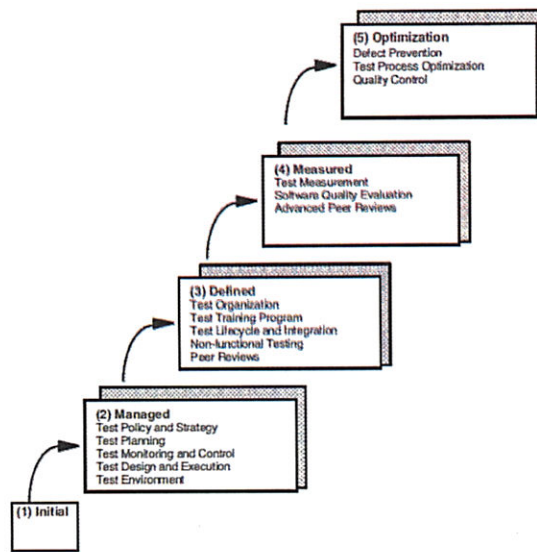


Figure 1. TMMi Maturity Levels and Process Areas[4]

Unlike that the TMMi has been developed to support organizations with evaluating and improving their test process, the TPI *next* model offers insight in the ‘maturity’ of the test processes within your organization [5]. The TPI *next* model is the improved model of TPI to apply in web-based business [6]. TPI *next* has 16 key areas, like test strategy, stakeholder commitment, degree of involvement and tester professionalism. Besides key areas, the model offers maturity levels, checkpoints, improvement suggestions and enablers for each level. Checkpoints of various Key areas are combined into Clusters that guide the improvement process with logical, coherent improvement steps. In a TPI assessment, these checkpoints are assessed to show you what to have the strengths and weaknesses of your test process. The outcome is visualized in the test maturity matrix to show a logical improvement sequence for your test process. To enable insight in the overall maturity of your test process, the model offers levels in Figure 2.

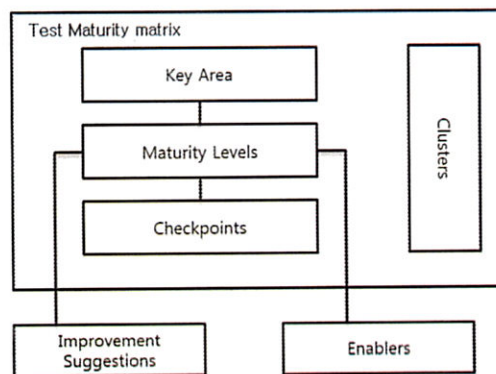


Figure 2. The Elements of the TPI [5]

Information Engineering (IE), developed by James Martin [7], is the application of an interlocking set of formal techniques for the planning, analysis, design, and construction of information systems on the enterprise wide basis or across a major sector of the enterprise. IE progresses in a top down fashion through the following stages: enterprise strategic systems planning; enterprise information planning; business area analysis; system design; construction.

3. TMMi Mapping with TPI Next

We have studied how to derive common/uncommon elements of TMMi and TPI *next* to improve the test process, which identify common/uncommon elements of the two models based on keywords and our empirical practice. But the mapping elements between the two models were not completely 100% equal. To solve this problem, we apply the mapping rule and correlation analysis.

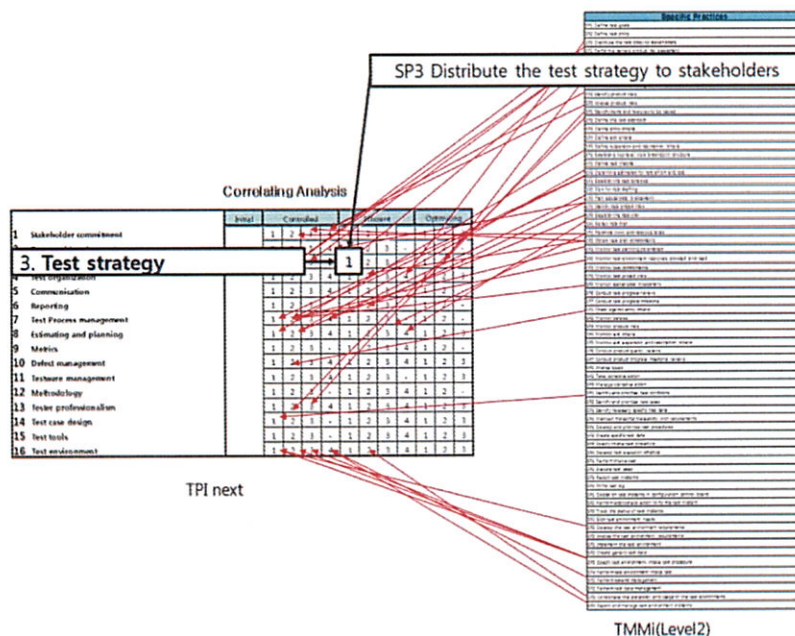


Figure 3. Previous Mapping Method

3.1. Structure Analysis of the Mapping Model

TMMi and TPI *next* have different purpose to use them. Therefore we cannot derive the correlation analysis using simple keyword analysis. Our analysis result is the follows:

- The Specific Practice of TMMi and Check Point of TPI *next* have similar information levels, so the mapping is possible
- All elements cannot be mapped with one to one.
- There is a different relevance of mapped elements

3.2. Mapping Rules and Correlation Analysis

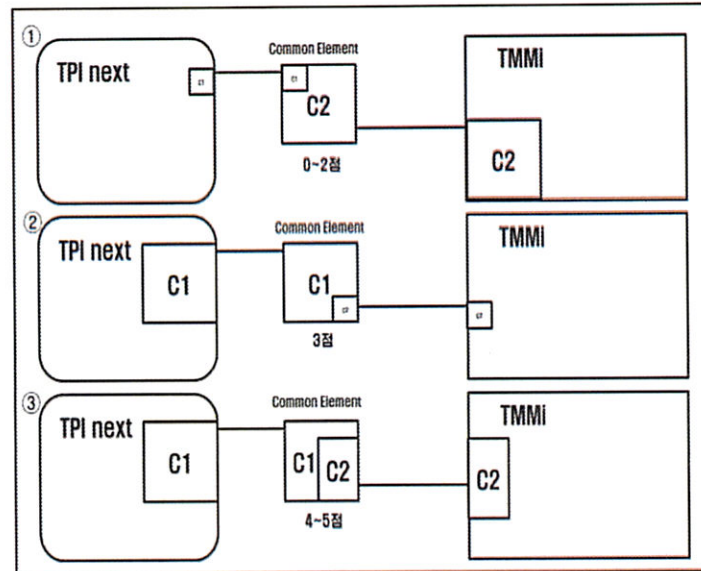


Figure 4. Correlative Analysis Rules

We obtain more systematic mapping rules through the correlative analysis method.

Mapping rules:

- Compare keywords
- Map elements (Specific Practice, Check Point) including meaning of higher level concept (Process Area, Level)
- Review individually mapped elements

Correlation analysis method:

- The range of compared score is 0 ~ 5.
- If the compared score is 0~2, it is not a common element.
- If the compare score is 3~5, it is a common element.

Table 1. Mapping Process through the Correlation Analysis

Correlation score	Analysis result	Mapping process
0	No relation	Exclude from the common elements
1~2	Little relation	Exclude from the common elements
3	Same relation	Include in the common elements
4~5	High relation	Include in the common elements

Evaluation rules:

In the comparison,

- An element of TMMi means more comprehensive than an element of TPI *next*.
- An element of TPI *next* means more comprehensive than an element of TMMi.
- An element of TPI *next* and an element of TMMi have a same meaning.

The elements of TMMi and TPI *next* do not map one to one, and some elements do not have any common factors.

Key Area	Level	Seq	TMMi Lev2	TMMi Lev3	TMMi Lev4	TMMi Lev5
Stakeholder commitment (SHC)	C	1	PA21-SG1-SP3 : DTSP(3) PA21-SG2-SP3 : DTSS(5) PA22-SG4-SP3 : PSI(3)	-	-	-
		2	PA22-SG3-SP3 : DEEC(3) PA22-SG5-SP2 : RWRL(4)	IPA3.3-SG3-SP3 : ETE(3)	-	-
		3	PA22-SG5-SP2 : RWRL(4) PA21-SG2-SP1 : PGPR(5) PA22-SG1-SP1 : DPCP(5)	-	-	-
		4	PA22-SG1-SP2 : IPR(5) PA21-SG2-SP2 : DTS(5) PA22-SG1-SP3 : APR(5)	PA3.4-SG1-SP1 : INPR(3) PA3.4-SG1-SP2 : ANFP(3)	-	-
	E	1	PA22-SG4-SP3 : PSI(4)	-	-	-
		2	-	-	-	-
		3	PA22-SG5-SP3 : OTPC(5) PA25-SG3-SP3 : CAUT(3)	-	-	-
	O	1	-	-	-	-
		2	-	-	PA4.2-SG1-SP1.1 : IPQN(3)	-

Figure 5. Mapping Result of TMMi and TPI *next*

3.3. Clustering Analysis

We use clustering analysis in information engineering by James Martin [7]. Figure 6 is the result of clustering analysis

TEST PROCESS		TEST PLAN																TEST ANALYSIS															
TMMi	TPI NEXT	PA21-SG1-SP1	PA21-SG1-SP2	PA21-SG2-SP1	PA21-SG2-SP2	PA21-SG2-SP3	PA21-SG2-SP4	PA21-SG2-SP5	PA21-SG2-SP6	PA21-SG2-SP7	PA21-SG2-SP8	PA21-SG2-SP9	PA21-SG2-SP10	PA21-SG2-SP11	PA21-SG2-SP12	PA21-SG2-SP13	PA21-SG2-SP14	PA21-SG2-SP15	PA21-SG2-SP16	PA21-SG2-SP17	PA21-SG2-SP18	PA21-SG2-SP19	PA21-SG2-SP20	PA21-SG2-SP21	PA21-SG2-SP22	PA21-SG2-SP23	PA21-SG2-SP24	PA21-SG2-SP25	PA21-SG2-SP26	PA21-SG2-SP27	PA21-SG2-SP28	PA21-SG2-SP29	PA21-SG2-SP30
		PA21-SG1-SP1	PA21-SG1-SP2	PA21-SG1-SP3	PA21-SG1-SP4	PA21-SG1-SP5	PA21-SG1-SP6	PA21-SG1-SP7	PA21-SG1-SP8	PA21-SG1-SP9	PA21-SG1-SP10	PA21-SG1-SP11	PA21-SG1-SP12	PA21-SG1-SP13	PA21-SG1-SP14	PA21-SG1-SP15	PA21-SG1-SP16	PA21-SG1-SP17	PA21-SG1-SP18	PA21-SG1-SP19	PA21-SG1-SP20	PA21-SG1-SP21	PA21-SG1-SP22	PA21-SG1-SP23	PA21-SG1-SP24	PA21-SG1-SP25	PA21-SG1-SP26	PA21-SG1-SP27	PA21-SG1-SP28	PA21-SG1-SP29	PA21-SG1-SP30		
Stakeholder commitment (SHC)	C	1																															
	C	2																															
	C	3																															
	C	4																															
	C	5																															
E	1																																
E	2																																
E	3																																
O	1																																

Figure 6. Clustering Analysis

On TMMi list activities of test organization according to the KPAs, we list test activities as the sequence of testing process using clustering analysis: Test Analysis, Test Design, Test Preparation, and Test Execution.

4. Test Process Improvement of Test Organization

We identify common elements identified the activities in each step, also apply the mapping model to an organization which prepare TMMi (level 2) assessment. Figure 7 is test process improvement of test plan phase.

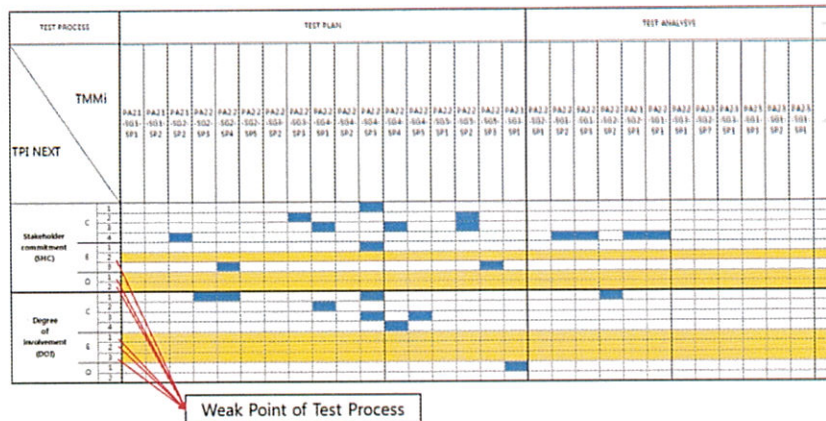


Figure 7. Test Process Improvement of Test Plan Phase

5. Conclusion

TMMi model only measures the maturity of a testing organization. We should prepare them on this scratch even with another assessment model. We propose a guideline to improve test process based on TMMi (level 2) with TPI NEXT. In this procedure, when we map the elements of TMMi model with TPI NEXT, we can define one guide of the activities in each level. In the near future, we need to map the correlative elements between TMMi (for above level 3-5) and TPI NEXT.

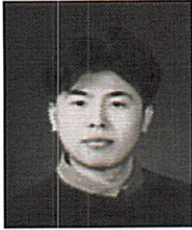
Acknowledgements

This work was supported by the IT R&D Program of MKE/KEIT [10035708, "The Development of CPS (Cyber-Physical Systems) Core Technologies for High Confidential Autonomic Control Software"] and Basic Science Research Program through the National Research Foundation of Korea(NRF) funded by the Ministry of Education (2013R1A1A2011601)

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