Usability RNF:

Requirement specification	RNF-008
Requirement Name	Reliability
Description of the requirement	The system will have the ability to function consistently and predictably over an extended period of time and under various conditions.

Test Planning

Participants:

Number of participants: It is recommended to have a minimum of 3 to 8 participants to assess the reliability of an application. This will allow obtaining a significant set of data and detect recurring problems.

Recruitment of participants: Participants must be recruited in such a way that they represent the target audience of the application. Different methods can be used to recruit participants, such as the use of online platforms for remote participants, social networks, online communities, user groups, among others.

Expected skills and knowledge: Participants must have sufficient skills and knowledge to perform common tasks in the application, but they do not need to be experts in the subject matter or in the use of the application. General questions can be asked at the beginning of the test to ensure that participants meet the minimum knowledge requirements.

The participants' responsibilities will be to attempt to complete a set of representative task scenarios presented to them in as efficient and timely a manner as possible, and to provide feedback regarding the usability and acceptability of the user interface. The participants will be directed to provide honest opinions regarding the usability of the application, and to participate in post-session subjective questionnaires and debriefing.

Tasks:

The following task descriptions should be reviewed by the Application Owner, Business Process Owner, Development Owner, and/or Implementation Manager to ensure content, format, and presentation are representative of actual usage and assess substantially the entire application.

Tasks:

1. Sign in to the app: Participants will be asked to sign in to the app using a test account provided by the test team. Participants will need to provide their credentials and will be asked to complete two-factor authentication if it is enabled on the app.

2. Find a technique to implement in a classroom activity: Participants will be asked to find a technique or resource available in the app that they can use to teach children with ADHD. This task aims to assess the application's ability to provide useful and relevant information to users.

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4. Browse the web app and use the features available during a specified period of time: Participants will be asked to explore the app and perform specific tasks during a specified period of time, such as finding activities to teach children with ADHD or accessing to online teaching resources. Time metrics will be recorded to assess the efficiency of the app and feedback from participants will be collected to gauge user satisfaction.

5. Test the web application in different browsers to verify consistency in functionality and reliability under different conditions: Participants will be asked to test the web application in different browsers to verify that the application works consistently and reliably under different conditions. This task is intended to assess the reliability of the application.

Test Scenarios

The scenarios in which the tests will be carried out will include the use of the web application in normal conditions of use, as well as in situations of high demand, such as during peak hours or when performing system updates. In addition, service interruption situations, such as power outages, server failures or internet connection interruptions, will be simulated to assess how the application handles these situations and how long it takes to recover. Tests will be performed on different browsers to verify consistency of functionality and reliability under different conditions. High load situations on the server will also be simulated and how this affects the reliability of the application will be evaluated.

Times:

- Sign into the app: 1-2 minutes.
- Find a technique to implement in an activity in the classroom: 5-7 minutes.
- Create an account and complete the profile: 2-4 minutes.
- Browse the web application and use the available features during a specified period of time: 10-15 minutes.
- Test the web application on different devices and/or browsers to verify consistency in functionality and reliability under different conditions: 10-15 minutes.

Instruments, Tools and Materials:

- Questionnaires: Questionnaires will be used to collect information on user satisfaction with the reliability of the system, as well as to collect general feedback on the user experience.

- Timers: Timers will be used to measure the time it takes the user to complete each task.
- Screen recordings: Screen recordings will be used to capture user behavior during testing and analyze reliability issues.
- Error Log: An error log will be used to document errors found during testing and the frequency of errors.

Usability Metrics

ISO/IEC 25010 Quality Model

The purpose of the ISO/ICE 25010 model is to establish a system for the quality evaluation of software products, a quality software product is the result of the quality of its elements, for this, quality characteristics such as: functional adequacy, reliability, performance, operability, security, compatibility, maintainability and transferability. Each characteristic has sub-characteristics that are evaluated and determine the quality of a software product, these can be measured internally or externally.

Reliability

- Availability
- Fault tolerance
- Recoverability
- Compliance

Reliability is the degree to which a software product can maintain a specified level of performance when used under specified conditions. Wear or aging does not occur in the software. Reliability limitations in a software product are due to flaws in requirements, design, and implementation. Failures depend on the way the software product is used, and the program options selected.

Reliability Metrics

Reliability metrics allow you to measure attributes related to the behaviors of the web application's system during execution tests to indicate the degree of reliability of the application on that system during operation.

Maturity

External maturity metrics allow you to measure attributes such as the freedom of software from failures caused by existing flaws in the software itself:

Metric 1: Mean Time Between Failures (MTBF)

The Mean Time Between Failures metric measures how often the system or software fails to function.

X = A / B
• **A = operating time** • **B = total number of failures actually detected.**

Usability levels:

Unacceptable: A mean time between failures of less than 100 hours is considered insufficient and suggests the need for improvements in system reliability and stability.

Acceptable: A mean time between failure between 100 and 500 hours is considered acceptable, but it is possible for the user to experience interruptions in the use of the system.

Excellent: A mean time between failures greater than 500 hours is considered excellent.

Availability

The availability in the external quality assessment can be evaluated by the proportion of the total time during which an application is in active state. Therefore, availability is a combination of maturity, fault tolerance and recoverability which is responsible for regulating the length of downtime after each failure.

Metric 2: Downtime

The downtime metric allows you to measure the average time that the system remains unavailable when a failure occurs.

X = A / B
• **A = total idle time** • **B = number of observed failures**

Usability levels:

Unacceptable: If the percentage of downtime is greater than 10%, it is considered an unacceptable level of usability in terms of reliability and can have a significant impact on the user experience, affecting the usability of the application.

Acceptable: If the percentage of downtime is 5% - 10%, this is considered an acceptable level of usability in terms of reliability, but it can lead to some frustration for users.

Excellent: If the percentage of downtime is less than or equal to 5%, it is considered an excellent level of usability in terms of reliability.

Metric 3: Activity percentage

This metric measures the percentage of time that a web application is available to users.

X = A / B
• **A = time the application was available** • **B = total time**

Usability levels:

Unacceptable: If the uptime percentage is less than 80%, it is considered a bad level of usability in terms of reliability. This means that the application has significant downtime, which can cause serious problems for users and negatively affect their experience.

Acceptable: If the uptime percentage is between 80% and 95%, it is considered a good level of usability in terms of reliability. This means that the application stays online most of the time, but there may be short periods of inactivity.

Excellent: If the uptime percentage is 95% or higher, it is considered an excellent level of usability in terms of reliability. This means that the application stays online and available to users most of the time, with minimal downtime.

References

Association, U. P. (07 de Abril de 2023). *Usability Body of Knowledge*. Obtenido de Usability Body of Knowledge: http://www.usabilitybok.org/usability-testing-methods

Maila, E. F. (2017). Evaluación de herramientas de Open Source para pruebas de fiabilidad y rendimiento de aplicaciones web. *Escuela Politécnica Nacional*, 18 - 25.