Polytechnic University of Puerto Rico

Electrical & Computer Engineering and Computer Science Department

COE 4002 Sec. 22 – Software Engineering

Prof. Zayira Jordan

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For

CardinalHealth™

prepared by

REAL STONE SOLUTION

Team Member	ID#	Program	Signature
Elian F. Madera Torres	116762	COE	
Ruben Mendez Rodriguez	120980	COE	
Carlos Hernandez Cabrera	99747	COE	
Xaymarie N. Garcia Collazo	102329	\CS	

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1. Scope

The main purpose of the Software Test Design (STD) document is to show the basic plan and approach of the tests that will be performed to ensure that Cardinal Health's dashboards work as it was originally intended. After each dashboard is implemented (The Project Health Dashboard, Iteration Review Dashboard, Sprint Overview Dashboard for Cardinal Health's Agile Team), each one will be tested and documented using this document. It is divided into numerous sections which include a test plan, test design, and the test result. The system is expected to function and behave as intended by the software requirements specification (SRS) document which includes the following operations: view the dashboards and apply filters to them.

Commented [ZJ1]: What is it you're working on? Introduce the project here.

2. References

[1] IEEE, " IEEE Standard for Software and System Test Documentation," 18 July 2008. [Online]. Available: https://subscriptions.techstreet.com/products/530950.

[2] Real Stone Solutions, "System Requirements Specifications," 2022.

[3] Asmo, "Agile Methodology: An Overview," Zenkit Blog, 2 March 2018. [Online]. Available: https://zenkit.com/en/blog/agile-methodology-an-overview/. [Accessed 25 October 2022].

[4] L. SEO, "A Beginner's Guide To The Agile Method & Scrums | Linchpin SEO," [Online]. Available: https://linchpinseo.com/the-agile-method/. [Accessed 25 October 2022].

[5] Nvisia, "The Agile Process 101: Understanding the Benefits of Using Agile Methodology," [Online]. Available: https://www.nvisia.com/insights/agile-methodology. [Accessed 25 October 2022].

[6] Atlassian, "What is Agile?" [Online]. Available: https://www.atlassian.com/agile#:~:text=Agile%20is%20an%20iterative%20approach,small%2C%20but%20consumable%2C%20increments. [Accessed 23 October 2022].

3. Definitions

Term	Definition
Power Bi	It is a data analysis service aimed at providing interactive visualizations and business intelligence capabilities with an interface simple enough for end users to create their own reports and dashboards.
VDI	Virtual desktop infrastructure (VDI) is the hosting of desktop environments on a central server. It is a form of desktop virtualization, as the specific desktop images run within virtual machines (VMs) and are delivered to end clients over a network. Those endpoints may be PCs or other devices, like tablets or thin client terminals.
Amazon Workspace	This VDI that where are going to use during this project.
Agile	"Agile is an iterative approach to project management and software development that helps teams deliver value to their customers faster and with fewer headaches. Instead of betting everything on a "big bang" launch, an agile team delivers work in small, but consumable, increments. Requirements, plans, and results are evaluated continuously so teams have a natural mechanism for responding to change quickly." (Atlassian)

Table 1 Definitions

4. Test Plan

4.1 Purpose

Analyze and test to ensure that the solution is fit for purpose. We create test case scenarios based on analyzed requirements and designs. Stakeholders are then interacted with to ensure that the desired solution is obtained.

4.2 Outline

Having an organized test plan is important for each test to be carried out as best as possible. The test plan will include the features that will be tested as well as features that will not be tested, what tests will be carried out, and the results of the test.

4.2.1 Test Plan Identifier

The test plan identifier will change over time as it is created. This means that we will commence on version 1 all the way to the most recent version.

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4.2.2 Introduction

The document will specify the way that the features are to be tested. The tests will be divided into segments, which will be detailed below, and in these segments will be certain features that pertain to that segment. They will be divided to make sure that they work independently and to have a clear structure for the tests. The result of the test plan will determine whether all features and requirements are functioning.

4.2.3 Test items

This section will detail the items that need to be tested to gather data and make sure there are no bugs or errors. Those items are:

- Filters Functionality: The filter must search for data in an organized and classified way.
- Database Functionality: The database must be interlocked correctly with the dashboard.
- Interface Functionality: The user must be able to use the dashboard with all its functions and use it to the maximum of its capacity.

4.2.4 Features to be tested

The following section will detail which feature belongs to which item:

Filters Functionality:

- Data Search: Search data and analyze it.

Database Functionality:

- Connection and communication between the dashboards and Cardinal Health's Databases: Connection to databases for keeping metrics and visuals of Cardinal Health's dashboards up to date.

Interface Functionality:

- Filters: Allow certain information to pass through for better analyzing.
- Design of metrics and visuals: Organize and optimize metrics and visuals for efficiency and to be able to analyze better.

Commented [ZJ3]: At this point you have not explained/described the dashboards.

Commented [ZJ4]: Is this GUI?

4.2.5 Features not to be tested

The following section will detail which features are not going to be tested:

VDI Functionality

- Amazon Workspaces: VDI in which the dashboards will are going to be implemented using Power BI

Software Functionality

- Power BI: Software that will be used to implement each dashboard containing the connections to the databases.

4.2.6 Approach

In this section the overall approach to testing will be described. The approach that will be used will verify the accuracy and comprehensiveness of the information in the documentation in those areas covered by tests.

Filters Functionality:

To properly test the filter, we select a tester who tries to click the filter button and verify that the data list works successfully. Finally, the tester will check all the filters on the dashboard. The tester will then write a report on whether the tests were successful or failed. The only tools the tester will need are a PC, a virtual machine, and an Internet connection.

Database Functionality

To properly test the database, we select a tester who attempts to search for any company-specific data with the dashboard filter, verifying that the user was able to successfully search for the data. Finally, the tester will check if the database used in the dashboard connects correctly to the Cardinal Health database. The tester will then write a report on whether the tests were successful or failed. The only tools the tester will need are a PC, a virtual machine, and an Internet connection.

Interface Functionality

To properly test the dashboard interface, all of the functions that were described in section 4.2.4 within the interface element will be verified by having a tester attempt to use them. The tester will first click on each filter to make sure it works correctly. Then, they will try to select some data from the company to make sure it works correctly. Finally, they will try to find different data to make sure that the tables and graphs work correctly. The tester will then write a report on whether the tests were successful or failed. The only tools the evaluator will need are a PC, a virtual machine, and an Internet connection.

4.2.7 Item pass/fail criteria

Commented [ZJ5]: List of itemized elements with their corresponding pass/fail criteria.

The following section lists the elements that will be tested and the pass / fail criteria that each of them will have during the test, the elements are:

1. Display of elements: The elements of the Dashboard should display in their correct position and without errors.
    - Organization
    - Elements correctly working
    - Cardinal Heath's Project Manager approval
2. Data search: The database must be interleaved correctly with the dashboard.
    - Correct data for each of the filters
    - Cardinal Heath's Project Manager approval

4.2.8 Suspension criteria and resumption requirements

- Suspension Criterion 1: Inability for the dashboard to connect to the database, information leak, or inability to connect to the server will result in the suspension of all testing activities.
- Resume Requirements 1 – Testing activities will resume once the dashboard has regained access to the database or server and the source of the leak has been identified and fixed.
- Suspension Criterion 2: Feature is not working as expected.
- Resumption 2 Requirements: After examining and establishing which of the elements or what was the cause to issue a food order and resume it.

4.2.9 Test deliverables

The following documents will be generated by the assigned tester and will be delivered to the team after test completion:

- Test Plan
- Test design specifications
- Test procedure specifications

4.2.10 Testing task

It is necessary to mention the responsibilities and requirements for every individual who is a participant of the testing phase. In this section and following list, these terms will be stated and affirmed:

Task	Inter Task dependencies	Special Skills	Responsibility	Finish date
Prepare test plan	Complete The Dashboard design description (SDD) and System Requirements Specifications (SRS)	Understanding of both the documents thoroughly.	Carlos Hernandez Xaymarie Garcia	12/08/22
Prepare test design specifications	Task 1	Knowledge of PowerBI	Xaymarie Garcia	12/08/22
Prepare test case specifications	Task 2	Knowledge of PowerBI	Ruben Mendez	12/08/22
Filters must be functional with data base	To perform the information search correctly between the database and the dashboard	Knowledge of PowerBI	Elian Madera	12/15/22
Display of elements	The elements of the Dashboard should display in their correct position and without errors	Knowledge of PowerBI	Elian Madera	01/08/23
Execute all test procedures	All previous tasks	Knowledge of PowerBI	Ruben Mendez	02/01/23
Transmit all test documentation and test data to team	All test documentation must filled out	Basic knowledge of word and PowerBI	Tester	02/01/23

Table 2 Testing Task

4.2.11 Environmental needs

Hardware: The testing will be done on a PC with Virtual Machine capability.

Software: The testing will be done on Power Bi inside of Virtual Machine

Operating system: The operating system that will be used to conduct the tests is Windows OS.

Security: As some sensitive information will be used during the tests it will be conducted on a secure server in a room that will be locked to ensure that the information is well protected.

Tools: The following test tools are required to develop and evaluate the tests:

a. **Microsoft Word:** This is where all documentation for the tests will take place.
b. **Virtual Machine:** This is the system that will be used to conduct the tests.
c. **Power Bi**: This is the program that will be used to carry out the functionality design tests of the database.

Publications: The System Requirements Specifications (SRS) is required to support testing.

4.2.12 Responsibilities

The following groups have the responsibility for segments of the testing

- **Developers:** The responsibility of the developers is to combine the elements into features that meet the functional requirements established in the Software Requirements Specification (SRS) document. The second task is to correct any errors or problems that may arise during the dashboard test. Also, if users or people who will test the application find a problem, they must be solved.
- **Testers:** This person is the one that will conduct all the tests that have been described.
- **Users:** The responsibility of the users lies in testing the application and giving an opinion about it.
- **Real Stone Solution team:** This is the team that will receive the test documentation, review it and correct any errors should they arise.

4.2.13 Staffing and training needs

The next part of the documents lists the personnel and training required for each group that makes up the members required for testing.

The following staff is needed to carry out this testing project:

Developers

4 members of Real Stone Solutions team (Xaymarie Garcia, Carlos Hernandez, Elian Madera, Ruben Mendez). The training of these developers has come from courses taken in college while studying Computer Science and Computer Engineering.

Tester

1 tester member of Real Stone Solution team (Ruben Mendez Rodriguez). The training of this developer has come from courses taken in college while studying Computer Engineering.

Users

A total of 1 or 2 users will be needed during the test. These users will test each of the functions offered by the dashboard. They will have on-site training on how to report any bug issues that may be found in the dashboard.

4.2.14 Schedule

This next table will describe the tests regarding what operations will be made to test the appropriate functions and the specified dates for such tests.

Schedule

Element to be tested	Date tested
Filters	01/31/2023
Database	01/31/2023
Interface	01/31/2023

Table 3 Schedule

4.2.15 Risks and contingencies

This next table will describe the risks that are possible to happen during testing with the results of such and other possible contingencies.

Risk	Result	Contingency
PC Malfunction	PC must be replaced appropriately after the test is stopped.	Testers should be equipped with spare PC that fill the required description.
Connection Malfunction	Router/Modem and device must be inspected after the test is stopped.	Testers should be ready to contact the ISP, if necessary, to fix connectivity issues.

Table 4 Risk, results and contingencies

5. Test Design Specification

5.1 Purpose

The purpose of this section is to specify the design and procedures used to test certain features selected from the features utilized in the project. We are going to be testing the Dashboards, with the 3 major parts of each Dashboard Filters Functionality, Database Functionality and Interface Functionality.

5.2 Outline A

5.2.1 (A) Features to be tested

- Filter functionality

5.2.2 (A) Approach Refinement

- The data filter

Feature	Pass/Fail Criteria
Choosing a filter	Pass: The user could pick the filter that they wanted Fail: The user pick doesn't affect the data display

Table 5 Approach Refinement

5.2.3 (A) Feature's pass/fail criteria

The following table demonstrates the approach utilized to test the filters.

Filter Functionality	Approach
Selecting the filter	The tester makes sure that the filter is connected to the correct database.

Table 6 Features's pass/ fail criteria

5.3 Outline B

5.3.1 (B) Test design specification identifier

- Database functionality

5.3.2 (B) Features to be tested

- The correct Data Shows up

5.3.3 (B) Approach Refinement

Database functionality	Approach
Showing the data that the user picks with the filter.	The tester makes sure that the Data address is correct.

Table 7 Approach Refinement

5.3.4 (B) Feature's pass/fail criteria

Database functionality	Pass/Fail Criteria
The user selected a data by using the filter system	Pass: Bring in up the data that the user chooses and display the data. Fail: The data never shows up or it displays the wrong data.

Table 8 Features' pass/ fail criteria

5.4 Outline C

5.4.1 (C) Test design specification identifier

- Interface Functionality

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5.4.2 (C) Features to be tested

- Selecting the data
- Displaying the data

5.4.3 (C) Approach Refinement

Interface Functionality	Approach
Being able to select the option that the user one	The tester would be selecting all the options and click on the menus
Displaying the Data	This is going to be tested by selecting all the options and making sure that it displays the data.

Table 9 Approach Refinement

5.4.4 (C) Feature's pass/fail criteria

Interface Functionality	Paas/Fail Criteria
Selecting Options	Pass: If the user can select any option from the menu. Fail: Not letting the user select an option.
Display Data	Pass: The Data is display Fail: nothing is displayed.

Table 10 Features' pass/ fail criteria

6. Test Case Specification

6.1 Purpose

This section aims to define a test case identified by a test design specification.

6.2 Outline

6.2.1 Test case specification identifier

- The ID number of the test case specification is #1, and it is associated with the Test Plan ID number #1.

6.2.2 Test Items

- The following are to be tested:
  - 6.2.1.1 Display of elements
  - 6.2.1.2 Filter Functionality
  - 6.2.1.3 Database Functionality

6.2.3 Input specifications

The following items are inputs:

- Virtual Machine
- Navigation redirection
- Selecting options to display data

6.2.4 Output specifications

The following items are outputs:

- The Data the user Selected

6.2.5 Input specifications

- It is important to understand that running a test of an application or program requires the hardware listed below.

  The hardware features and configuration required to run the cases are:
  a. Internet connection
  b. Virtual Machine

6.2.6 Special Procedure Requirements

- Credentials from Cardinal Health are required to access the dashboard with project information.

6.2.6 Intercase Dependencies

- To perform test #1, the user must have access provided by Cardinal Health to the dashboard to confirm that the information is correct.

7. Test Procedure Specifications

7.1 Purpose

- These tests are to ensure that the Dashboard is functioning at its maximum and intended capacity and to corroborate that each of the visualizations has the correct information provided by Cardinal Health. A total of four tests and revisions will be performed with Cardinal Health before it is ready for internal use.

7.2 Outline

The test procedure will have the following structure:

a. Test procedure identification identifier
b. Special requirements
c. Procedure steps

7.2.1 Test procedure identification identifier

- Following the completion and approval of the test design, the development of the test procedure specification can start. The test procedure specification includes several items, such as the test procedure specification identifier. It is a unique identifier for a test procedure.

7.2.2 Special requirements

- The specific requirements for these tests are several.

1. Knowledge of using a computer.
2. Have access to the Cardinal Health virtual machine to access your systems.
3. Have valid credentials provided by Cardinal Health.
4. Have authorization to access the group in Microsoft Office 365 and access the data.

7.2.3 Procedure steps

7.2.3.1 Log

The purpose of the test log is to document the events and results of the pass/fail criteria encountered during the test. The test log is a chronological record of the execution of the test, including persons present and functions. The results of the procedure and any anomalies encountered.

7.2.3.2 Set up

1. Verify internet connection
2. Set up virtual machine
3. Validate credentials with Cardina Health

7.2.3.3 Start

1. Turn on Virtual machine
2. Login to your assigned browser to access the Cardinal Health home page.

7.2.3.4 Proceed

- Test Fiscal Year filter
  - Visualize the information and check that everything is correct.
- Test IT Manager filter
  - Visualize the information and check that everything is correct.
- Test Agile Team filter
  - Visualize the information and check that everything is correct.
- Test Sprint filter
  - Visualize the information and check that everything is correct.

7.2.3.5 Measure

- Project Health Dashboard
  - Verify that the information is correct
- Iteration Review Dashboard
  - Verify that the information is correct
- Sprint Review Dashboard
  - Verify that the information is correct

7.2.3.6 Shut down

- Close dashboards and run a test again

7.2.3.7 Restart

- If something may occur while running the test, developers must attend the issue and run the test again.

7.2.3.8 Stop

- If something may occur in order to stop the test the user closes the dashboard.

7.2.3.9 Wrap up

- To restore the environment the user must log back into Power BI where the dashboards are located.

7.2.3.10 Contingencies

- Developers must fix the issue and rerun the test until it is executed correctly as part of the response to abnormal events.

8. Test Log

8.1 Purpose

- The purpose of the test log is to provide a chronological and detailed record of all the tests that will be done for the MSL WebApp. This will provide a better grasp of the information to be expected when conducting the tests specified in section 4 and 5.

8.2 Outline

- The test log has the following structure:
  - Test log identifier
  - Description
  - Activity and event entries
  - Procedure results

8.2.1 Test log identifier

- All executed tests will contain a unique specifier for each log recorded in the system.

1. Database test log identifier: **DAT.TEST**
   - Database functionality

2. Filter test log identifier: **FIL.TEST**

- Filter functionality

3. Interface test log identifier**: INTER.TEST**
    - Interface Functionality

8.2.2 Description

- This section provides a full description of each of the test logs that were run. Each log will provide the time and date the incident occurred.

8.2.3 Activity and event entries

- Each activity and event will be documented with the date and time of occurrence, as well as the tester's name (s).

1. First Activity/event log:
    - Identifier: **DAT.TEST**
    - Author: Ruben Mendez (Tester)
    - Observer: Xaymarie Garcia , Elian Madera, Carlos Hernandez
    - Date/Time: 8:00 PM (Tuesday)

2. Second Activity/event log:
    - Identifier: **FIL.TEST.**
    - Author: Elian Madera
    - Observers: Xaymarie Garcia, Elian Madera, Carlos Hernandez
    - Date/Time: 8:00 PM (Tuesday)

3. Third Activity/event log:
    - Identifier: **INT.TEST**
    - Author: Carlos Hernandez
    - Observers: Xaymarie Garcia, Elian Madera, Ruben Mendez
    - Date/Time: 8:00 PM (Tuesday)

8.2.4 Procedure results

- The following visual results will be obtained from the test logs:
    - The data filters

- Selecting the data
- Displaying the data
- The correct Data Shows up

8.2.5 Environmental information

- Not applicable

8.2.6 Anomalous events

8.2.7 Incident report identifiers

9 Test summary report

9.1Purpose

The test summary report's goal is to consolidate and summarize the information obtained during the testing.

9.2 Outline

- The test summary report has the following structure:
  - Test Summary Report Identifier
  - Summary
  - Variances
  - Comprehensive Assessment
  - Summary of Results
  - Evaluation
  - Summary of Activities
  - Approvals

9.2.1 Test Summary Report identifier

- The allocated tester is responsible for adding the assigned unique identification to the most recent and updated test summary report.

9.2.2 Summary

- The tester will be responsible for summarizing the evaluation of the test items in this paragraph. This will entail identifying the test items, stating the most recent version, and, finally, defining the environment in which the items were evaluated. If the following documents are accessible, they must also be mentioned as references: test plan, test design specifications, test process requirements, and test logs.

Name	Version	Test Plan	Test Procedure Specs.	Test Logs	Summary

Table 11 Summary

9.2.3 Variances

- In this section, the tester will be responsible for reporting any deviations from the test items' design specifications. It must also include any deviations from the test strategy, test design, or test processes. Finally, it will explain why each deviation occurred.

Variance design	Variance Test Plan	Variance Test Procedure	Reason of Variance Design	Reason of Variance Test Plan	Reason of Variance Test Procedures

Table 12 Variance

9.2.4 Comprehensiveness Assessment

- The comprehensiveness assessment evaluates how thorough the testing procedure is in relation to the criteria specified above in the test plan (4.2.6). This review must be able to determine precisely which elements did not receive adequate testing and the reasons for future investigation.

Feature to be tested further	Reason

Table 13 Comprehensiveness Assessment

9.2.5 Summary of results

- The findings of all tests will be summarized in this section. All resolved incidents and associated remedies will also be included. Finally, any unresolved issues will be identified for further investigation.

9.2.6 Evaluation

- This section will provide an overall review of each test question, along with its restrictions and an optional estimated risk of failing. This assessment will be based on the exam results as well as the item level pass/fail criteria.

Test Filter	Evaluation	Risk of Failure

Table 14 Evaluation

9.2.7 Summary of activities

- This part will provide a summary of actions and occurrences, as well as their associated consumption statistics, total elapsed time, total staffing time, and total machine time.

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Total Staffing Level	Total Elapsed time

Table 15 Summary of Activities

9.2.8 Approvals

- The names and signatures of the approval team, as well as the dates of such, must be supplied in this subsection.

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70%

Team Member	Date	Signature
Elian F. Madera Torres	02/02/2023	
Ruben Mendez Rodriguez	02/02/2023	
Carlos Hernandez Cabrera	02/02/2023	
Xaymarie N. Garcia Collazo	02/02/2023	

Table 16 Approvals