Visualized guideline model for measuring the Assessment Model based on an Simplified Test Maturity Model(TMM)

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Outline

1. Motivation

2. Related works
   - Original TMM (Test Maturity Model)

3. Simplified Test Maturity Model (TMM)

4. Visualized Guideline Model of Simplified TMM

5. Conclusion
Motivation

- Why need the quality of Software?
- Why software is important?
<table>
<thead>
<tr>
<th>Accidents</th>
<th>Damage</th>
<th>Causes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Personal injury caused by SW Errors</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| 2009 Washington Subway's Collision | • 9 person's death  
• Over 70 persons damage | • System error on automatic driving mode  
• Stop to work the break |
| 2014 America Southwest temporal suspension of landing service | • Delay Air 212 airplane  
• Cancel 21 airplanes | • LA air control center  
• On calculating U2 a reconnaissance plane on U2 Control system, stop system due to overload |
| **Ignoring Warning for SW safety** | | |
| 2010 BP A fire on an oil ship | • British Petroleum (BP)  
• Leaking an oil and occurring a fire in an oil ship | • On needing to have space between Oil pipeline,  
• Give automatic alarm  
• BP to lose cost to delay construction, ignore warning |
| **SW deficiency for Safety** | | |
| 2015 young jong bridge car collision | • 106 accidents in collision  
• 2 person's death  
• Over 70 persons damage | • Over 100km speed, deficiency for safety |
How to produce quality of Software?

Who is important?
Too much work to developer
Need to work all ways for high quality SW
2. Related works (cont.)

- TMM (Test Maturity Model)
  - 1996 Dr. Burnstein at IIT, Chicago
  - based on CMM (Capability Maturity Model)
  - 5 level of maturity
  - Assessment Model
  - Process for Test Organization
2. Related works (cont.)

[ Original TMM Structure ]

Level 1: Initial
- Institutionalize basic testing techniques and methods
- Initiate a test planning process
- Develop testing and debugging goals

Level 2: Phase Definition
- Institutionalize basic testing techniques and methods
- Initiate a test planning process
- Develop testing and debugging goals

Level 3: Integration
- Control and monitor the testing process
- Integrate testing into the software life cycle
- Establish a technical training program
- Establish a software test organization

Level 4: Management and Measurement
- Software quality evaluation
- Establish a test measurement program
- Establish an organizationwide review program

Level 5: Optimization/Defect Prevention and Quality Control
- Test process optimization
- Quality control
- Application of process data for defect prevention
3. Simplified TMM

**Simplified TMM Framework**
- **Levels**
  - Testing capability
  - Maturity goals
  - Maturity subgoals

- **Indicate**
- **Contain**

- **Supported by**

- **Use for Assessment**

- **Activities/tasks/responsibilities**
  - Manager/Developer/Tester

**Test Attributes to Maturity Level collation Matrix**

**Enhanced TMM**

**Test Process**
- **TPI**
- **Define**

**Manager/Developer/Tester**

**Enhanced TMM**

**Use for Assessment**
How to make Simplified Test Maturity Model?

Simplified TMM Development Process

- Step 1
  - Changing the sentence of TMM documents into a table.

- Step 2
  - Determining Goodness-of-fit of each TMM ATRs.

- Step 3
  - Identifying relationship between the maturity subgoals and ATRs.
  - Merge each ATRs into the one ATRs.

- Step 4
  - Adding TPI next attributes into TMM.
Simplified Test Maturity Model

- **Step 1** – Changing the sentence of TMM document into a table
  - 1.1 Step
    - Changing the levels into a table.
  - 1.2 Step
    - Changing the maturity goals into a table.
  - 1.3 Step
    - Changing the maturity subgoals into a table.
  - 1.4 Step
    - Changing the ATRs (Manager, Developer, User) into a table.
Simplified Test Maturity Model

Step 1 – make tablization with TMM documents of all Maturity Goals

* TMM Level 2: Phase Definition

**Maturity Goal 2.1: Develop Testing and Debugging Goals and Policies**

- **Level 2 Phase Definition**
- **Maturity Goal 2.1: Develop Testing and Debugging Goals and Policies**

Result

TMM Document

S_TMM Tablization
Step 2 – Determining Goodness-of-fit of each TMM ATRs (Activities/Tasks/Responsibilities)
- Decide suitability of TMM ATRs for Korean Small & Medium Company
- Describe decision method as follows.

<table>
<thead>
<tr>
<th>decision</th>
<th>description</th>
<th>decision</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fitness</td>
<td>available attribute</td>
<td>Accept</td>
</tr>
<tr>
<td>Unfitness</td>
<td>unavailable attribute</td>
<td>Unaccept</td>
</tr>
<tr>
<td>Partly fitness</td>
<td>partly available attribute</td>
<td>Accept</td>
</tr>
</tbody>
</table>
## Simplified Test Maturity Model

- **Step 2 – Goodness-of-fit decision Result of TMM ATRs**

### [Original TMM]

<table>
<thead>
<tr>
<th>Level</th>
<th>Level 2</th>
<th>Level 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maturity Goal</td>
<td>2.1 2.2 2.3</td>
<td>3.1 3.2 3.3 3.4</td>
</tr>
<tr>
<td>Manager’s ATRs</td>
<td>11 19 16</td>
<td>17 10 11 12</td>
</tr>
<tr>
<td>Test Manager’s ATRs</td>
<td>– – –</td>
<td>– – – 13</td>
</tr>
<tr>
<td>Developer/Tester’s ATRs</td>
<td>9 10 17</td>
<td>21 6 10 12</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>20 29 33</strong></td>
<td><strong>38 16 21 37</strong></td>
</tr>
</tbody>
</table>

### [Simplified TMM]

<table>
<thead>
<tr>
<th>Level</th>
<th>Level 2</th>
<th>Level 3</th>
</tr>
</thead>
<tbody>
<tr>
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<td>2.1 2.2 2.3</td>
<td>3.1 3.2 3.3 3.4</td>
</tr>
<tr>
<td>Manager’s ATRs</td>
<td>9 17 12</td>
<td>14 7 9 9</td>
</tr>
<tr>
<td>Test Manager’s ATRs</td>
<td>– – –</td>
<td>– – – 13</td>
</tr>
<tr>
<td>Developer/Tester’s ATRs</td>
<td>9 8 7</td>
<td>20 10 12</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>17 26 29</strong></td>
<td><strong>34 12 19 25</strong></td>
</tr>
</tbody>
</table>
Step 3 – Identifying relationship between the maturity subgoals and ATRs

- ATRs of TMM are connected with maturity goals.
- But ATRs of Simplified TMM are connected with maturity subgoals.
- If all the ATRs be achieved, maturity subgoal be achieved.
- If all the maturity subgoals be achieved, maturity goal be achieved.
## Simplified Test Maturity Model

- **Step 3** – Merge each ATRs into the one ATRs
  - In ATRs of maturity subgoal, merge if similar activities on each Critical View.
  - In “unfitness” case, delete attributes.

<table>
<thead>
<tr>
<th>Maturity Subgoal</th>
<th>ATRs</th>
<th>Maturity Subgoal</th>
<th>ATRs</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Managers</td>
<td></td>
<td>Developers</td>
</tr>
<tr>
<td>2.1.1</td>
<td>1</td>
<td>Unfitness</td>
<td>2.1.1</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>Integrate Developer 4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>Integrate Developer 1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>Unfitness</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>Fitness</td>
<td>2.1.2</td>
</tr>
<tr>
<td></td>
<td>11</td>
<td>Integrate Developer 9</td>
<td></td>
</tr>
<tr>
<td>2.1.2</td>
<td>7</td>
<td>Fitness</td>
<td>2.1.3</td>
</tr>
<tr>
<td></td>
<td>8</td>
<td>Unfitness</td>
<td></td>
</tr>
<tr>
<td>2.1.3</td>
<td>9</td>
<td>Integrate Manager10, Developer 7, 8</td>
<td></td>
</tr>
<tr>
<td></td>
<td>10</td>
<td>Integrate Manager 9</td>
<td></td>
</tr>
<tr>
<td>2.1.4</td>
<td>6</td>
<td>Unfitness</td>
<td></td>
</tr>
</tbody>
</table>
Simplified Test Maturity Model

- Step 4 – Adding TPI next attributes into TMM
  
  - Compare TMM with TPI Next.
  
  - Identify *each deficient test activity* in maturity subgoal of TMM.
  
  - Add *TPI Next attribute* into the deficient test activity of TMM.

* TPI: Test Process Improvement
We simplified with TMM.
- The comparison result were as follows.

<table>
<thead>
<tr>
<th></th>
<th>TMM</th>
<th>Simplified TMM</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Level 2</td>
<td>Level 3</td>
</tr>
<tr>
<td>Maturity Goal</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Maturity Subgoal</td>
<td>13</td>
<td>12</td>
</tr>
<tr>
<td>ATR (Activities/tasks/ responsibilities)</td>
<td>91</td>
<td>118</td>
</tr>
</tbody>
</table>
Visualized guideline model for measuring an assessment model base on Simplified TMM

- Easy to assess test organization with assessment model
- Identify what to need and what to do more activity
- Then help and guide to enhanced level of TMM for small and medium companies in Korea
- We just check each question in the assessment model at right menu.
Visualized guideline model

Like Vitamin Bucket Model

Level 2
Easily guiding how to enhance level up

Maturity Subgoal 3.1.3
Action:
- Defect life cycle record and...
- Development defect classification...
- Fault recording and documentation
Output:
- Defect life cycle document
- Defect classification scheme documents
- Use of defective store
Conclusion

We propose Simplified TMM
- Help to measure TMM for test organization
- Guide what need to work more maturity level
- With our model, will apply two IT companies with TTA in 2016
Thank you