LGE Internal Use Only

SW Test Guide

About This Document

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# Establish SW test plan

|  |  |  |
| --- | --- | --- |
| **Task Description** | **Procedure** | **Outcomes** |
| The SW test manager establishes the SW test goal that the project must achieve, and describes it in the SW test plan. It also defines the scope of SW test execution of the project. | 1.1 SW Test Goal Definition [SW Test Manager]  1.2 Defining SW Test Roles and Responsibilities [SW Test Manager]  1.3 SW Test Scope Definition [SW Test Manager]  1.4 SW Test Strategy Definition [SW Test Manager]  1.5 SW Test Regression Test Strategy Definition [SW Test Manager]  1.6 SW Test Schedule Definition [SW Test Manager]  1.7 Defining SW Test Case Design Criteria [SW Test Manager]  1.8 SW Test Entry/Stop/Resume Criteria Definition [SW Test Manager]  1.9 Definition of SW Test End Criteria [SW Test Manager]  1.10 SW Test Environment Definition [SW Test Manager] | SW Test Plan, WBS |

## SW Test Goal Definition

The SW test manager establishes the goals the project must achieve based on the needs of the organization and customers.

The establishment of the project SW test goal should be considered from the following perspectives.

- Schedule: Objectives in terms of meeting key milestone schedules for organizations and customers

- Cost: Target in terms of development cost including human and material resources

- Quality: Objectives in terms of product quality and process quality

The organization's SW test goal is 100% after functional implementation,

Test coverage – 100% requirements coverage (SW).

However, if there is a SW test goal requested by the customer or negotiated with the customer, the customer's goal will be followed..

## Defining SW Test Roles and Responsibilities

The SW test manager creates the roles and responsibilities for each role related to the SW test test execution in the project.

SW Test Manager

• Establish SW test plan

• Review SW test plan

• SW test case review

• SW test result report review

SW tester

• Participate in SW test plan review

• Participate in SW test case review

• Perform SW test

SW ENG.

• Participate in SW test plan review

• SW test case development

• Participate in SW test case review

• SW test case tracking

SW PL

• Participate in SW test plan review

• Participate in SW test case review

• Participation in SW test result reporting

PL

• Participate in SW test plan review

• Participation in SW test result reporting

## SW Test Scope Definition

The SW test manager defines the SW test scope that must be performed in the project.

Basically, all SW components are included in the SW test scope, except for SW implemented by the company, SW implemented by OEM companies and SW automatically generated on the tool are excluded from the SW test scope.

## SW Test Strategy Definition

The SW test manager defines the SW test strategy that the project should carry out. Based on the FRP, the SW components that can be implemented are identified according to the sample release time, and the SW test time is defined so that the SW test can be performed. After 100% of function implementation, plan to perform SW test on all components.

| SW Components | B2 | B3 | B4 | B5~ |
| --- | --- | --- | --- | --- |
| Component A | ● | ● | ● | ● |
| Component B |  | ● | ● | ● |
| Component C |  |  | ● | ● |
| Component D |  |  |  | ● |
| Component E |  |  |  | ● |

Table 1 Sample - SW test strategy

## SW Test Regression Test Strategy Definition

The SW test manager defines a regression test strategy for re-verification when a defect occurs through SW test execution.

In case of critical rating issue, Full Test

If an issue below the major grade occurs, a regression test is performed.

## SW Test Schedule Definition

The SW test manager establishes the SW test schedule and prepares the WBS in consideration of the SW test goal, scope, and strategy.

## Defining SW Test Case Design Criteria

The SW test manager defines the SW test case design criteria of the project by referring to the table below.

However, if there is a special requirement for the SW test case design criteria of the OEM, the SW test case design criteria are defined according to the requirements of the OEM..

In the case of specific SW components, if it is difficult to apply the test case design criteria specified in the table below, the reason shall be specified in the SW test plan.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Test Type | Test Case Design Criteria | | | |
| Analysis of Requirements | Equivalence Partitioning | Analysis of Boundary Value | Error Guessing |
| SW Unit Test | ● | ○ | ○ | ○ |
| SW Integration Test | ● | ○ | ○ | ○ |
| SW Test | ● | ○ | ○ | ○ |
| System Integration Test | ● | ○ | ○ | ○ |
| System Test | ● | ● | ● | ● |

(●: Required, ○: Optional)

Table 2 Test Case Design Criteria

• For details on TC Design when writing test cases, refer to the guide below.

1. LGE\_VSsmart\_SysT\_G02\_Test Technique Guide

## SW Test Entry/Stop/Resume Criteria Definition

The SW test manager specifies the SW test entry/stop/resume criteria in the SW test plan.

|  |  |
| --- | --- |
| Criteria | |
| Entry | SW release for test  Completed SW Integration Test |
| Suspension | On **critical** defect occurring  (reporting to SW FO and deciding rebuild)  **HW board crash occurring** |
| Resumption | Completed solving **critical** defects  Changed HW board and completed SW download |

Table 3 SW Test entry/stop/resume criteria

## Definition of SW Test End Criteria

The SW test manager can define the SW test termination criteria for each sample release according to the SW test strategy that needs to be performed in the project.

SW test end criteria

When 100% of the function is implemented,

1. Test coverage – requirements coverage (SW) 100%,

2. Defect Zero must be satisfied.

If the defined termination criterion is not satisfied, the SW test is repeated according to the regression test strategy until the termination criterion is satisfied.

## SW Test Environment Definition

The SW test manager describes the SW test environment in the SW test plan, and describes the resources necessary for building the SW test environment.

# Review SW test plan

|  |  |  |
| --- | --- | --- |
| **Task Description** | **Procedure** | **Outcomes** |
| The SW test manager reviews the SW test plan and related deliverables with stakeholders. | 2.1 Preparation for review meeting [SW Test Manager]  2.2 Conducting a review meeting [SW Test Manager]  2.3 SW Test Plan Supplement [SW Test Manager] | SW Test Plan, VR Report |

## Preparation for review meeting

The SW test manager identifies the review participants and convenes a review meeting.

* Ensure that the deliverables under review are ready.
  + The subject of review may be the SW test plan.
* Prepare a review checklist.
  + You can select the items to be reviewed from the standard checklist and add items to be reviewed if necessary.
* Schedule with review participants.
  + Required review participants: SW test manager, SW test manager, SW ENG., QA, SW PL, PL
  + Additional review participants may be selected as needed.
* Distribute review materials in advance and convene review meetings.

## Conducting a review meeting

The SW test manager conducts a review meeting based on the review checklist.

For detailed review items, refer to ‘LGE\_VS Smart\_VR\_C01\_Review Checklist’.

## SW Test Plan Supplement

The SW test manager supplements the SW test plan based on the review results along with the SW PL. VR can be performed again if necessary.

※ The detailed review procedure follows the ‘LGE\_VS Smart\_VR\_P01\_Review Process Definition’.

# SW test case development

|  |  |  |
| --- | --- | --- |
| **Task Description** | **Procedure** | **Outcomes** |
| SW ENG. develops SW test cases by referring to the SW test plan and detailed SW design. | 3.1 SW Test Case Development [SW ENG.] | SW test case |

## SW Test Case Development

W ENG. develops SW test cases by referring to the SW test plan and SW requirements specification.

• Consider the following when writing SW test cases.

1. LGE\_VSsmart\_SWRA\_T01\_SW Requirements Specification (SRS)

• SW test case is written including the following items.

| Item | Description |
| --- | --- |
| Requirements ID | Specify the Requirement ID to be tested. |
| TC ID | Specify TC ID, write TC\_Requirements ID\_#.  # is the test case no for the corresponding requirement.  Ex. Requirements ID: SAD\_38  TC ID: TC\_SAD\_38\_1, TC\_SAD\_38\_2 |
| TC Title | Enter the name of the test that can distinguish the test.  Ex. Sensor\_Monitoring, BrightnessControl |
| TC Design Type | Select and specify among Analysis of Requirements, Equivalence Partitioning, and Analysis of Boundary Value Error Guessing. |
| Preconditions | Write prerequisites for performing the test. |
| Input | When testing, describe the input value. |
| Expected Output | It describes the expected output value when the test input value is entered. |
| Observed Output | Write the observed output value through the actual test. |
| Pass/Fail/NA | Write whether the test is Pass/Fail/NA. |
| Remarks | Describe the specifics during testing. |

If a test case is automatically generated using a separate SW test tool, the tool usage standards are followed.

• For details on TC Design when writing test cases, refer to the guide below.

1. LGE\_VS\_SysT\_G02\_Test Technique Guide

# SW test case Traceability

|  |  |  |
| --- | --- | --- |
| **Task Description** | **Procedure** | **Outcomes** |
| ENG. defines the traceability between SW test cases and SW requirements. | 4.1 Definition of trace relationship between SW requirements [SW ENG.] | Requirements Traceability Matrix |

## Definition of trace relationship between SW requirements

SW ENG. defines the trace relationship between SW test cases and SW requirements.

Consider the following when defining a tracking relationship.

- In principle, tracing is reflected in the output of 100% development stage without omission of requirements.

- The principle of requirements tracking follows the structure and scope of tracking management of deliverables defined in the 'Requirements Tracking Guide' document.

- Manage the tracking relationship by selecting a requirements tracking management tool (DOORS, Excel, etc.).

- A traceability relationship can be defined during the creation or completion of a requirement or traceable artifact.

- If requirements or traceable artifacts are changed, review whether the traceability should be adjusted due to the change and reset the traceability.

- The structure and scope of tracking management and tracking management tools can be adjusted and used according to the characteristics of the project (eg, development environment).

SW ENG. Reinforce test cases when checking omissions through tracking.

• For details on tracking management when defining a tracking relationship, refer to the guide below.

1. LGE\_VSsmart\_REQM\_G01\_Product Traceability Guide

# SW Test Case Review

|  |  |  |
| --- | --- | --- |
| **Task Description** | **Procedure** | **Outcomes** |
| The SW test manager reviews the SW test cases with the stakeholders. | 5.1 Preparation for review meeting [SW Test Manager]  5.2 Conducting a review meeting [SW Test Manager]  5.3 SW Test Case Supplement [SW ENG.] | SW Test Case, VR Report |

## Preparation for review meeting

The SW test manager identifies the review participants and convenes a review meeting.

* Ensure that the deliverables under review are ready.
  + The subject of review may be a SW test case.
* Prepare a review checklist.
  + You can select the items to be reviewed from the standard checklist and add items to be reviewed if necessary.
* Schedule with review participants.
  + Required review participants: SW test manager, SW test manager, SW ENG., QA, SW PL
  + Additional review participants may be selected as needed.
* Distribute review materials in advance and convene review meetings.

## Conducting a review meeting

Based on the review checklist, the SW test manager conducts a review meeting focusing on the following items:

Completeness: Are all TCs defined in the test scope of the test plan designed?

Consistency: Is the TC defined by reflecting the technique defined in the Test Methodology of the test plan?

Traceability: Is a unique ID assigned to the TC? Is the TC defined and traceable?

Individual TC testability: Are the TC performance procedures, input data, and expected result testable in detail?

## SW Test Case Supplement

SW ENG. complements the SW test plan based on the review results with the SW test manager. VR can be performed again if necessary.

※ The detailed review procedure follows the ‘LGE\_VS Smart\_VR\_P01\_Review Process Definition’.

# Perform SW test

|  |  |  |
| --- | --- | --- |
| **Task Description** | **Procedure** | **Outcomes** |
| The SW tester performs SW tests according to the schedule set in the SW test plan, records and handles defects.  The SW test manager checks the test results and decides/performs the regression test with the stakeholders. | 6-1 SW test execution [SW test manager]  6-2 Perform regression test [SW Test Manager.]  6-3 SW Test Defect Management [SW Test Manager] | Issue,  SW test result |

## SW test execution

The person in charge of the SW test performs the SW test according to the SW test plan. SW test can be performed through a separate SW tool (eg, Controller test, Junit, etc.) specified in the SW test plan.

## Perform regression test

The SW test manager plans to perform the regression test according to the SW test regression test strategy (Section 1.5).

Under the supervision of the SW test manager, PL, SW PL, SW ARCH, SW ENG., and the person in charge of resolving issues establish a regression test plan.

The regression test plan procedure is as follows.

1. Issue impact analysis: Identify the part where the issue occurred, and analyze the impact relationship with other parts (RTM)

2. Test range selection: Select the test range based on the impact analysis result.

3. Selection of test cases to be performed: Select test cases within the selected range.

4. Regression test person and schedule planning: Establish a test person and schedule plan and reflect it in WBS.

According to the plan established by the SW test manager, the SW test manager performs the regression test.

## SW Test Defect Management

The SW test manager manages defects resulting from the SW test according to the ‘LGE\_VS Smart\_IM\_P01\_Issue Management Process Definition’.

# Report SW test results

|  |  |  |
| --- | --- | --- |
| **Task Description** | **Procedure** | **Outcomes** |
| The SW test manager organizes the SW test results and reports the results to stakeholders. | 7-1 Summary of SW Test Results [SW Test Manager]  7-2 SW Test Result Report [SW Test Manager] | SW test result |

## Summary of SW Test Results

The SW test manager collects and organizes the SW test results performed by the SW test manager according to the SW test plan.

SW test results include the following items.

1. SW test case (specify check result)

2. test coverage

3. Test Pass/Fail

## SW Test Result Report

The SW test manager prepares the SW test result and shares it with stakeholders.

• Essential stakeholders: SW test manager, SW test manager, SW ENG., QA, SW PL, PL

• Additional stakeholders may be selected as needed.