

SOFTWARE PROJECT PLANNING, DESIGN AND QUALITY MANAGEMENT

Task 81D

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SWE20001 / Managing Software Projects

Modification History

Date (modified)	Purposes
03-June-2022	<ol style="list-style-type: none">1. Add an Overview to the report2. Fix Quality model Part
05-June-2022	<ol style="list-style-type: none">1. Change duration of each sprint from 5 days to 10days2. Change solution direction3. Modified some business value to the backlog items4. Fix Effort Estimation5. Add list of figures and tables
06-june-2022	<ol style="list-style-type: none">6. Fix Effort Estimation

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Software Project Planning, Design and Quality Management

Overview

The goal of the report is to show a thorough understanding of the unit materials, such as how to plan, create, and manage the quality of a software project.

Planning, design, and quality management will be the three aspects of this report. The context and scope of the project will be covered in the planning section. Furthermore, the backlog of products and when they will be delivered. The solution to the project, as well as a high-level design diagram and work break down structures, will be explored in the design phase, particularly the effort estimation. The final section is quality management, in which we will explore what quality model to use to test our project's compliance with the standard, why the quality model is vital to the business, and how to measure each model with a plan.

Planning

Background

Angkor Media (AM) is a local business that sells plane tickets in Phnom Penh. It has a large number of repeat customers, and new consumers are coming every day due to word of mouth that the company sells tickets at a lower price.

The customers purchase their flight tickets by calling on the phone, on social media, or just walking in. However, they currently do not store any client records, so an existing customer would have to present their passport and other information every time they wanted to buy a ticket.

Even though they have a lot of customers each day, they appear to be unaware of their sales and profit. They have an accountant who is also a bookkeeper who would copywrite receipts to a computer-based document to maintain track of their daily income (spreadsheet). Their accountant would manually generate their income at the end of the month and year.

The company's owner now wants to open more branches, but their present sales record system prevents them from making that decision. They would also like to reward their loyal customers with gifts, coupons, or discounts. But first, they need to figure out how many their loyal customers are there.

They are seeking a new system that can automatically generate sales reports and save customer information.

Scope

In this project, we are going to develop an MIS (Management Information System) that can monitor internal business operations. This new system will be capable of:

1. Data Capture:
 - Allow users to enter a customer detail information
 - Allow users to enter sales data
2. Information Storage
 - Store information that enters by users into the database
3. Processing Data
 - Produce daily, monthly and annual sales reports
 - Produce Revenue, profit, and cost reports (income statement)
4. Analysing Data
 - Automatically analyse sales trend
5. Information retrieval
 - Allow users to retrieve customer information
 - Allow users to retrieve income statements
 - Allow users to retrieve sales reports
 - Allow users to retrieve sales trend report

However, it is not within our scope how customer contacts them to buy the ticket, which means our system will not be able to handle purchasing ticket online via the website.

Product Backlog

Product Backlog and Business value Justification:

Table 1: Product Backlog

#	Items	Dependencies	Business Value (1 < 10)	Explanation of Business Value
1	Add a new customer	N/A	10	Without adding new customer information into the database, the system won't be able to keep their information.
2	Edit a customer information	1	10	Customer information is very important to the company, and if their information is not, they might change their passport number, their contact detail, address, etc. So, editing customer information could help the user keep the up-to-date info.
3	Search for a customer	1	10	Without needing to ask the customer for their details, the user must be able to look up their customer information on the system.

4	Delete a customer	1	2	This function is just in case we need to blacklist a customer. If we just want to delete a customer for that we enter the detail wrong, we might just edit the info.
5	Add a sales record	1	10	Without adding a sale record, we could not produce any sale report, income statement, or analyse any sales data, which is the main purpose of the system.
6	Edit a sales record	5	8	Edit the sale record for editing the wrong entered sales information.
7	Delete a sales record	5	1	This function is just for the convenience of the user in case they want to delete the entered sale data wrong. Otherwise, they can just edit the sales records.
8	Produce a sales report	5	8	The produce daily sales report is for the user to monitor their sales every day.
9	Produce monthly income statement	5	9	This function helps users to know the company's income monthly.
10	Analyse monthly sales trend	5	10	This function helps the user to understand their sales trend, and to do the decision making for the company.
11	Download customer information	1	8	This function is a convenient way to retrieve the information of customers in order to offer them a gift for being a loyal customer.
12	Download income statement	11	8	This function is a convenient way for the user in case they want to keep their statement of income on paper, for a meeting presentation, or tax declaration things.
13	Download sales report	5	4	This function is a convenient way for the user in case they want to keep their sales report on paper, or meeting presentation.
14	Download sales trend report	12	9	This function is a convenient way for the user in case they want to keep their sales report on paper, or meeting presentation, in order to do the decision making.
15	User Account Login	N/A	10	This function is important to the system by preventing an unwanted user to access the data.

Delivery schedule

This project is planned to be a 2-week sprint, and there will be 4 sprints. So, it will be 40 days for the entire project.

- Sprint 1 has 10 days: From day 1 to 10

- Sprint 2 has 10 days: from day 11 to 20
- Sprint 3 has 10 days: from day 21 to 30
- Sprint 4 has 10 days: from day 31 to 40

Table 2: Delivery Schedule

#	Items	Release Schedule (Sprint 1, 2, 3, 4)
1	Add a new customer	Sprint 1
2	Edit a customer info	Sprint 1
3	Search for a customer	Sprint 1
4	Delete a customer	Sprint 1
5	Add a sales record	Sprint 1
6	Edit a sales record	Sprint 1
7	Delete a sales record	Sprint 1
8	Produce a sales report	Sprint 2
9	Produce monthly income statement	Sprint 2
10	Analyse monthly sales trend	Sprint 3
11	Download customer information	Sprint 3
12	Download income statement	Sprint 4
13	Download sales report	Sprint 4
14	Download sales trend report	Sprint 4
15	User Account Login	Sprint 4

Design

Solution Direction

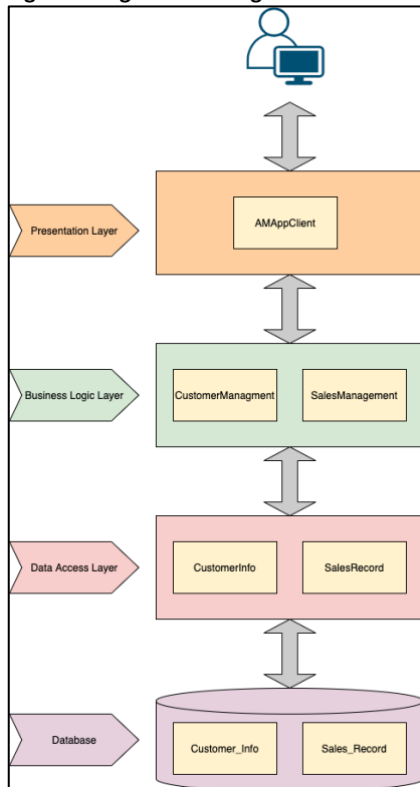
This new system will be a web-based application. For their business, the benefits of using web-based application are:

- Data Sharing and Collaboration
 - o As in the background of the company, AM is considering open another branch. So, using web app will make them able to access the data each of them create, and download each branch's report, because data is stored in one central location.
- Flexibility
 - o The owner might want to access their data from home with his laptop in order to make company decision. And manager may want to do the same to make a management decision. So, by using web-app, they could access the data anywhere at any time, not only in the office.
- Easy installation and cost effective

- They wanted to run another branch, so they will not need to installation the previous system to another computer. With web app they just log in to the web browser and work, so no further cost needed.

Architectural design

Figure 1: High-Level Design



Components:

Database:

1. **Customer_Info**: Store Data of customers' detail
2. **Sales_Record**: Store Data of Sales records

Data Access Layer: (SQL server)

1. **CustomerInfo**: Receive parameter from CustomerManagement passed to Database and vice versa.
2. **SalesRecord**: Receive parameter from SalesManagement passed to Database and vice versa.

Business Layer: (C# class)

1. **CustomerManagement**: Where users add new data to the customer
2. **sales management**: Where users add new records of sales

Presentation Layer: (User Interface)

1. **AMAppClient**: A new desktop application for AM

Work breakdown structure

Figure 2: WBS sprint 1

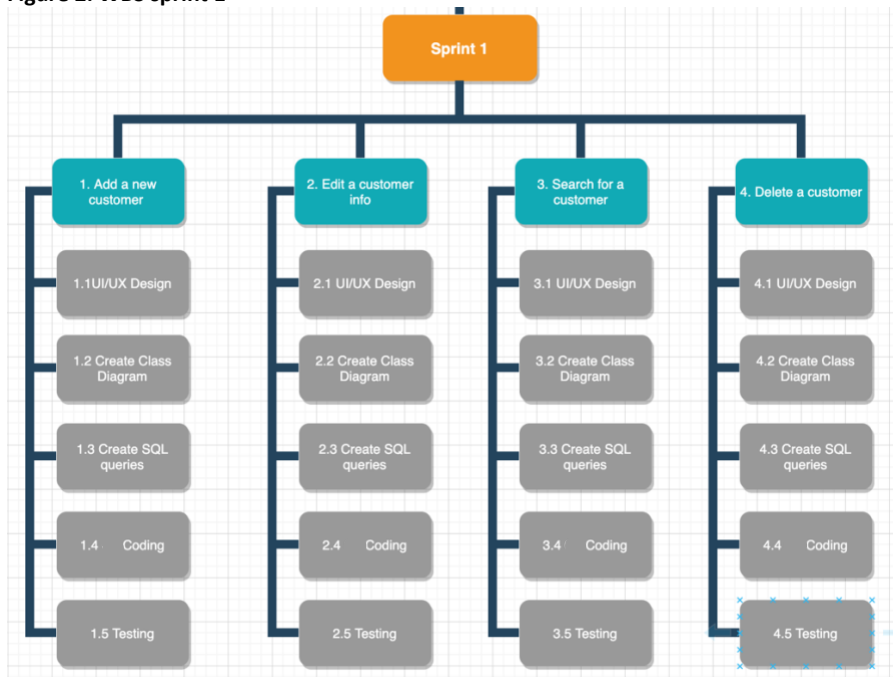


Figure 3: WBS Sprint 2



Figure 4: WBS Sprint 3

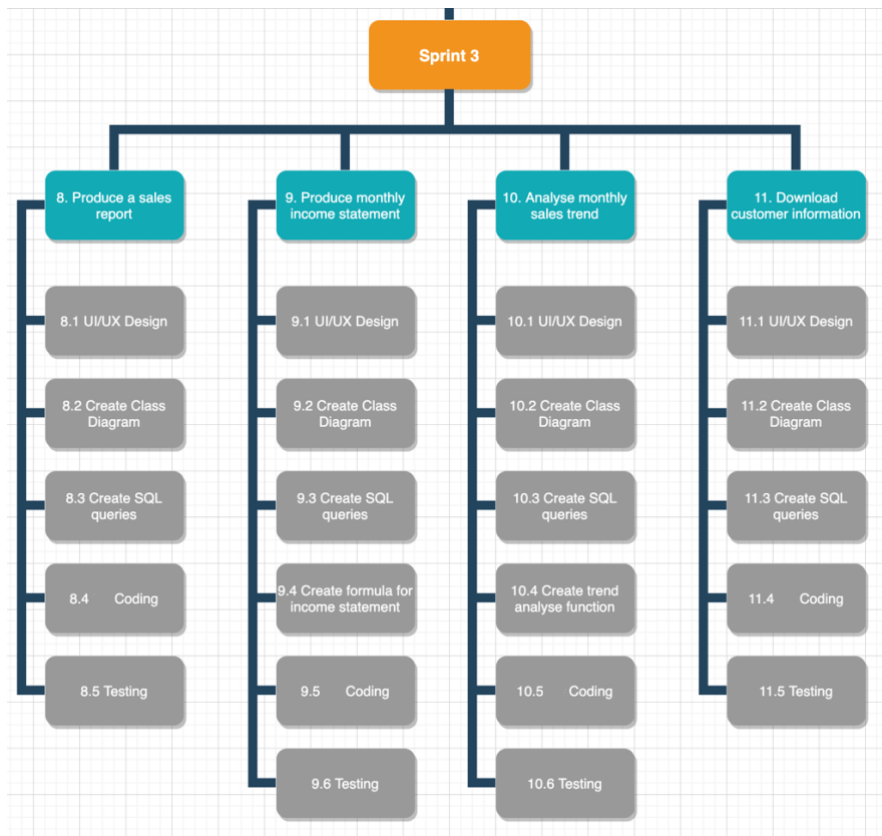
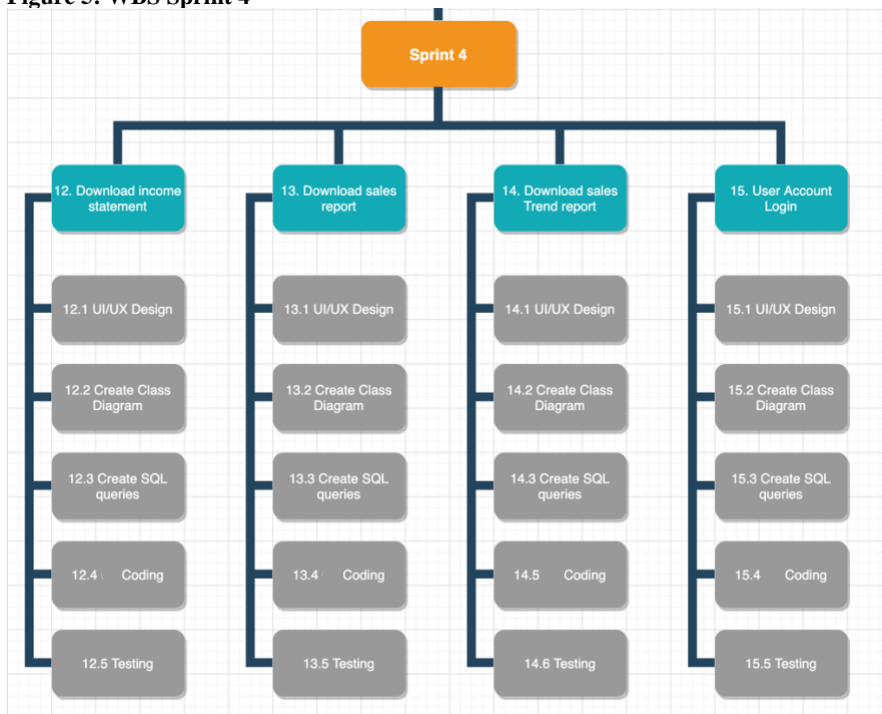


Figure 5: WBS Sprint 4



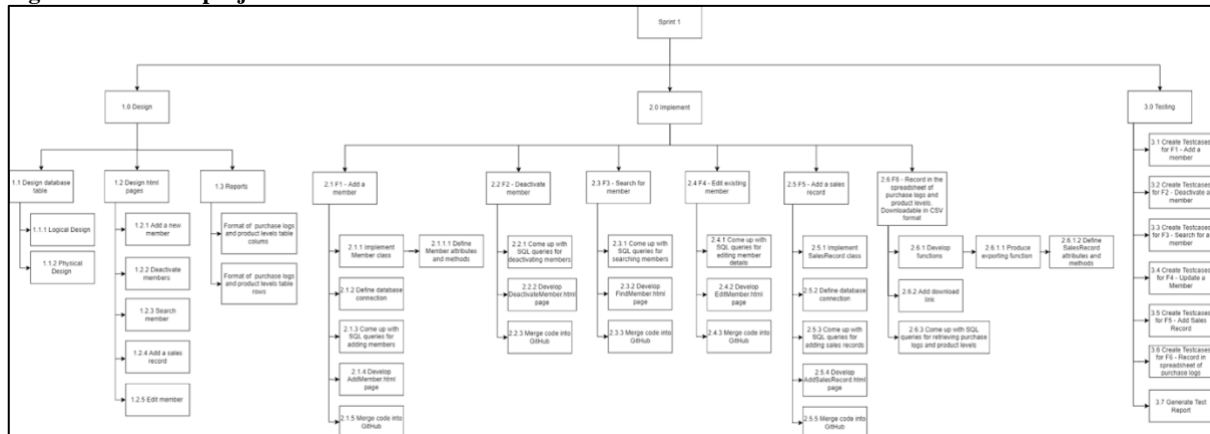
Sprint 1 detail and Effort Estimation

There are 2 technique we are going to use for this project effort estimation: Analogy, and Size comparison. We will compare each task to the previous project backlog that we had complete in this semester.

Sprint 1

For these sprint1 backlog items we are going to use Analogy Technique, because we had done the similar project with the similar items. This below figure shown the similar previous project tasks. We can see that they have very similar backlog items such as Adding a new member, Edit the member information, search for a customer, and delete the customer. each backlog item has similar tasks, including Design, coding, testing.

Figure 6: Previous project tasks



Item 1. Add a new customer vs F1: Add a new member

Using Analogy	F1: Add a new member	1. Add a new customer
Similarities and differences	<p>Team size: 6 people</p> <p>Sub tasks:</p> <ul style="list-style-type: none"> - logical and physical design - implemented member class - come up with SQL queries - coding - Testing - Coding languages: HTML, CSS, JS, and PHP 	<p>Team size: 7 people</p> <p>Sub tasks:</p> <ul style="list-style-type: none"> - UI/UX design - Create diagram class design - Create SQL queries - coding - Testing - Coding languages: HTML, CSS, JS, and PHP

Similarity:

Previous effort takes up

- logical design and physical design= 60mn
 - implemented member class = 30mn
 - come up with SQL queries = 30mn
 - HTML, CSS, JS coding = 90mn
 - PHP coding = 120 mn
 - Testing = 90mn
- ⇒ total effort = 420mn = 7 hours

Differences:

Since the team size won't have much effect to the work effort, we could remain the effort the same.

⇒ 1. Add a new customer = 7 hours

Item 2. Edit a customer info vs F4: Edit existing member

Using Analogy	F4: Edit existing member	2. Edit a customer info
Similarities and differences	Team size: 6 people Sub tasks: <ul style="list-style-type: none"> - logical and physical design - Implemented member class - Come up with SQL queries - Coding: HTML, CSS, JS, and PHP - Testing 	Team size: 7 people Sub tasks: <ul style="list-style-type: none"> - UI/UX design - Create diagram class design - Create SQL queries - Coding: HTML, CSS, JS, and PHP - Testing

Similarity:

Previous effort takes up

- logical design and physical design= 60mn
- implemented member class = 30mn
- come up with SQL queries = 30mn
- HTML, CSS, JS coding = 90mn
- PHP coding = 120mn
- Testing = 90mn

⇒ total effort = 420mn = 7 hours

Differences:

Since the team size won't have much effect to the work effort, we could remain the effort the same.

⇒ 2. Edit a customer info = 7 hour

Item 3. Search for a customer vs F3: Search for member

Using Analogy	F3: Search for member	3. Search for a customer
Similarities and differences	Team size: 6 people Sub tasks: <ul style="list-style-type: none"> - logical and physical design - Implemented member class - Come up with SQL queries - Coding: HTML, CSS, JS, and PHP - Testing 	Team size: 7 people Sub tasks: <ul style="list-style-type: none"> - UI/UX design - Create diagram class design - Create SQL queries - Coding: HTML, CSS, JS, and PHP - Testing

Similarity:

Previous effort takes up

- logical design and physical design= 60mn
 - implemented member class = 30mn
 - come up with SQL queries = 30mn
 - HTML, CSS, JS coding = 90mn
 - PHP coding = 120mn
 - Testing = 90mn
- ⇒ total effort = 420mn = 7 hours

Differences:

Since the team size won't have much effect to the work effort, we could remain the effort the same.

- ⇒ 3. Search for a customer = 7 hour

Item 4. Delete a customer vs F2: Deactivate member

Using Analogy	F2: Deactivate member	4. Delete a customer
Similarities and differences	<p>Team size: 6 people</p> <p>Sub tasks:</p> <ul style="list-style-type: none"> - logical and physical design - Implemented member class - Come up with SQL queries - Coding: HTML, CSS, JS, and PHP - Testing 	<p>Team size: 7 people</p> <p>Sub tasks:</p> <ul style="list-style-type: none"> - UI/UX design - Create diagram class design - Create SQL queries - Coding: HTML, CSS, JS, and PHP - Testing

Similarity:

Previous effort takes up

- logical design and physical design= 60mn
 - implemented member class = 30mn
 - come up with SQL queries = 30mn
 - HTML, CSS, JS coding = 90mn
 - PHP coding = 120mn
 - Testing = 90mn
- ⇒ total effort = 420mn = 7 hours

Differences:

Since the team size won't have much effect to the work effort, we could remain the effort the same.

- ⇒ 4. Delete a customer = 7 hour

➔ The entire sprint 1 would take 28 hours.

Quality Management

Quality management assure that before a product is delivered to a client, it must be no errors and flaws.

Quality Model

To ensure that our systems are functional before delivered to our client, we use the ISO2510 model. Moreover, to consider our system is done, our desktop application must meet some requirements such as:

- Be able to work without any mistakes (Function Completeness and Correctness)
- Show accurate data of the reports (Function Correctness)
- Prevent unwanted users from login in (Integrity)
- Easy to use (Learnability)
- Satisfied by the client (Time efficiency)
- Prevent any errors (user error protection)

Table 3: Backlog items

- | |
|--|
| 1. Add a new customer
2. Edit a customer info
3. Search for a customer
4. Delete a customer
5. Add a sales record
6. Edit a sales record
7. Delete a sales record
8. Produce a sales report
9. Produce monthly income statement
10. Analyse monthly sales trend
11. Download customer information
12. Download the income statement
13. Download the sales report
14. Download the sales trend report
15. User Account Login |
|--|

Table 4: Quality Model with Metrics

Sub-characteristic	Items	Quality Metrics	Threshold
Characteristic: Functional suitability			
Function Completeness	All product backlog items	Number of completed functions in performance testing	Each function must complete at least 90% of the total test case.
Function Correctness	All product backlog items	Number of errors found in performance testing	The number of defect densities shall be less than 5% of the total case.

Characteristic: Performance efficiency			
Time behaviour	5. Search for a customer 15. User Account Login	Response time per request in performance testing	The system shall be able to respond in less than 5 seconds in each test case.
Characteristic: Usability			
Learnability	All product backlog items	Total minutes of user able to know how to use the functions in usability Testing	The user shall be able to understand how to use each function in less than 3 minutes
User error protection	1. Add a new customer 2. Edit a customer info 4. Delete a customer 5. Add a sales record 6. Edit a sales record 7. Delete a sales record	Number of errors found in usability testing	The number of errors found in testing is less than 10% of the total test case
Characteristic: Security			
Integrity	15. User Account Login	Number defect per KLOC found in unit testing	The number of errors found in unit testing shall be less than 5 per KLOC of the total case

Quality Checking Plan

Functional completeness:

The degree to which a set of functions fulfils all specific tasks and user goals is referred to as functional completeness. This feature is critical to our project since, without all of those functions, our system would be useless. If one of the functions is broken, the other will be broken as well. For example, if item 1 (add a new customer) is not performed, further functions such as Edit, delete customer, create a sale record, and generate a report will not operate.

We will have to undertake performance testing on our project to see if it meets the quality requirements. Each function will be tested at least 3 times throughout the performance testing. If the overall test of each function shows that more than 90% of the time, the function works correctly, it will be considered complete.

Function Correctness:

Functional Correctness ensures that the product or system produces the desired outcome with the required precision. This feature is critical because our data is critical to their operations. For example, if item 3. Search for a Consumer returns an inaccurate result, the firm will receive incorrect customer information, putting the organisation at risk. Another example: if item 10. Analysing sales trends that are completed wrong, will have an impact on their decision-making.

We will also undertake performance testing to consider this function complete. Each function will be tested 3 times. If the total error in each scenario is less than 5%, the function will meet the quality model.

Time behaviour:

This attribute refers to how well the product's reaction and processing times, as well as its throughput rate, match criteria as it performs its purpose. It is critical to our product since everyone hates waiting; if a user has to wait 5 minutes simply to load a customer's information, they will be frustrated, resulting in client dissatisfaction.

We'll run performance testing to see how quickly each function responds. With each function being tested at least 5 times. Our system should be able to respond in less than 5 seconds to each request, according to the results.

Learnability:

Learnability ensures that users may use the system to fulfil their goals of learning how to use it. It's crucial for our system because this is AM's first time adopting a GUI system, thus our product must be simple for them to learn.

We will do user testing to see whether these functions meet quality standards. We will have 5 participants, each of whom will perform all of the functions, a total of at least 15 tasks. If the result shows that a tester can understand how each function works in less than 3 minutes, our product meets the quality criteria.

User error protection:

The degree to which a system prevents users from making mistakes is known as user error protection. It is critical to our system since humans make mistakes all the time. For example, deleting a sale record without intending to do so may result in false results in analysis, reports, and so on. Those errors will have a significant negative impact on the company.

We will do usability testing to ensure that our system is effectively protected against user error. We will gather 5 individuals, each of whom will complete at least 6 tasks. If just 10% of errors were detected in the overall test scenario, we will consider this function to meet the quality criteria.

Integrity:

Our systems' integrity ensures that unauthorised access to the application is prevented. This is critical to our system since it is a nightmare for someone who has bad intentions for AM, like deleting data from the system. We must unit test our programme to ensure that our system is secure. The unit test code will be written. For this Item 15, If the number of defects per KLOC is less than 5, the user login will meet the quality standards.

References

iso25000. (n.d.). *Home: ISO 25000 STANDARDS: ISO 25010: Usability*. Retrieved from iso25000: <https://iso25000.com/index.php/en/iso-25000-standards/iso-25010/61-usability>

