**SERIS**

Solar Energy Research Institute Singapore



Cloud Based Realtime Analytical Monitoring of Photovoltaic Systems and Weather Parameters Project

Quality Plan

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Management summary

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| **Project objective**  The main objective of the project is to develop cloud-based real-tiime monitoring system for photovoltaic and weather parameters.This project involves implementation of cloud-based backend server system and front-end web application.This system will be deployed in AWS Cloud. | | | |
| **Test objective and assignment**  The objective of the test is to ensure that all the functionalitites of the project meet the requirements of the end users and the system works as intended.  User acceptance testing (UAT) is the last phase of the software testing process. During UAT, actual software users test the software to make sure it can handle required tasks in real-world scenarios, according to specifications. | | | |
| **Short description of the test approach**  User acceptance is a type of testing performed by the Client to certify the system with respect to the requirements that was agreed upon.  UAT is one of the final and most critical software project procedures that must occur before newly developed software is rolled out to the market. UAT is also known as beta testing, application testing or end user testing. UAT directly involves the intended users of the software.  This UAT will be implemented through an in-house testing team comprised of actual software users.  The testing team executes the designated test cases. All bugs will be logged in a testing document with relevant comments.  After all bugs have been fixed, the testing team indicates acceptance of the software application. This shows that the application meets user requirements and is ready to be rolled out. | | | |
| **Results to be realized** | | | |
| *Result*   * Well executed and finished system­ test | *Document*   * UAT test report | *Delivery date* <mm-dd-yyyy> |
| **Qualitative objectives**  Each test level needs to be finished on time and meet the user’s requirements and acceptance criteria. | | | |
|  | | | |
| **Go/no-go decisions**  After each test level the test manager makes sure that a test report is drawn up. This report will, after reviewing with the project manager, be presented to the key stakeholders, who decide if it is possible to move to the next test level. At the end of the total test project an end testing report will be drawn up, containing a risk based assessment of the test object. Based on this end report the key stakeholders make the final decision to go live or not. | | |

Table of Contents

1. **INTRODUCTION**.………………………………………………………………………...7
   1. Purpose....……………………………………………………………………….........7
   2. Assignment .…………………...…………………………………………………..…7
2. **DOCUMENTATION**....………………………………………………….........................7
   1. Basis for the test plan ...................................................................................................7
   2. Test Basis .....................................................................................................................7
3. **TEST STRATEGY**....…………………………………....................……….………………8
   1. Test Strategy .............................................................................................8

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1. **APPROACH** …….............................................…………………………………………….9
   1. Test Design Table ..................................................................................................9
   2. Description Test Approach ........................................................................................9
   3. Entry and Exit Criteria ...............................................................................................10
2. **INFRASTRUCTURE** ……...................…………………………………………………10
   1. Test Environments ……………………………………………………..........……10
      1. Acceptance tests ..................................................................................................10
   2. Office Setup ……………...……………………....……………………………….10
3. **MANAGEMENT** …….........................................…………………………………………10
   1. Test Management ……………………….............…………………………………..10
   2. Defect Procedure ………………………………………....…………………………11
4. **ESTIMATION & PLANNING** …………..........………………………..………………...12
   1. Estimation ……………………………...............…………………………………...12
   2. Planning ……………………............……………………………………………….13
5. **Test Report**  ........................................................................................................................13
   1. Acceptance Test Summary Report ............................................................................13

**APPENDIX 1: PRODUCT RISF ANALYSIS** ….............................................….……….14

1. **INTRODUCTION**

SERIS requires the development of cloud-based real-tiime monitoring system for photovoltaic and weather parameters .This will involve implementation of cloud-based backend server system and front-end web application.This system will be deployed in AWS Cloud. Users will be able to view, analyze, supervise and control different systems ranging from small roof-top systems to large ground-based PV power plants across different time zones.

**SE25PT7 team** will be taking care of implementation for cloud-based back-end application and front-end web applications.

This document is the project quality plan of SE25PT7 for development of back-end application and front-end web application system.Thefollowing sections describe the plan in terms of its purpose, audience, organisation and related documents.

* 1. **Purpose**

The goal of this Test Plan (TP) for User Acceptance Test is to inform all who are involved in the test process about the approach, the activities and the deliverables concerning User Acceptance Test for SERIS project.

This test plan describes a concrete and detailed elaboration of what has been described in the master test plan “\MGMT\QUALITY\MTP\SMTP.doc “for the User Acceptance Test.

* 1. **Assignment**

UAT Tester should possess good knowledge of the business. He should be independent and think as an **unknown user to the system**. Tester should be analytical and lateral thinker and combine all sorts of data to make the UAT successful.

Tester or Business Analyst or Subject Matter Experts who understand the business requirements or flows can prepare test and data which are realistic to the business. The entire UAT team will be responsible for coordinating the preparation of all test cases and its execution.

Client will coordinate with test team and verify with the requirements discuss on issues and bugs if found.

1. **DOCUMENTATION**
   1. **Basis for the Test Plan**

A test plan is a technical documentation which details a systematic approach to testing a specific system.

* 1. **Test Basis**

One of the most important activities in the UAT is to identify and develop test scenarios. These test scenarios are derived from the following documents:

* Project Charter
* Use Cases
* Process Flow Diagrams
* Requirements Document
* System Requirements Specification(SRS)

1. **TEST STRATEGY**
   1. **Test Strategy**

**Analysis of Business Requirements**

* Creation of UAT test plan
* Identify Test Scenarios
* Create UAT Test Cases
* Preparation of Test Data(Production like Data)
* Run the Test cases
* Record the Results
* Confirm business objectives

### Creation of UAT Plan:

### The UAT test plan outlines the strategy that will be used to verify and ensure an application meets its business requirements. It documents entry and ****exit criteria for UAT, test scenarios and test cases approach and timelines of testing.****

### Identify Test Scenarios and Test Cases:

Identify the test scenarios with respect to high level business process and create test cases with clear test steps. Test Cases should sufficiently cover most of the UAT scenarios. Business Use cases are input for creating the test cases.

### Preparation of Test Data:

It is best advisable to use live data for UAT. Data should be scrambled for privacy and [security](https://www.guru99.com/ethical-hacking-tutorials.html) reasons. Tester should be familiar with the data base flow.

### Run and record the results:

Execute test cases and report bugs if any. Re-test bugs once fixed. [Test management](https://www.guru99.com/test-management.html) tools can used for execution.

### Confirm Business Objectives:

Business Analysts or UAT Testers needs to send a sign off mail after the UAT testing. After sign-off the product is good to go for production. Deliverables for UAT testing are Test Plan, UAT Scenarios and Test Cases, Test Results and Defect Log

### 

1. **APPROACH**
   1. **Test Design Table**

|  |  |  |
| --- | --- | --- |
| **ID** | **Use Cases** | **Test Cases** |
| **1** | Authenticate users |  |
| **2** | Maintain personas |  |
| **3** | Maintain users |  |
| **4** | Maintain devices info |  |
| **5** | View/select user(s) |  |
| **6** | Select device(s) |  |
| **7** | View/select persona |  |
| **8** | Send data |  |
| **9** | Transform raw data to structured data |  |
| **10** | Store structured data |  |
| **11** | Send real-time data |  |
| **12** | Synchronize data with browsers |  |
| **13** | Get device health |  |
| **14** | Download history data |  |
| **15** | View real-time station information |  |
| **16** | View station history information |  |
| **17** | Notify device status |  |
| **18** | Send stream data |  |
| **19** | Store raw data |  |
| **20** | Purse raw data |  |
| **21** | Create device group |  |
| **22** | Maintain device group(s) |  |
| **23** | View/Select device group |  |
| **24** | View/Select station |  |
| **25** | Maintain stations |  |

* 1. **Description Test Approach**

The main purpose of this testing is to validate the end to end business flow. This testing is carried out in separate testing environment with production like data setup. It is a kind of black box testing where two or more end users will be involved and functionality check vs requirements will be carried out.

* 1. **Entry and Exit Criteria**

**Entry Criteria for Acceptance Test:**

Following are the entry criteria for User Acceptance Testing:

* Business Requirements must be available.
* Application Code should be fully developed
* Unit Testing, Integration Testing and/or System Testing should be completed
* No Showstoppers, High, Medium defects in System Integration Test Phase -

Only Cosmetic errors are acceptable before UAT

* Regression Testing should be completed with no major defects
* All the reported defects should be fixed and tested before UAT
* Traceability matrix for all testing should be completed
* UAT Environment must be ready
* Sign off mail or communication from System Testing Team that the system is ready for UAT execution

### Exit criteria for Acceptance Test:

Before moving into production, following needs to be considered:

* No critical defects open
* Business process works satisfactorily
* UAT Sign off meeting with all stakeholders

1. **INFRASTRUCTURE**
   1. **Test Environments**

This is cloud-based IoT application and used AWS (Amazon Web Services) IoT Core and related facilities.

All necessary data (sensor’s data and other information) will be provided by IoT devices/hubs from client’s existing system.

* + 1. **Acceptance Tests**

Acceptance test is performed to know how the system will behave in the real world unless it’s being tested by real users. With UAT, it takes both system performance and human behaviour into account.

* 1. **Office Setup**

UAT is done by the intended users of the system or software. This testing usually happens at the client location which is known as Beta Testing.

1. **MANAGEMENT**
   1. **Test Management**

Comprehensive acceptance test materials are a critical component of a successful acceptance test program. The acceptance test team uses a requirements-driven, structured approach to identify acceptance test data.

Test procedures provide the testers with precise steps that should be followed to execute a test. Test procedures are essentially the recipe used to perform the test. Test cases are identified and documented as progressively detailed modules.

Progress and quality of all test activities will be guarded by the test coordinator.

A weekly testing progress report is sent by email to the client’s project manager and/or test manager. The progress report gives insight in the status of the test activities and the quality of the system that’s being tested.

* 1. **Defect Procedure**

If issues/problems occur during testing, refer to problem reporting procedures documentation. Also, identify any problem reporting tools being used. A sample report format is provided below. Provide a list of the problem types and their description. The test problem reporting process includes:

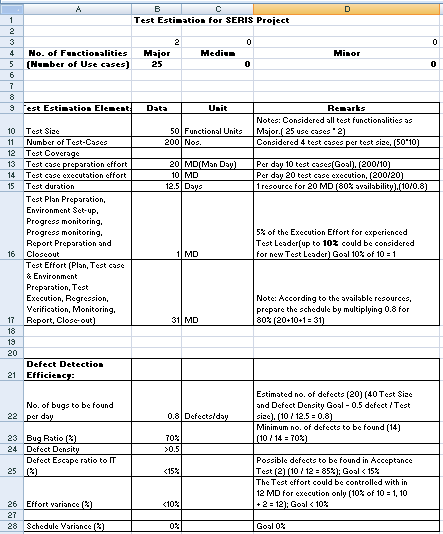
* Identifying the problem
* Creating the software change request (SCR)
* Assigning a problem status and severity
* Monitoring the SCR resolution
* Verifying the results
* Closing resolved SCRs
* SCR status

**Issue/Defect Report Sample**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Issue/Defect Report** | | | | | | | |
| Tester Name: |  | | | | Software Version: | |  |
| Area of Impact |  | | | | Preliminary Severity Assessment: | |  |
| **Nature of Issue/Defect:** | | |  | | | | |
| What occurred: | |  | | | | | |
| How did it occur: | |  | | | | | |
| When did it occur: | |  | | | | | |
| Describe how to reproduce the error: | |  | | | | | |
| **SCR Information** | | | | | | | |
| Assigned SCR Number: | | | | Severity: | | Status: | |
|  | | | |  | |  | |
|  | | | |  | |  | |

1. **ESTIMATION & PLANNING**
   1. **Estimation**

The below table describes test effort estimation for SERIS project.

****

* 1. **Planning**

User acceptance test will be performed after all software modules are implemented and performed integration/ system test. The objective of this test is to ensure that the functionalities of software system work in the way it supposed to work and all user requirements for the project are met.

One tester will be assigned for the test together with the users.

The aceptance test effort and estimation details are described in the section 7.1.

1. **Test Report**
   1. **Acceptance Test Summary Report**

After the test is done, all the collected data will be compiled and make a status report, and evaluate the test results. This will determine whether to:

* Leave bug and go ahead with the release
* Push back the release date and fix bug
* Add change request for future release

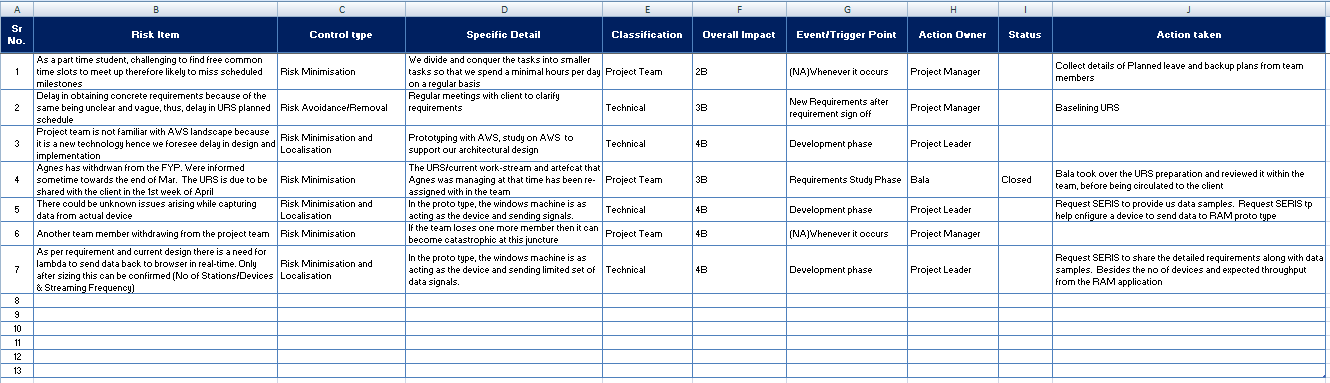
The acceptance test team will deliver the Acceptance Test Summary Report no later than an agreed upon number of days after the end of acceptance testing. This report provides the client with the information to formulate an “accept” or “reject” decision. The information within the report includes:

* Total number of tests
* Sub-total number of tests executed
* Sub-total of number passed
* Sub-total of number failed
* Severity of failed test issues grouped by low, medium, or high
* Sub-total of number not tested
* Sub-total of tests no longer applicable
* Total number of SCRs
* Number of Open SCRs
* Number of SCRs not tested
* Number of unresolved SCRs
* Number of SCRs failed
* Number of SCRs resolved and tested
* Number of Closed SCRs
* Sub-total by level and open/closed status
* Number of software deliveries during testing

**APPENDIX 1: PRODUCT RISK ANALYSIS**

From the risk questionnaire mentioned in risk management plan, the following risk items have been identified and classified as having relatively larger impact on the project:

* Understanding the no of interfaces and the requirements for each of those interface
* Understanding the technical complexity of the project and being able to deliver the project
* Finalization of User requirements
* Expectations on systems performance(real time system)
* Familiarity of the Hardware Technology to be adapted by the proposed system
* Agreed Project Plan with mile stones and expected deliverables



The following are typical, general overall acceptance test risks:

1. Insufficient test time –

* Risk: If the amount of time available is too short, the acceptance test team may not have enough time to complete acceptance testing or perform regression testing.
* Mitigation: Develop a critical path of tests, prioritized by importance.

1. Incomplete requirements -

* Risk: May result in insufficient testing of the system.
* Mitigation: Use the traceability matrices to track the testing/requirements relationship.

1. A test environment that is not the same as the production environment -

* Risk: May prevent the detection of some defects and issues.
* Mitigation: Note the differences and work to have them as close as possible.