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1.0 Overview

1.1 Overview of the System

The Sports and Facilities Booking System used by the University is a platform that can be used throughout the campus and designed to simplify the process of reservation and to manage the sports facilities, equipment, and recreational areas. It combines booking management, monitoring of facility availability in real time, and administrative reporting so that a user-friendly and effective experience for both users and administrators can be provided. The system can be used from web and mobile devices which will help students, staff, and sports administrators *(Awah, 2015)* to have the access, too.

The main reason for building such a system is the increased need for sports facilities in universities to be managed properly. Manual booking systems make it very difficult to manage the facilities resulting in many problems like double-bookings, wrong usage tracking, and lack of access to the facilities. The digital booking system is therefore expected to optimize the allocation of resources, minimize the occurrence of scheduling conflicts, and improve the overall efficiency of facility management. This position is in line with the previous research about the role of digital reservation systems in improving user satisfaction and operational control in the educational institutions *(Palaniyappan, 2020; Al Zaman, 2021)*.

Main functions of the system include:

1. Facility Reservation Management: From among all the facilities (gyms, courts, pools), users can select one that is available in real time, and reserve its time slots with instant confirmation.

2. Usage Statistics and Reporting: Large-scale, customized reports of facility usage, peak hours, and operational trends can be generated by the admin to drive data-driven decision-making *(Al Zaman, 2021)*.

System Users

The system users will consist of:

1. Students: The main users who reserve the sports facilities for relaxing and competing.

2. Faculty and Staff: Both academic and non-academic staff will use the sports facilities for their fitness and wellness activities.
3. Sports Administrators: The managers and administrators of the sports facilities have to take care of bookings, maintenance, schedules, equipment and usage reports.
4. IT Support Staff: The technical staff will take charge of the system's maintenance, updates, and providing users with technical assistance.

Limitations in Using the System

1. Peak Hour Performance Degradation: The system is likely to slow down and have more latency during the peak demand periods (afternoons, weekends) as the number of users accessing the system online at the same time will be very high.
2. Mobile Device Compatibility Issues: A few users will not be able to access some features or may find it difficult to navigate through the website on certain mobile devices or browsers that are not very current.
3. Internet Connectivity Dependency: The system's dependence on internet connection for every operation means that users in poorly connected areas will not be able to access the system easily.

Limitations in Developing the System

1. Integration Complexity: Technical challenges are presented by ensuring seamless data synchronization with the existing Student Information System (SIS).
2. Budget and Resource Constraints: The limited budget and time may restrict the scope of advanced features to be implemented.
3. Compliance Requirements: The implementation of data protection regulations (GDPR) and security standards increase the complexity of the development process.

2.0 Requirement Elicitation Activities

2.1 Questionnaire

Overview

The purpose of this questionnaire is to gather feedback from key users of the University Sports & Facility Booking System, including students and registered sports trainers. The goal is to understand their usage patterns, satisfaction levels, booking preferences, and expectations regarding system functionality and usability. This questionnaire focuses on identifying challenges related to booking ease, confirmation reliability, interface design, real-time facility availability, and system responsiveness. The data collected will support the development of improved functional and non-functional requirements that aim to enhance the overall booking experience and ensure the system meets the needs of the university community.

Rationale of Choosing This Technique

A questionnaire was selected due to its efficiency in collecting standardized information from a diverse and large population of users. It allows the research team to gather both quantitative data (such as frequency of usage and satisfaction ratings) and qualitative feedback (such as desired features and suggestions for improvement). This combination makes it easier to identify trends, user preferences, and usability issues across different user categories. Using a questionnaire also ensures anonymity, which encourages honest responses, especially when evaluating system limitations. This method is particularly valuable in the early stages of requirement engineering, providing insights aligned with the ISO/IEC 25010:2011 quality model in areas such as usability, performance, functionality, and reliability.

Objective of the Questionnaire

The objective of this questionnaire is to collect meaningful insights from users regarding their experience with the University Sports & Facility Booking System. The information will help identify strengths and weaknesses of the current system, assess user satisfaction, determine how important real-time availability and automated suggestions are, and gather expectations for new features such as AI assistance or live chat. The findings will be used to refine system requirements and guide improvements toward a more user-friendly and reliable booking platform.

Targeted Audience

The targeted participants for this questionnaire are students, lecturers, sports administrators, and staff members who use or manage university facilities. These groups represent the primary users and decision-makers involved in booking and maintaining university sports facilities.

Questionnaire

1. What is your role?
2. How often do you use university sports facilities?
3. Which sports facilities do you use most frequently?
4. How easy is it to make a booking?
5. How satisfied are you with the booking confirmation process?
6. Would you like to receive reminders or notifications for your upcoming bookings?
7. How satisfied are you with the design and layout of the booking system?
8. How would you prefer to make a booking through a website, mobile app, or both?
9. How important is it for the system to show real-time facility availability?
10. Would you find it helpful if the system could automatically suggest available times?
11. How reliable do you find the system in confirming or rejecting requests?
12. Are the available facilities sufficient for your needs?
13. How would you rate the system's interface in terms of user-friendliness?
14. Do you find the customer or technical support responsive when issues occur?
15. What type of information would you like to see clearly displayed when making a booking?
16. Would you like to see new features such as automatic scheduling, live chat, or an AI assistant?
17. What new features or ideas would make the system more useful for you? (Open-ended)
18. How often do you experience booking errors or delays?
19. How satisfied are you overall with the current booking process?
20. What suggestions do you have to improve the booking system? (Open-ended)

Evidence of Answered Questionnaire

University Sports & Facility Booking System form (Responses)

Findings/Outcome

Based on the questionnaire responses, the University Sports & Facility Booking System supports users' basic booking needs; however, several areas require improvement to enhance usability and overall satisfaction. Many users frequently access the gym, swimming pool, and badminton courts, with several respondents relying heavily on mobile devices for booking. While some users found the booking process easy, a significant number expressed neutral or dissatisfied levels of satisfaction, particularly regarding confirmation speed and system reliability.

A strong majority indicated that notification reminders through mobile or email are important for managing bookings effectively. Additionally, most users prefer booking through a mobile app, highlighting the need for improved mobile optimization. Many respondents also emphasized the importance of viewing real-time facility availability, and several expressed interest in system-generated suggestions for available time slots.

Common issues reported include booking delays, inconsistent confirmation, and occasional technical issues. Users also noted that the current interface could be made more intuitive, with clearer steps and better visual organization. Requested improvements include automatic scheduling, AI assistance, live chat support, and clearer display of essential details such as facility rules, time slots, fees, and equipment availability.

In conclusion, while the system performs its essential functions, users desire a more responsive, reliable, and interactive platform. Enhancing system speed, improving mobile usability, offering smarter automation features, and simplifying the interface would significantly improve the overall booking experience

2.2 Interview

Overview

A single student of the university was interviewed who regularly attends the gym and sports booking system. This was in an effort to know how the student bookings facility or equipment is achieved, verifies availability and communication with the reporting or usage statistics feature. The purpose of the interview was to obtain personalized feedback on the experience of the user, issues, and anticipations.

Rationale for Choosing Interview

An interview gives more qualitative information and gives the user an opportunity to elaborate their thoughts. It makes it possible to follow up with questions and uncovers issues or problems which might not be evident in the results of the questionnaires. This approach can be applied to get an idea of the real user behaviour and a personal experience of using the sports booking system.

Objectives of Interview

This interview is aimed at achieving:

- To determine how students make reservations of sports facilities and equipment through the system.
- To determine the problems or delays of the system or errors that students experience.
- To investigate usage statistics or report generation capabilities on the part of the student.
- To collect the recommendations on the ways to improve in order to provide the improved booking and reporting features.
- To determine the general user satisfaction with the sports booking system.

Target Audience

The intended audience of this interview will be students that frequent the university sports facilities, particularly the gym patrons that rely on the booking system to use the same every day or week.

Overview of the Process of Interview

This interview was carried out in an informal and straightforward way so as to ensure that the participant is relaxed. It occurred in the form of a brief face-to-face interaction with the duration of about 6-8 minutes. Open-ended questions involving making a booking of a facility, using equipment, checking reports, and reviewing the performance of the systems were posed to the student. The answers were taken down manually and summarised to be analysed.

Interview Questions

Only one interview was performed with a user of the gym facilities of the university who regularly orders the facilities and sports equipment online via the university system.

No.	Interview Question	Purpose	Student Gym User Response
1	Can you describe how you usually book a sports facility or equipment?	Understand user workflow	I log in to the system, pick the gym or equipment I need, and choose a time slot.
2	What challenges do you face while booking or checking availability?	Identify pain points	Sometimes it shows “unavailable” even when the place is empty, or it loads too slowly.
3	How satisfied are you with the confirmation or approval process?	Check efficiency and communication	It works fine, but approval messages can take too long to come.
4	Have you ever faced technical issues like login errors or system delays?	Find system reliability issues	Yes, a few times it froze when I tried to confirm my booking.
5	Do you think the interface is easy to navigate on your device?	Usability evaluation	It’s okay on laptop, but not very smooth on phone screens.
6	What device do you prefer for booking and why?	Assess accessibility	I use my phone because it’s faster and I can book anywhere.
7	Have you ever used or checked the report or usage statistics feature?	Evaluate reporting experience	I tried once, but it didn’t show clear details about my previous bookings.
8	What new features would make the booking and reporting system better?	Feature suggestions	Maybe clearer reports, faster booking, and notifications when equipment is available.

9	How satisfied are you overall with the system?	Overall satisfaction	It's good but needs improvements in speed and report functions.
10	Any final suggestions to improve the system?	Open feedback	Make reports easier to read and fix booking errors that sometimes happen.

Evidence of Interview

link for the interview video.

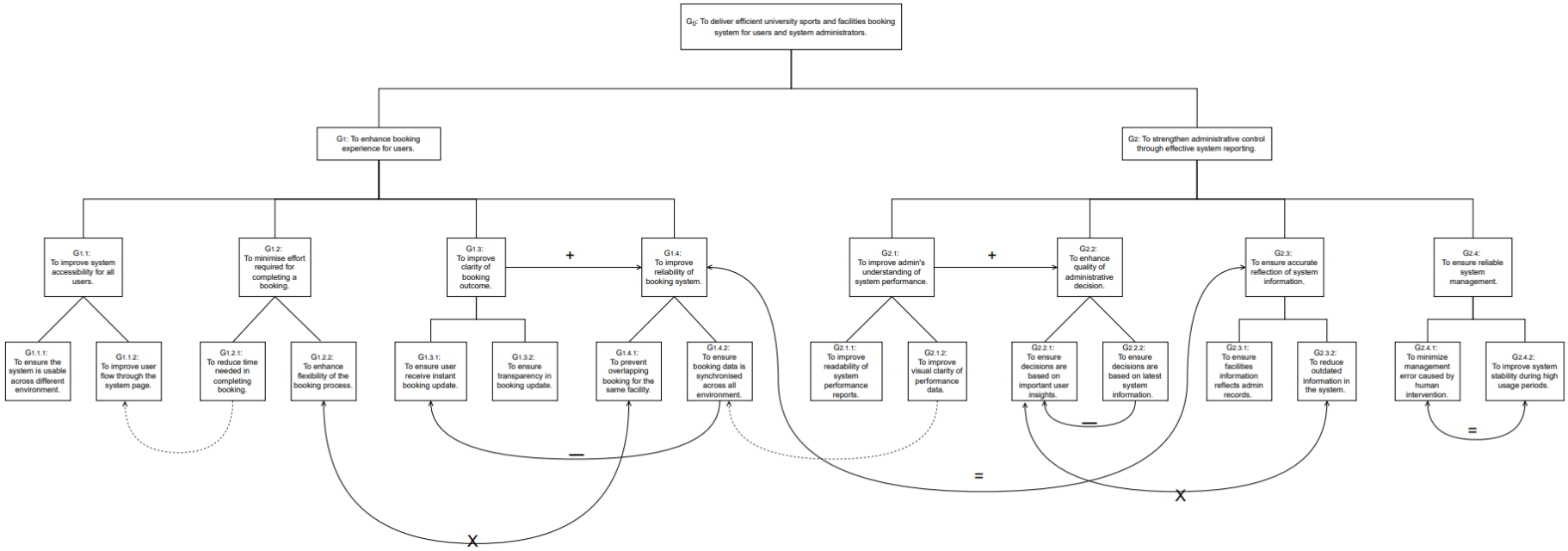
Findings

Based on the interview, the following have been pointed out:

1. The booking system is convenient though at times sluggish or wrong in indicating availability.
2. The interface on the mobile device should be enhanced.
3. There is no clear information regarding the past utilization and statistics in the report feature.
4. Mobile access is convenient to the users.
5. Some of the proposals are more understandable reports, quicker performance, and improved notifications.

As it has been demonstrated during the interview, the booking system is operational, but it provides users with slow loading, vague report information, and a lack of mobile functionality. The results will be used to narrow down on the requirements of the booking and reporting functionality in subsequent phases.

3.0 AND/OR Goal Diagram



4.0 Goal Documentation & Mapping

4.1 Goal Table

No.	Section	Content/Description
1	Goal ID	G0
2	Goal Name	To deliver efficient university sports and facilities booking system for users and system administrators.
3	Goal Description	To determine the overall purpose of the sports and facilities reservation system and make sure that it helps both users and administrators.
4	Super-goal	-
5	Sub-goal(s)	G1, G2 (AND)
6	Other goal dependency	-

No.	Section	Content/Description
1	Goal ID	G1
2	Goal Name	To enhance booking experience for users.
3	Goal Description	To explain the goal of enhancing the booking experience of the user by making the interactions with the system simple and effective.
4	Super-goal	G0
5	Sub-goal(s)	G1.1, G1.2, G1.3, G1.4 (AND)
6	Other goal dependency	-

No.	Section	Content/Description
1	Goal ID	G1.1
2	Goal Name	To improve system accessibility for all users
3	Goal Description	To describe how the system facilitates easier and more inclusive access by all users.
4	Super-goal	G1
5	Sub-goal(s)	G1.1.1, G1.1.2 (OR)
6	Other goal dependency	-

No.	Section	Content/Description
1	Goal ID	G1.1.1
2	Goal Name	To ensure the system is usable across different environment
3	Goal Description	To outline the purpose of achieving the same usability irrespective of the environment of the user.
4	Super-goal	G1.1
5	Sub-goal(s)	-
6	Other goal dependency	-

No.	Section	Content/Description
1	Goal ID	G1.1.2
2	Goal Name	To improve user flow through the system page
3	Goal Description	To improve user navigation by facilitating easy and smoother movement around the system page.
4	Super-goal	G1.1
5	Sub-goal(s)	-
6	Other goal dependency	6.1 Describe other goal dependency (if applicable). REQUIRES: This goal is required by G1.2.1. To decrease

		the time required in achieving the booking. 6.2 Provide a brief explanation on the dependency. REQUIRES: To have a shorter time that a booking can be made, there must be smooth navigation of the user through the system page.

No.	Section	Content/Description
1	Goal ID	G1.2
2	Goal Name	To minimise the effort required for completing a booking.
3	Goal Description	To simplify the booking procedure and minimize the needless stages and make the actions that a user needs to take simpler.
4	Super-goal	G1
5	Sub-goal(s)	G1.2.1, G1.2.2 (OR)
6	Other goal dependency	-

No.	Section	Content/Description
1	Goal ID	G1.2.1
2	Goal Name	To reduce time needed in completing booking.
3	Goal Description	To simplify the booking process and make users able to accomplish the necessary tasks faster and with minimum delays.
4	Super-goal	G1.2
5	Sub-goal(s)	-
6	Other goal dependency	6.1 Describe other goal dependency (if applicable). REQUIRES: Achieving this goal G1.2.1 requires G1.1.2 to enhance the flow of users through the system page. 6.2 Provide a brief explanation on the dependency. REQUIRES: The only way to reduce unnecessary delays in the user flow is to complete the booking process in a shorter time.

No.	Section	Content/Description
1	Goal ID	G1.2.2
2	Goal Name	To enhance flexibility of the booking process.
3	Goal Description	To give the users more control over their booking management by offering choices that can accommodate various preferences and circumstances.
4	Super-goal	G1.2
5	Sub-goal(s)	-
6	Other goal dependency	6.1 Describe other goal dependency (if applicable). CONFLICT: This goal G1.2.2 is in conflict with G1.4.1: To avoid the booking of the same facility. 6.2 Provide a brief explanation on the dependency. CONFLICT: The high flexibility provided to users in terms of booking options can cause a higher likelihood of overlapping requests that go against the need to ensure that there is no chance of simultaneous bookings of the same facility.

No.	Section	Content/Description
1	Goal ID	G1.3
2	Goal Name	To improve clarity of booking outcome.
3	Goal Description	To provide the result information in a clear and simple way, so that the users can make the most sense of the consequences of their booking activities.
4	Super-goal	G1
5	Sub-goal(s)	G1.3.1, G1.3.2 (AND)
6	Other goal dependency	6.1 Describe other goal dependency (if applicable). SUPPORT: This goal G1.3 supports G1.4 by offering more precise booking outcome information that ensures improved system reliability. 6.2 Provide a brief explanation on the dependency. SUPPORT: The enhanced readability of booking outcomes can be used to lessen user confusion and wrongdoing, which in turn can lead to a more dependable booking method.

No.	Section	Content/Description
1	Goal ID	G1.3.1
2	Goal Name	To ensure user receive instant booking update.
3	Goal Description	To enable the immediate notification to the users of any changes in their booking status, to be aware of the updates on time.
4	Super-goal	G1.3
5	Sub-goal(s)	-
6	Other goal dependency	6.1 Describe other goal dependency (if applicable). OBSTRUCTION: This goal G1.3.1 is blocked by G1.4.2 that demands complete alignment of the booking data in all of the settings. 6.2 Provide a brief explanation on the dependency. OBSTRUCTION: Data may have to be syncronized in all environments, which can slow down the capability of the system to provide instant updates about booking to users, hindering the intention of providing real-time information.

No.	Section	Content/Description
1	Goal ID	G1.3.2
2	Goal Name	To ensure transparency in booking update.
3	Goal Description	To make the information on booking changes clear and accessible, so that the user can easily know the status and details of changes.
4	Super-goal	G1.3
5	Sub-goal(s)	-
6	Other goal dependency	-

No.	Section	Content/Description
1	Goal ID	G1.4
2	Goal Name	To improve reliability of booking system.
3	Goal Description	To make the booking system work reliably with less errors and guaranteeing a steady performance when processing user transactions.
4	Super-goal	G1
5	Sub-goal(s)	G1.4.1, G1.4.2 (OR)
6	Other goal dependency	6.1 Describe other goal dependency (if applicable). SUPPORT: This goal G1.4 is supported by G1.3 that improves the clarity of booking results. GOAL EQUIVALENCE: This goal G1.4 is similar to G2.3 since they both serve the purpose of providing a reliable and trustworthy booking system. 6.2 Provide a brief explanation on the dependency. SUPPORT: The availability of better booking data by G1.3 minimizes errors and confusion, which contributes to the overall trust needed by G1.4. GOAL EQUIVALENCE: Enhancing system reliability (G1.4) and correct reflection of system information (G2.3) have the same overall outcome of ensuring consistent and reliable system behavior.

No.	Section	Content/Description
1	Goal ID	G1.4.1
2	Goal Name	To prevent overlapping booking for the same facility
3	Goal Description	To ensure proper scheduling by making sure none of the two users can reserve the same facility simultaneously.
4	Super-goal	G1.4
5	Sub-goal(s)	-
6	Other goal dependency	6.1 Describe other goal dependency (if applicable). CONFLICT: This goal G1.4.1 is in conflict with G1.2.2: To increase the flexibility of the booking process.

		6.2 Provide a brief explanation on the dependency. CONFLICT: Non-overlapping booking restrictions are strictly enforced thus minimizing the amount of flexibility available to the users when choosing desired times or options.

No.	Section	Content/Description
1	Goal ID	G1.4.2
2	Goal Name	To ensure booking data is synchronised across all environment.
3	Goal Description	To make all booking details up to date by synchronizing information in all system environments in real time.
4	Super-goal	G1.4
5	Sub-goal(s)	-
6	Other goal dependency	6.1 Describe other goal dependency (if applicable). OBSTRUCTION: This goal G1.4.2 blocks G1.3.1, which should ensure the users get real-time booking updates. REQUIRES: This goal G1.4. 2 is required by G2.1.2, which aims at enhancing visual clarity of performance data. 6.2 Provide a brief explanation on the dependency. OBSTRUCTION: The need to harmonise booking information in all settings may also cause delays in processing and this is a disruption to what the system aims to provide users with on a real time basis. REQUIRES: It is a prerequisite that the booking data in all environments is fully synchronized, as without this clear and accurate performance visualisation is impossible.

No.	Section	Content/Description
1	Goal ID	G2
2	Goal Name	To strengthen administrative control through effective system reporting.
3	Goal Description	To assist in informed administration decision making through the provision of accurate, clear and timely system reports reflecting operational activity
4	Super-goal	G0
5	Sub-goal(s)	G2.1, G2.2, G2.3, G2.4 (AND)
6	Other goal dependency	-

No.	Section	Content/Description
1	Goal ID	G2.1
2	Goal Name	To improve admin's understanding of system performance.
3	Goal Description	To give clear understanding of system operation to the administrators by displaying the performance data in a structured and easy to understand format.
4	Super-goal	G2
5	Sub-goal(s)	G2.1.1, G2.1.2 (OR)
6	Other goal dependency	6.1 Describe other goal dependency (if applicable). SUPPORT: This goal G2.1 supports G2.2 because it offers the insight needed to make higher-quality administrative decisions. 6.2 Provide a brief explanation on the dependency. SUPPORT: With better knowledge of system performance, administrators may be able to make more precise and datadriven decisions, which directly supports the attainment of G2.2.

No.	Section	Content/Description
1	Goal ID	G2.1.1
2	Goal Name	To improve readability of system performance reports
3	Goal Description	To make the reports easier to read and understand and to display system performance information in a clear and organized format.
4	Super-goal	G2.1
5	Sub-goal(s)	-
6	Other goal dependency	-

No.	Section	Content/Description
1	Goal ID	G2.1.2
2	Goal Name	To improve visual clarity of performance data.
3	Goal Description	To show performance data in a way that is visually clear and well-organized and that enables administrators to interpret information more easily.
4	Super-goal	G2.1
5	Sub-goal(s)	-
6	Other goal dependency	6.1 Describe other goal dependency (if applicable). REQUIRES: This goal G2.1.2 requires G1.4.2 so that the booking data can be constantly in sync in all environments 6.2 Provide a brief explanation on the dependency. REQUIRES: It can only improve visual clarity of performance data when underlying booking data are correct and synchronised, which is why G1.4.2 is required to achieve G2.1.2.

No.	Section	Content/Description
1	Goal ID	G2.2
2	Goal Name	To enhance quality of administrative decision
3	Goal Description	To assist in better informed decision making by the administration by offering effective, correct, and timely information that assists in the evaluation of system activities.
4	Super-goal	G2
5	Sub-goal(s)	G2.2.1, G2.2.2 (OR)
6	Other goal dependency	6.1 Describe other goal dependency (if applicable). SUPPORT: This goal G2.2 goal is supported by G2.1, which advances the knowledge of the administrator of the system performance. 6.2 Provide a brief explanation on the dependency. SUPPORT: To make effective decisions, it is necessary to understand the performance of the system, and G2.1 is a valuable tool that contributes to G2.2.

No.	Section	Content/Description
1	Goal ID	G2.2.1
2	Goal Name	To ensure decisions are based on important user insights
3	Goal Description	To give user feedback to administrators in a meaningful manner to enable them make more informed and accurate decisions.
4	Super-goal	G2.2
5	Sub-goal(s)	-
6	Other goal dependency	6.1 Describe other goal dependency (if applicable). OBSTRUCTION: This goal G2.2.1 is hindered by G2.2.2, which is concerned with the use of the newest system information only. CONFLICT: This goal G2.2.1 is in conflict with G2.3.2 which aims at minimizing outdated system information. 6.2 Provide a brief explanation on the dependency. OBSTRUCTION: The use of system information alone can

		lead to missing deeper understanding of the user which hinders the aim of making decisions that could be based on the meaningful user understanding. CONFLICT: To focus on user insights, it might be necessary to keep the historical or older data, and to minimize the outdated information, they might need to remove this information, a conflict between the level of insight and the freshness of the date.

No.	Section	Content/Description
1	Goal ID	G2.2.2
2	Goal Name	To ensure decisions are based on latest system information.
3	Goal Description	To enable the administrators to have current information about the system to aid in making the right decisions and in a timely manner.
4	Super-goal	G2.2
5	Sub-goal(s)	-
6	Other goal dependency	6.1 Describe other goal dependency (if applicable). OBSTRUCTION: This goal G2.2.2 hinders G2.2.1, which seeks to make sure decisions are informed by valuable user contributions. 6.2 Provide a brief explanation on the dependency. OBSTRUCTION: The focus on the latest data of the system may disrupt the approach to analyzing more global user insights and make it difficult to make valuable decisions based on them.

No.	Section	Content/Description
1	Goal ID	G2.3
2	Goal Name	To ensure accurate reflection of system information.
3	Goal Description	To define the purpose to maintain system information in full compliance with the actual condition and documents maintained by the administrator.
4	Super-goal	G2

5	Sub-goal(s)	G2.3.1, G2.3.2 (AND)
6	Other goal dependency	6.1 Describe other goal dependency (if applicable). GOAL EQUIVALENCE: This goal G2.3 is similar to G1.4 which both seek to guarantee the reliability and trustworthiness of the system. 6.2 Provide a brief explanation on the dependency. GOAL EQUIVALENCE: Reliable operation through accurate system information is an equivalent and stable requirement to be achieved through reliable booking processes, as goals are similar so their achievement equally.

No.	Section	Content/Description
1	Goal ID	G2.3.1
2	Goal Name	To ensure facilities information reflects admin records.
3	Goal Description	To provide the purpose of keeping the facility information accurate and consistent to what the administrator has as the official records.
4	Super-goal	G2.3
5	Sub-goal(s)	-
6	Other goal dependency	-

No.	Section	Content/Description
1	Goal ID	G2.3.2
2	Goal Name	To reduce outdated information in the system.
3	Goal Description	To specify the purpose of maintaining information in systems by detecting and eliminating old or inaccurate records.
4	Super-goal	G2.3
5	Sub-goal(s)	-
6	Other goal dependency	6.1 Describe other goal dependency (if applicable). CONFLICT: This goal G2.3.2 is in conflict with G2.2.1, which seeks to make decisions grounded on valuable user

		insights. 6.2 Provide a brief explanation on the dependency. CONFLICT: The deletion of old or old records to ensure that the system has current information can cause a loss of valuable user insight information that can help make decisions, thus a direct conflict between the two goals.

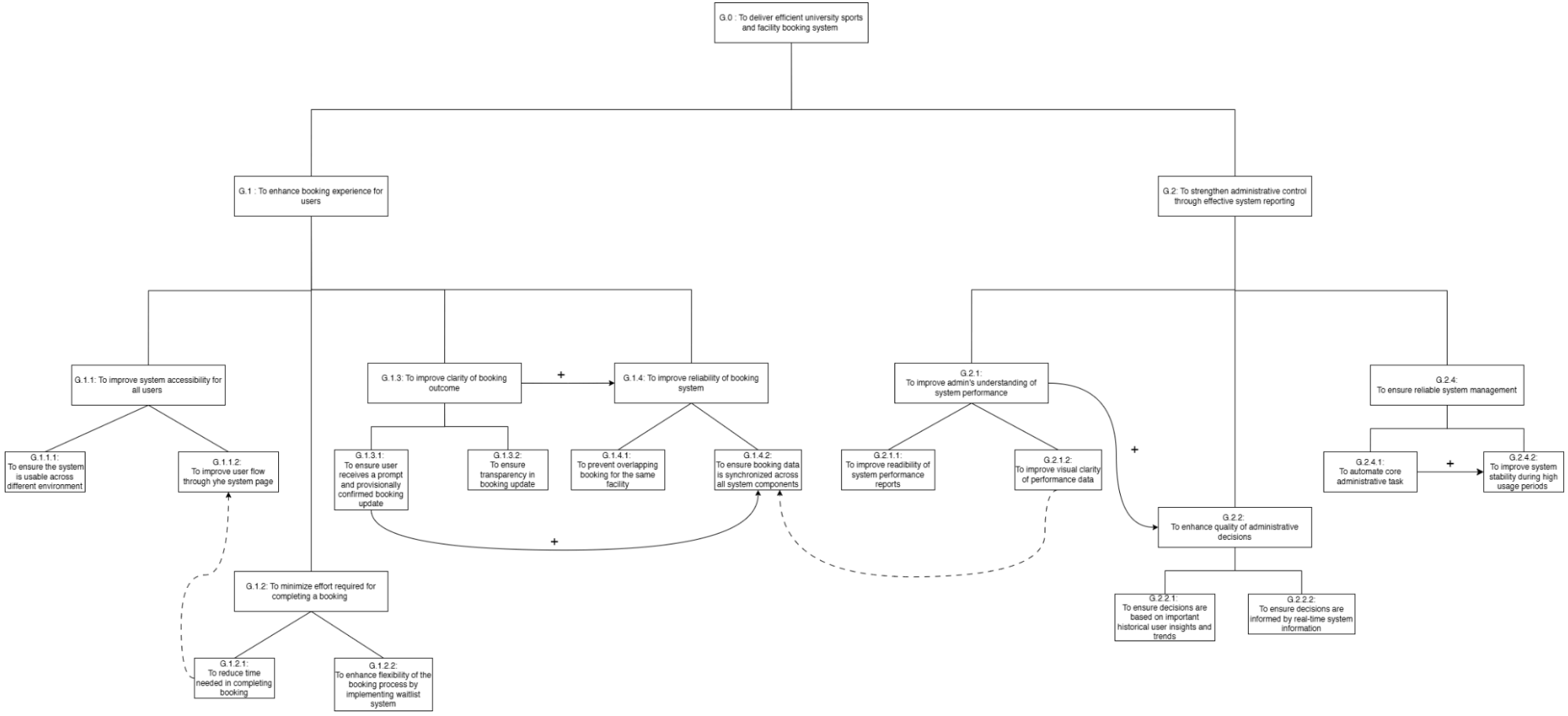
No.	Section	Content/Description
1	Goal ID	G2.4
2	Goal Name	To ensure reliable system management
3	Goal Description	To describe the general purpose of having a stable, predictable, and error free system which is to provide consistency in the management processes and minimizing interference with the operations.
4	Super-goal	G2
5	Sub-goal(s)	G2.4.1, G2.4.2 (AND)
6	Other goal dependency	-

No.	Section	Content/Description
1	Goal ID	G2.4.1
2	Goal Name	To minimize management error caused by human intervention
3	Goal Description	To formulate the objective of minimizing management errors by humans through the advancement of automated, uniform, and controlled system responses.
4	Super-goal	G2.4
5	Sub-goal(s)	-
6	Other goal dependency	6.1 Describe other goal dependency (if applicable). GOAL EQUIVALENCE: This goal G2.4.1 is equal to G2.4.2 in ensuring the reliable management of the system. 6.2 Provide a brief explanation on the dependency.

		GOAL EQUIVALENCE: Both goals are designed to enhance the overall reliability of the system: reducing human factors (G2.4.1) and stability when the system is heavily used (G2.4.2) are equally important to making sure that the system is reliable and consistent in its performance

No.	Section	Content/Description
1	Goal ID	G2.4.2
2	Goal Name	To improve system stability during high usage periods.
3	Goal Description	To explain the objective of ensuring the smooth and continuous operation of the system by promoting performance that is stable even at the most active time.
4	Super-goal	G2.4
5	Sub-goal(s)	-
6	Other goal dependency	6.1 Describe other goal dependency (if applicable). GOAL EQUIVALENCE: This goal G2.4.2 is equal to G2.4.1 to aid in consistent system management. 6.2 Provide a brief explanation on the dependency. GOAL EQUIVALENCE: Both works on increasing system stability (G2.4.2) and reducing management errors (G2.4.1) are equally important and mutually reinforcing because both are aimed at improving the system reliability.

4.2 Finalized AND/OR Goal Diagram



5.0 Functional Requirement

5.1 Functional Requirement Table

FR ID	Functional Requirement	Description	Goal Mapping (Goal Name)
FR01	The University Sports & Facility booking system shall notify students regarding the status and updates for their respective bookings.	The system should be notifying students regarding the status and updates for their respective bookings.	**G1.3.1:** To ensure user receives a prompt and provisional booking update
FR02	The University Sports & Facility booking system shall enable users to use voice command features for making their bookings.	The system should ensure users are able to use the voice command feature to make their bookings.	**G1.1.2:** To improve userflow through the system page
FR03	The University Sports & Facility booking system shall generate reports for facility usage and booking trends	The system should ensure that reports with regards to facility usage and booking trends are generated accurately.	**G2.4.1:** To automate core administrative task
FR04	The University Sports & Facility booking system shall enable users to make booking via calendar interface in the Admin Dashboard.	The system should have an embedded Calendar interface in the Admin Dashboard. This should enable the administrators to visually track and control all facility bookings, availability and scheduled events in a chronological display.	**G.1.2.1:**To reduce time needed in completing booking
FR05	The University Sports & Facility booking system shall enable users to click on the confirmation button so booking data is updated immediately in the system	The system should ensure that the booking data is updated immediately in the system if and only the confirmation button is clicked .	**G.1.4.1:** To prevent overlapping booking for the same facility.
FR06	The University Sports & Facility booking system shall enable Inline Availability Preview to users when hovering over a date or time slot in the primary facility selection view.	The system should offer Inline Availability Preview whereby the user can verify (e.g. remaining capacity, open slot) by simply hovering over a date or time slot in the primary facility selection view, therefore, there is no need to have a separate detail display.	**G.1.2.1 :** To reduce time needed in completing booking
FR07	The University Sports & Facility booking system shall enable users to click on the refresh button so data is synchronized.	The system should ensure that across all panels such as user ,admin etc the data is synchronized in a consistent manner when the refresh button is pressed.	**G1.4.2:** To ensure booking data is synchronized across all system components

FR08	The University Sports & Facility booking system shall enable users to view booking history by accessing their respective log history.	The system should ensure the history of the bookings exists as proof for each user.	**G1.3.2:** To ensure transparency in booking update
FR09	The University Sports & Facility booking system shall enable users to click on the search button to search for their respective sports facilities.	The system should ensure users are able to use the search function to search for their respective sports facilities.	**G1.2.1:** To reduce time needed in completing booking
FR10	The University Sports & Facility booking system shall enable users to click on the filter button to filter for their respective sports facilities.	The system should ensure users are able to use the filter function to filter out their respective facility.	**G1.2.1:** To reduce time needed in completing booking
FR11	The University Sports & Facility booking system shall enable admin to have access to the dashboard for booking management.	The system should have a dashboard for admins for managing bookings ,users and facilities.	**G2.1.2:** To improve visual clarity of performance data
FR12	The University Sports & Facility booking system shall enable users to have access to the waitlist board for booking purposes.	The system should ensure users would be assigned to a waitlist board when specific facilities are fully booked .	**G1.2.2:** To enhance flexibility of the booking process by implementing a waitlist system.
FR13	The University Sports & Facility booking system shall enable admin to have access to the trend analysis graph to show calculation of trend lines.	The system will ensure the calculations trend lines (e.g. moving averages, growth of past week) of any metric that is stored within a defined date range set by a user and present it in a graph format in the dashboard.	**G2.2.1:**To ensure decisions are based on important historical user insights and trends.
FR14	The University Sports & Facility booking system shall enable users and staff to have access to chatbox to resolve any booking issues.	The system will have a permanent, clickable chatbox window on every user-accessible page that allows users to chat and interact in real-time with the university support staff via text messaging.	**G.1.3.2:**To ensure transparency in booking update
FR15	The University Sports & Facility booking system shall integrate Automated routine task (API) to automate repetitive tasks.	The system should ensure that Automated routine task (API) is integrated so repetitive tasks such as booking confirmation, validation of booking etc are handled automatically by ai.	**G2.4.1:** To automate core administrative task

6.0 Quality Requirement

6.1 Quality Requirement Table

QR ID	Quality Requirement Description	Mapping to ISO25010:2011	Justification of Mapping (between QR and ISO)	Goal Mapping (Goal Name)
QR01	If the user is navigating from a mobile device , the University Sports & Facility booking system shall be able to adapt to the mobile environment seamlessly by reducing excessive scrolling and zooming.	Quality trait: Usability Sub characteristic: Operatability	Operatability expresses how a user would navigate through the system seamlessly. The University Sports & Facility booking system mobile interface shall function as effectively compared to the web browser version that is mapped to Usability/Operatability.	**G1.1.2 :** To improve user flow through the system page.
QR02	The University Sports & Facility booking system shall be able to conform to a uniform style guide to reduce ambiguity.	Quality trait: Usability Sub characteristic: Understandability	Understandability expresses how easily the users are able to understand the system .The University Sports & Facility booking system is designed with standardized text and label for users to understand the system easily thus it's mapped to Usability / Understandibility.	**G1.1.2 :** To improve user flow through the system page.
QR03	The University Sports & Facility booking system shall be able to run on different environments such as linux windows or mac.	Quality trait: Portability Sub characteristic: Adaptiability	Adaptability expresses how a system is able to run accordingly in different environment.The University Sports & Facility booking system is able to run on different environments accordingly thats why its mapped to Portability / Adaptibility.	**G1.1.1:** To ensure the system is usable across different environments.
QR04	If 400 users or more are active in the system ,The University Sports & Facility booking system shall be able to load additional resourses to avoid performance doowngrade.	Quality trait: Performance Efficiency Sub characteristic: Scalability	Scalability expresses how a system is able to maintain its performance under high traffic load.The University Sports & Facility booking system is able to perform as effectively even when there is high traffic load that is why it is mapped to Efficiency/ Scalabiliy.	**G.2.4.2:** To improve system stability during high usage periods
QR05	The University Sports & Facility booking system shall be able to show the availability of booking spots within 2 seconds.	Quality trait: Performance Efficiency Sub characteristic: Time Behaviour	Time Behaviour expresses how fast the system is able to respond to request.The University Sports & Facility adheres to the facts of showing booking spots availability within the set time time frame thats why mapped to performance efficiency/Time behaviour.	**G.1.2.1:**To reduce time needed in completing booking

QR06	The University Sports & Facility booking system shall be able to not duplicate any bookings made by a user prehand.	Quality trait: Functional Suitability Sub characteristic: Functional correctness	Functional correctness expresses the ability of the system to produce results that are correct. The University Sports & Facility booking system is able to not duplicate the same booking twice which is why its mapped to Functional suitability /Functional correctness.	**G1.4.1 :** To prevent overlapping booking for the same facility
QR07	The University Sports & Facility booking system shall be able to synchronise data on booking across all the panels.	Quality trait: Functional Suitability Sub-characteristic: Functional Correctness	Functional correctness expresses the ability of the system to produce results that are correct. The University Sports & Facility booking system is able to synchronise data across the user and staff panel correctly that is mapped to Functional suitability /Functional correctness.	**G1.4.2:** To ensure booking data is synchronized across all system components.
QR08	The University Sports & Facility booking system shall be able to prevent user from inputting the wrong booking details such as dates that are invalid.	Quality trait: Usability Sub-characteristic: User error protection	User error protection prevents user from making the wrong entry so the correct input can be filled . The University Sports & Facility booking system prevents users from inputting invalid dates that are out of bound that is why it is mapped to Usability / User error protection.	**G1.1.2 :** To improve user flow through the system page.
QR09	The University Sports & Facility booking system shall be able to render pages correctly .	Quality trait: Usability Sub-characteristic: Operatability	Operatability expresses how a user would navigate through the system seamlessly.When a page from the University Sports & Facility booking system is rendered correctly then users would able to interact efficiently with the system that is why it is mapped to Usability /Operatability	**G1.1.2 :** To improve user flow through the system page.
QR10	The University Sports & Facility booking system shall be able to receive response from the Automated routine task's API within 3 seconds.	Performance efficiency Sub-characteristic: Time- behaviour	Time Behaviour expresses how fast the system is able to respond to request.The University Sports & Facility system is able to receive a response within the stimulated timeline that is its mapped to Performance/efficiency/Time behaviour	**G2.1.1:**To automate core administrative tasks.

7.0 Constraint

7.1 Constraint Table

Constraint ID	Constraint Description	Type of Constraint	Goal Mapping (Goal Name)
CS01	During peak hours (afternoons, weekends), the system may face slower response times due to high concurrent usage. This limits booking efficiency and requires optimization.	Performance	**G1.2.1:** To reduce time needed in completing booking.
CS02	The system must remain accessible at least 99.5% of the time, but server maintenance or unexpected downtime can restrict availability during critical booking periods.	Availability	**G1.4:** To improve reliability of booking system.
CS03	To prevent overlapping reservations, the system enforces strict scheduling rules. This constraint limits user flexibility but ensures reliability of bookings.	Data Integrity	**G1.4.1:** To prevent overlapping booking for the same facility.
CS04	Synchronization of booking data across user and admin environments is required. Any delay in synchronization may obstruct instant updates and reduce transparency.	Technical	**G1.4.2:** To ensure booking data is synchronized across all system components.
CS05	The system must support both desktop and mobile devices. However, older browsers or outdated mobile devices may not fully support all features, limiting accessibility.	Compatibility	**G1.1.1:** To ensure the system is usable across different environments.

8.0 Conclusion

The requirements specification of the University Sports & Facility Booking System is drawn from the genuine contributions of stakeholders who were consulted through surveys and personal interviews. The results of the study showed that the stakeholders valued the real-time facility availability, mobile access, timely notifications, and reliable booking confirmations most. The administrators pointed out that they needed real-time data synchronization and transparent reporting for better facility management.

The confirmed objectives and interdependencies assure that both the user satisfaction and the system dependability are considered. The functions like immediate booking updates, overlapping reservations prevention, and usage report creation are the direct means supporting these objectives. The quality attributes associated with ISO/IEC 25010:2011 highlight the aspects of ease of use, performance efficiency, reliability, and compatibility, thus guaranteeing that the system is not below the international standards.

The constraints specified show a realistic picture of limitations which will have to be dealt with when conducting the system's design and implementation. These limitations set the boundaries for the system's operation ensuring that the development is still viable and the user’s expectations are met.

To sum up, the University Sports & Facility Booking System has been tailored to cope with the coming changes and to provide smooth and quick management for campus sports facilities. The system will be friendly and strong enough to support the users from the university community as well as maintain operational integrity because it will have addressed both functional and non-functional requirements and adhered to ISO/IEC 25010:2011 standards.

9.0 References

Awah, A. A. (2015). *UNIMAS sport facilities reservation and information system* [Final year project report, Universiti Malaysia Sarawak]. UNIMAS Institutional Repository. https://ir.unimas.my/id/eprint/40038/

Palaniyappan, Y. (2020). *Sports facility booking system* [Final year project, Universiti Teknologi PETRONAS]. UTPedia. https://utpedia.utp.edu.my/id/eprint/21693/

Al Zaman, N. S. S. (2021). *Implementation of sport facilities booking system using progressive web application technology* [Student project, Universiti Teknologi MARA]. UiTM Institutional Repository. https://ir.uitm.edu.my/id/eprint/46117/