MASTER OF INFORMATION AND COMMUNICATION STUDIES

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SECURITY DEPLOYMENT TRACKING SYSTEM

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This paper prepared by **MARIA ELISSA A. DELA ROSA** with the title: **"SECURITY DEPLOYMENT TRACKING SYSTEM"** is hereby accepted by the Faculty of Information and Communication Studies, U.P. Open University, in partial fulfillment of the requirements for the degree Course.

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ROBERTO B. FIGUEROA JR.
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25 October 2022
Date

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Dean
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(Date)

Biographical Sketch

Maria Elissa A. dela Rosa (Maria/Melissa), is an IT professional with extensive years of technical and management experience, with solid understanding of the Software Development LIfe Cycle (SDLC), Software QA Methodologies, Database Management, Server/Network Security and Deployment Methodologies.

Melissa knew from an early age that she wanted to work something related to computers and technology. She loves exploring new things to build strong skills and is very committed to pursuing a career in Information Technology.

In her spare time, Melissa enjoys reading, watching movies, playing video games, and playing musical instruments.

Acknowledgement

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Dedication

This is completely dedicated to my respectful family and friends, without whose constant support was not possible. Thank you for the endless love and always reminding me of the end goal.

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Abstract

The United Nations (UN) Mission Security Office has a sub-unit who does the daily radio check to know whether staff member(s) are present/absent at any given time within the mission area. It is the Security Office's responsibility to know the staff member(s) and other personnel's accommodation location and even movement from one team-site to another team-site in the mission. The daily radio check helps the security process, since radio communication is primarily a means to receive and disseminate information in a timely and effective manner to multiple users in times of emergencies like crises. Furthermore, it is a link between the various entities, sectors, and regional offices of a mission. Personnel traveling out of their designated duty station are to notify relevant radio room in duty station of their absence and to be excluded from daily radio check during dates provided. Similarly, those that are traveling back and arriving in the mission area, are to be included in the daily radio check during the stated period of their stay. But the manual logging and lack of significant data and other information needed is becoming problematic.

The Security Deployment Tracking System (SDTS) aims to assist Security Officials to keep up-to-date information related to staff member(s) and other personnel within the Security System. The out-of-date process of monitoring staff member(s) and other personnel was transformed in having efficient information over the web-based application that allow quick saving of data, updating of data, extracting useful data for reporting purposes and an email notification to those who doesn't do the daily radio check within the time-range specified to do it. This email notification is filtered to certain criteria to avoid alert and email overload.

Chapter I

THE PROBLEM DOMAIN

Statement of the Problem

There are two types of documents being used to track staff member(s) and other personnel, first is the logbook where security staff is manually logging who is doing the daily radio check. Unfortunately, some of the logbooks get lost due to mishandling or misfiling. Another one is the spreadsheet that is stored in a shared drive, that only allows one security staff member to open and update the file. Additional issue on this is that there are times that the shared drive is not accessible to other team-sites when the connection isn't as good as it's supposed to and consolidating the spreadsheet from other team-sites into one is also a problem. Mass printing this spreadsheet to submit to Security Headquarters also increased paper waste volume in a mission where supplies are difficult.

Security Deployment Tracking System (SDTS) addressed the various issues, such as quick access to staff members' information in one platform that Security Office personnel can utilize and allow easy verification of exact accommodation location and status of daily radio check of staff members. Eliminated the connection problem in using the shared drive and reduced the printing of documents for submission to Security Headquarters.

Background and Objectives of the Project

The main goal of the project is to have a one platform of managing and tracking staff members' daily radio check and accommodation location. This improves collaboration amongst the Security Office and Security Headquarters. This

decreases printing documents, addresses the routing issues where logbooks and printed copies going to Security Headquarters get lost and reduces costs and saves budget on buying supplies that are tough to bring in the Mission.

Additional feature is adding and/or retrieving information thru scanning QR Code linked to a unique staff member UN ID number on their ID card instead of trusting on a manual logbook. Occasionally, Security Office personnel forgets to log the daily radio check that staff member(s) are doing. To have this system gives Security Office personnel the most convenient way of logging and retrieving staff members' information and submission to Security Headquarters. This reduces the turnaround time on every process from logging daily radio checks to retrieving information and routing to Security Headquarters which increase productivity to the process and to the Security Office.

Significance and Scope of the Project

The possibility of losing the logbook and other printed materials or even inadvertently deleting the shared file is probable to occur. This process of logging the daily radio check is very significant to the Security Office, removing the logbook, reducing physical paper and eliminating sending the actual logbook to Security Headquarters will be a step towards an environmentally-friendly business model.

This system has a greater backup and recovery of data, easy access and storing information for the daily radio check and an interface for adding and updating staff members' accommodation location was included, the system is in a centralized repository and a web-based system that improves the workflow. Right after saving

information that immediately reflects to other users results in speeding up performance. Any staff member included in the system receives an e-mail notification reminder in any event that they didn't do their required daily radio check.

The system was made up of modules that allow diverse groupings of users and give the user administrator to grant or revoke the user accounts. Users that's added to the system automatically have a viewing access to information unless otherwise, the account was altered by user administrator conferring to user task compensating controls for vulnerability. User administrator is accountable in granting user access to the system, resetting password, adding or even updating UN provided accommodation location and private house number to which staff member(s) can be associated as requested by Facility Officers and/or Security Officers. The Security Office personnel in the radio room that logs the daily radio check have the access to track those staff member(s) that didn't do the daily radio check, ensure that the Security Headquarters received the updated daily radio check status and verify all required information is collected and completed.

Finally, the system allows the extraction of useful reports including staff members' basic information, their zones and house number.

The system includes;

- Staff Management Module
    - Staff Members (New, Search)
    - Staff Absences (New, Search)
    - Staff Accommodation (New, Search)
    - Daily Radio Check Release and Tracking (New, Search)

- Admin Tools Module
    - Absences Management
    - Accommodation Management
    - Deleted Absences
    - Deleted Daily Radio Check
    - Deleted Members
    - Department Management
    - Member Category Management
    - Modules Management
    - Nationality Management
    - Position Management
    - Radio Management
    - Region & Location Management
    - Section Management
    - User Management | Filter User
    - User Roles Management

The computer in the Security Office and Radio Room have a reader to ease the encoding of the unique staff member UN ID number or scan for the QR code from staff members' ID if they opt not to manually enter the staff members' UN ID number.

Documentation of Existence and Seriousness of the Problem

Desired Future State	Current State	Action Plan
All daily radio check related information is created and saved in a centralized repository that is safe to backup.	Security Office personnel are using a manual process with a logbook and a shared file that is prone to disk	Create a web-based application and install a database in a server that will have an easy process to backup data.

	failure and loss of copy of the file in the shared drive.	
Easy access to information. Searching or processing staff members' information is in a matter of seconds.	At times Security Office personnel forgets to log the daily radio check and searching or processing information can take time.	Create a module, in particular to search or retrieve information and a page that will display staff member(s) that didn't do the daily radio check. Result will give a better view of information that can be downloaded for printing.
Instead of sending the logbook, all processed information will be readily available to the system.	Have to send the actual logbook to Security Headquarters on a weekly or even daily basis. But this doesn't include who didn't do the daily radio check and who is not in the Mission area.	Provide a common module to Security Headquarters to view or download the current released daily radio check report(s).
Easy collaboration that will allow Security Office and Facility Office to update staff members' accommodation location and other information related to staff members' safety and security.	The Security Office doesn't have a good collaboration with the Facility Office with regards to staff members' accommodation location.	Provide a common module to Security Office and Facility Office to add, update, and remove staff members' accommodation location information and any movement to a new location or accommodation within the UN system, staff member(s) should be notified through e-mail.
Eliminate sending of the actual logbook to Security Headquarters. Any printed material that requires a signature is not needed, instead, a status in the system will be changed once a Security Officer reviews the daily radio check information and reports for that day or for that	Security Headquarters needs to receive the logbook for the daily radio check with the problem that every so often it is lacking important data and the logbook can be misplaced.	Make sure that the dashboard that displays who didn't do the daily radio check is completely empty, that will ensure that all staff member(s) already did the daily radio check. In any case that some didn't manage to do it, an explanation or description should be

week it was submitted to the system.		linked to staff members' daily radio check status for that day before sending the daily radio check report to Security Headquarters.

Chapter II

REVIEW OF EXISTING ALTERNATIVES

The manual method and tracking the document is very challenging, though some manual approaches are still being practiced by other organizations, such use of a logbook and manual logging or printing a copy of the document in particular that needs to be routed can take much time with this kind of collaboration that totally decreases productivity. Having a shared file in a shared drive requires Security Office personnel to regularly perform the archiving and making a backup of the file before deletion to the actual shared drive but not all that have access practice this process.

Security Office personnel priority task is to log the daily radio check and send the logbook to Security Headquarters. At times, may need to print the spreadsheet from the shared drive to have collective information from both the logbook and the spreadsheet itself. This increases paper usage and storage in Security Headquarters to keep information safely.

The Security Office issue is looking for the logbook. The worst-case scenario is that of a missing logbook that needs to be routed to Security Headquarters. Partially to address the issue, is to take full advantage of the spreadsheet in the shared drive, but still have a problem as Security Office personnel can lose connection and will not have access to it.

Whilst the Security Office is responsible in monitoring the status of daily radio check and staff members' accommodation location, security and protecting the data should

be on the list of concerns, backup is usual thing to do. But with a logbook, re-creating this will take a lot of working hours. Shared drive can still be unsecured and can lead to uneasy access.

In spite of having the resources available like file servers where the shared file is stored, printers, and computers, the problem still occurs.

There are other systems available in the market that can be an alternative or adapt the process flow but it will need an increase in the budget and will require redesign of the security process and change of devices.

- *Northern Apex Personnel Tracking Solution* [*https://northernapex.com/location-access.php*] monitor and measure personnel movement to be sure employees are where they should be and also look backward into past movement to identify trends in employee's location and the amount of time spent at those locations.
- The *RFID Personnel Tracking System* from GAO/RFID Inc. [*https://gaorfid.com/rfid-personal-tracking-system/*] where personnel are provided with RFID wearable tags that enable the logging of their movements from one zone to another, their exact location is recorded but this needs an installation of RFID receivers in the environment.
- *AB&R Personnel Tracking Solution* [*https://www.abr.com/solutions/personnel-tracking-solutions/*] by using RFID employee ID cards to track employees.

RFID though is effective when tags are in range of RFID readers and RFID enabled environment will be an additional cost to implement in a Mission.

Security Deployment Tracking System should be suitable in this situation to maximize the resources already available whilst aiming to remove the manual logging approach in a logbook and make it easier for Security Office to track the status of staff members' daily radio check and accommodation location. This improves collaboration between Security Office, Security Headquarters and even Facility Office in advancing the process by centralizing storage, securing data, tracking status of the daily radio check, staff members' accommodation location, and having a timely report for review from specific modules in the system.

Chapter III

APPROACH TO BE TAKEN IN THIS PROJECT

Theoretical Framework

With the increase of interest in Web application, usability and user experience have become a first step in evaluating a web application. In the Human-Computer Interaction (HCI) community, the usual way to measure usability is through a user test. According to ISO/IEC 9126-1, usability is one of the characteristics that define Software Quality together with Functionality, Reliability, Efficiency, Maintainability, and Portability. The user can reject a system with poor usability even though functionality is adequate. Usability is therefore an essential software characteristic.

Usability is increasingly recognized as an important quality factor for interactive software systems, including traditional GUIs-style applications, Websites, and the large variety of mobile and other interactive services. There are many methods for evaluating usability like ISO 9241, ISO/IEC 9126, IEEE Std.610.12 or conceptual models like Metrics for Usability Standards in Computing (MUSiC). These standards or models can be unified into a single consolidated, hierarchical model of usability measurement. This consolidated model is called Quality in Use Integrated Measurement (QUIM). QUIM is hierarchical in that it decomposes usability into factors, then into criteria, and finally into specific metrics. *In this sense, QUIM follows the IEEE 1061 (1998) standard (Software Quality Metrics Methodology), which outlines methods for establishing quality requirements as well as identifying, implementing, analyzing, and validating both process and product quality metrics (see Schneidewind, 1992; Yamada et al., 1995).*

A.1 System Design Principles

A.1.1 Should correspond to the analysis model

A.1.2 Choose the right programming paradigm

A.1.3 Should be uniform and integrated

A.1.4 Should be flexible

A.1.5 Should ensure minimal conceptual (semantic) errors

A.1.6 Should be structured to degrade gently

A.1.7 Should represent correspondence between the software and real-world problem

A.1.8 Software Reuse

A.1.9 Designing for testability

A.1.10 Prototyping

Rationale for the Framework

The use of Quality in Use Integrated Measurement (QUIM) in this system is essential to provide a consistent framework and repository for usability factors, criteria, and metrics. The QUIM model has two explicit supplementary levels as being, *data and data collection methods*, which is of great value to this system. Usability is generally a relative measure of whether a software product enables a particular set of users to achieve specific goals in a specified context of use. Therefore, the measurement of usability requires that we should know in advance the characteristics of the target users and the kinds of tasks they will carry out with the system. It would also help to determine the effectiveness, efficiency, satisfaction, learnability, productivity, memorability, errors and most especially the cognitive load as an attribute of

usability. Cognitive load refers to the amount of cognitive processing required by the user to use the system.

Technologies you plan to consider or use

The system is a web-based application that allows UN Security Office personnel to access it in any web browser, it is not hardware or system specification reliant, and there is not much disturbance in updating the web application compared to a desktop application and this eats up significantly less processing power.

The system was developed using Core Hypertext Preprocessor (PHP) and HTML/CSS for programming to maximize the incredible synergy between these technologies, since it is a popular general-purpose scripting language that is suited for web development and was chosen as being platform independent for building the server side of web applications.

The server-side process was used to interact with permanent storage for the database in MySQL running inside Ubuntu 20.04.3 x64 based.

Chapter IV

CHAPTER PLAN

Concept

Security Deployment Tracking System have different modules; Staff Management Module (*Staff Members Management, Staff Absences Management, Staff Accommodation Management, Daily Radio Check Release and Tracking Management*), and Admin Tools Module (User Management, Radio Management, Accommodation Management, and logs of deleted record of staff members, absences, accommodation, and daily radio checks are in this module), and reports can be generated in most of the modules. All these modules are interrelated, this one platform increases productivity and provides advanced staff members' daily radio check and accommodation location management, that would help the security process.

- **Staff Management Module** – this gives Security Office and Facility Office to manage staff information and gives the user administrator to add and update staff members' information including staff category, call sign, UN Index number, and UN ID number, etc. This module allows the user administrator to check out and bring back staff members in the system. This also allows the user administrator to update the absence type and absence period of staff members, so they will not be included in the daily radio check and send notifications to those that didn't do their daily radio check, and release the overall status of the daily radio check to Security Headquarters. In Accommodation Location Management, the user administrator from Security Office can update the staff members' accommodation location with Security Officer and/or Facility Officer request and/or approval. This gives better

tracking and updated staff member information and accommodation location as they move within the UN system, not only to the Security Office but to the Facility Office as well. Almost all of the modules provide a feature-rich and user-friendly web interface for managing reports. This generates a printed report as well with UN staff members' basic information including their UN provided accommodation location. A daily radio check status report filtered from daily or different date ranges as needed.

- **Admin Tools Module** – this covers user registration who can access the system, and set user role for default permission and assigned by user administrator. Under this module is where users can add radios, accommodation, region, location and other system libraries.

a. System Features

- *Generate QR code* – the QR code per staff member is generated as they are added to the system.
- *QR code scanning* – the occurrence of errors for manually entered data is significantly higher than that of QR code scanning, this feature makes it fast and reliable and takes infinitely less time than entering data by hand. Staff members who have access to the system can also scan their QR code to login.
- *Full responsiveness and browser compatibility* – this provides the functionality and content regardless of browsers security office personnel use or connection quality whilst still delivering a more sophisticated page.
- *Self-update* – able to update automatically and is promptly delivered to users.

- *Safety* – Security Deployment Tracking System is served through HTTPS; unauthorized users can't access the content.
- *Access restriction* – this makes the user administrator to be flexible in providing user permission. User administrators can limit the access of a user in a module that doesn't need as per tasks they execute.
- *Centralized and auto-backup* – this is automatically set in the system through the secured VLAN.
- *Turnaround-time measurement* – makes information available easily, with less interruption in the security process and this measures the productivity of security office or a security office personnel.
- *Confidential data restriction* – this feature helps especially in the security office to hide the information for privacy and security of staff member(s).

Methods

To successfully achieve the work required to complete this project, it was subdivided into separate work packages. This allowed management of the project's scope efficiently on the activities required for project completion. It was broken down into different phases; Kickoff, Mockup | Design, Execution | Development, Control | Testing, Documentation, Pilot, and Closeout | Deployment. Each of these phases was subdivided further to detail the activities needed.

- **Kickoff / Discovery and Research** – the discovery phase was to understand more about the daily radio check security process, overall plan to improve and eliminate the use of a logbook, and to further audit the existing manual process. This provided a better insight from the Security Office and brainstorm solutions that provided a 360-degree view of the

manual process that the system would like to address in the design and development process. The discovery and research covered methodologies like user surveys, user interviews, and system usability scale (SUS) as needed.

- **Mockup / Visual Design** – the UX and Visual Design are the wireframe creation process models that allow users to see the effective user flow testing. They can reflect the recommended content requirements and strategy that are rooted in research, that its goal is to create a contemporary brand experience that meets an overall communications objectives and user goals. Content audit comprises quantitative and qualitative analysis of content, evaluating current process against quality, relevance, and structure in order to determine needs, gaps, and opportunities.
- **Execution / Development** – within the development, an established design system helped ensure process alignment and consistency while enabling flexibility, usability, and adaptability over time. This revealed processes that need improvement, and data that have to be consolidated or archived, that helped define process improvement effort going forward.
- **Control / Assembly, Testing, and Closeout** – this method helped test a prototype to get feedback from users, that indicated whether it's failed, partial, or passed to come up for improvement. And since daily radio check data was collected, an updated accommodation location was stored, this established a baseline to review the results and generated reports that were forwarded to Security Headquarters to have a greater understanding of the need until it reached the closeout phase.

Plan for User Testing and Project Assessment

A. User Testing

The researcher only got approved for a certain number of staff to help out with the exploratory testing. And to guarantee the usability and efficiency of Security Deployment Tracking System (SDTS), the Usefulness, Satisfaction, and Ease of Use (USE) – *(see Appendix A)* and the System Usability Scale (SUS) – *(see Appendix B)* survey was conducted.

The researcher finds the exploratory testing to be more effective for the project, as it gives more latitude to do different types of testing and is cognitively structured that functionalities are checked in an ad-hoc manner and empathized on learning and adaptability. Whilst researcher and testers work together during the testing, the testers reacted to the response of the web application, explored it to further create critical, practical and useful tests for the successful testing of web application whilst continuously make a valuable decision for the next step of action depends upon tester's thought process for fresh perspective to use and researcher assessed the defects learnt from the test. At the same time, results were compiled and checked for needed additional bug(s) fixing and testing.

B. Security Testing

Security Deployment Tracking System (SDTS) is in a secured VLAN, that was included in a scheduled network scan for security vulnerabilities, risk assessment and remediation. Deception technology software is implemented in this network, as it is vital to detect suspicious activity in order to neutralize the threat within the network and help prevent future breaches and buys IT Security Incident and Event

team the time needed to respond quickly and makes the United Nations as an organization always one step ahead of attackers.

Confidential data scanning was also scheduled in this secured VLAN to protect applications, web applications, and other systems including their databases. This secured VLAN has running rules leveraging the methodologies of combined Dynamic Application Security Testing (DAST) and Static Application Security Testing (SAST), as there are system business-critical running in this node.

Apart from the security measure in place, Application Threat Modeling using DREAD and STRIDE was carried out to identify, classify, rate, compare, and prioritize the security risks associated with the application based on severity.

Chapter V

RESULTS AND DISCUSSION

The researcher always relates managing projects to careful planning and executing appropriate solutions. But every project that the researcher does like this one, the researcher has to reprioritize time, like breaking large things into small actionable steps and manageable increments to progress and accomplish more. Just have to keep trying and experimenting what will work best and be open to different approaches. Debugging the entire model was quite a chore even when the individual pieces work on their own, but bringing everything together needed a lot more time than what was originally allocated.

Working on this project made the researcher realize even more that as the researcher gets to it day-to-day, the researcher also gets to study and experience hundreds of different project management challenges. But as a result of it, the researcher was able to recognize patterns, think fast to provide quick solutions, and come up with long-term strategies that will have a positive impact on the system and users.

The planning phase was a smooth transition but the execution was a challenge as the researcher had to divide time from working on this project and doing work-related tasks at the same time, as the researcher saw it could inevitably lead to a major problem or even failure if not managed well. Collaboration between various stakeholders was also a challenge and a remedy to it was just to politely remind of the estimated due date of this project. Though to stick with the project scope, and know how to complete a certain task, lessen unnecessary stress.

The researcher created a simple test plan as part of the exploratory testing to catch if functional errors occurred and included was performance-tuning effort aligned with code changes were made to the environment. And to make sure that this project moves in the right direction after full implementation, the Security Office and Facility Office endorsement is to deploy a team to work with the researcher to maintain the system. Update and maintain network and system security and apply patches when necessary. As the disaster recovery and flash storage solutions have taken center stage in UN datacenters which provide the optimal platforms to deploy these modern applications, it only makes sense that modern applications deserve modern infrastructure and storage for optimal performance and availability.

Chapter VI

CONCLUSIONS

As part of the objective of SDTS to address the issue of manual logging of daily radio checks and mishandling or misfiling of logbooks or even using a shared spreadsheet over the network for reporting, too lax of a stance, on the other hand, would result in unsustainable data exposure and risk, so it was given an amount of attention to deliver this system to manage those issues. With tight integration across a number of tools, users of SDTS who participated in the exploratory testing find the features implemented to be useful, to improve their productivity and generating reports is much easier, as well as tracking staff members' location is very straightforward. The QR code scanning feature is functional in that it eliminates the errors for manually entering a UN ID number and it's effortless to search for records needed.

Chapter VII

RECOMMENDATIONS

As the United Nations moved towards highly collaborative, secure, and integrated enabled-systems, old-legacy solutions or even manual processes and others were expanded to the digital organization objectives that provided capabilities for storage expansion and intra-organizational access. Though there are tradeoffs, like the transformation from paper-based documents to electronic with different report formats is a big step and became the de facto hub for storing digitized content. Different platforms combined with edge technology integrations is more robust and the content value of these systems addresses the content retention policies and risk mitigation for the organization. As SDTS worked into removing the manual logbook process and aligned data management solutions to centralized data and provided the very platform that broaden the innovation, collaboration, security, and connectivity to the boundary information technology, the future work that will be helpful should include the e-signature for security clearance approver, allow user to have access to specific region and location, and if at all possible enhance the interface to generate QR code as part of the exploratory testing feedback.

On the path to a more mature system, the researcher thought of a broader innovation leveraging the platform aspect of mobile access to content with high security, retention policy implementations, and increased collaboration to other organization divisions would be a great future work to extend the power of these platforms if possible. It is the researcher's belief that when the sources of data are derived from multiple sources, e.g. scanners, cameras, mobile, etc. or even inputs from networked devices, the aggregation of this valuable data onto a single

connected platform will provide the organization of tomorrow with a single pane of glass with which to drive more data management strategies and data access whilst making sure to keep copies of data in a secured and isolated off-site location should be an essential part of a comprehensive ransomware-resilient data protection strategy.

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Appendices

APPENDIX A

System Usability Scale (SUS)

		Strongly Disagree				Strongly Agree
1.	I think that I would like to use this website frequently.	☐	☐	☐	☐	☐
2.	I found this website unnecessarily complex.	☐	☐	☐	☐	☐
3.	I thought this website was easy to use.	☐	☐	☐	☐	☐
4.	I think that I would need assistance to be able to use this website.	☐	☐	☐	☐	☐
5.	I found the various functions in this website were well integrated.	☐	☐	☐	☐	☐
6.	I thought there was too much inconsistency in this website.	☐	☐	☐	☐	☐
7.	I would imagine that most people would learn to use this website very quickly.	☐	☐	☐	☐	☐
8.	I found this website very cumbersome/awkward to use.	☐	☐	☐	☐	☐
9.	I felt very confident using this website.	☐	☐	☐	☐	☐
10.	I needed to learn a lot of things before I could get going with this website.	☐	☐	☐	☐	☐

"*A SUS score above a 68 would be considered above average and anything below 68 is below average.*"

Interpreting SUS Scores
URL: https://measuringu.com/sus/

APPENDIX B

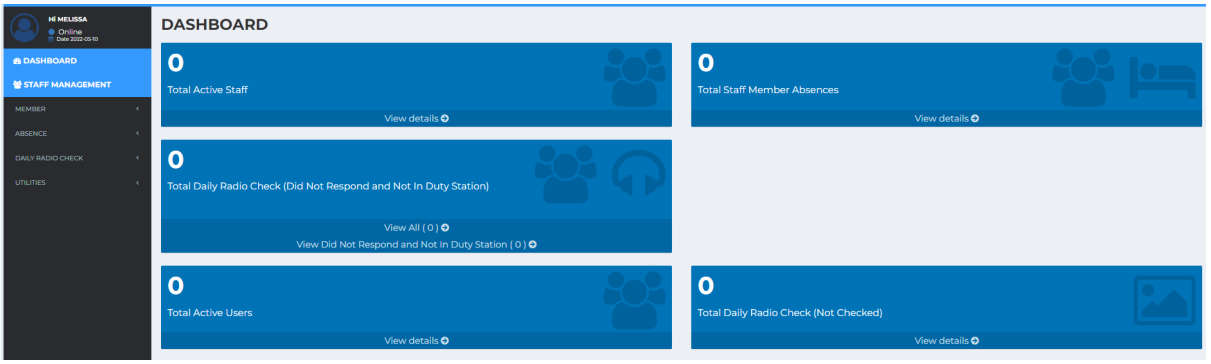
Usefulness, Satisfaction, and Ease of Use (USE)

USEFULNESS		1	2	3	4	5	6	7		NA
1. It helps me be more effective.	strongly disagree	○	○	○	○	○	○	○	strongly agree	○
2. It helps me be more productive.	strongly disagree	○	○	○	○	○	○	○	strongly agree	○
3. It is useful.	strongly disagree	○	○	○	○	○	○	○	strongly agree	○
4. It gives me more control over the activities in my life.	strongly disagree	○	○	○	○	○	○	○	strongly agree	○
5. It makes the things I want to accomplish easier to get done.	strongly disagree	○	○	○	○	○	○	○	strongly agree	○
6. It saves me time when I use it.	strongly disagree	○	○	○	○	○	○	○	strongly agree	○
7. It meets my needs.	strongly disagree	○	○	○	○	○	○	○	strongly agree	○
8. It does everything I would expect it to do.	strongly disagree	○	○	○	○	○	○	○	strongly agree	○
EASE OF USE		**1**	**2**	**3**	**4**	**5**	**6**	**7**		**NA**
9. It is easy to use.	strongly disagree	○	○	○	○	○	○	○	strongly agree	○
10. It is simple to use.	strongly disagree	○	○	○	○	○	○	○	strongly agree	○
11. It is user friendly.	strongly disagree	○	○	○	○	○	○	○	strongly agree	○
12. It requires the fewest steps possible to accomplish what I want to do with it.	strongly disagree	○	○	○	○	○	○	○	strongly agree	○
13. It is flexible.	strongly disagree	○	○	○	○	○	○	○	strongly agree	○
14. Using it is effortless.	strongly disagree	○	○	○	○	○	○	○	strongly agree	○
15. I can use it without written instructions.	strongly disagree	○	○	○	○	○	○	○	strongly agree	○
16. I don't notice any inconsistencies as I use it.	strongly disagree	○	○	○	○	○	○	○	strongly agree	○
17. Both occasional and regular users would like it.	strongly disagree	○	○	○	○	○	○	○	strongly agree	○
18. I can recover from mistakes quickly and easily.	strongly disagree	○	○	○	○	○	○	○	strongly agree	○
19. I can use it successfully every time.	strongly disagree	○	○	○	○	○	○	○	strongly agree	○
EASE OF LEARNING		**1**	**2**	**3**	**4**	**5**	**6**	**7**		**NA**
20. I learned to use it quickly.	strongly disagree	○	○	○	○	○	○	○	strongly agree	○
21. I easily remember how to use it.	strongly disagree	○	○	○	○	○	○	○	strongly agree	○
22. It is easy to learn to use it.	strongly disagree	○	○	○	○	○	○	○	strongly agree	○
23. I quickly became skillful with it.	strongly disagree	○	○	○	○	○	○	○	strongly agree	○
SATISFACTION		**1**	**2**	**3**	**4**	**5**	**6**	**7**		**NA**
24. I am satisfied with it.	strongly disagree	○	○	○	○	○	○	○	strongly agree	○
25. I would recommend it to a friend.	strongly disagree	○	○	○	○	○	○	○	strongly agree	○
26. It is fun to use.	strongly disagree	○	○	○	○	○	○	○	strongly agree	○
27. It works the way I want it to work.	strongly disagree	○	○	○	○	○	○	○	strongly agree	○
28. It is wonderful.	strongly disagree	○	○	○	○	○	○	○	strongly agree	○
29. I feel I need to have it.	strongly disagree	○	○	○	○	○	○	○	strongly agree	○
30. It is pleasant to use.	strongly disagree	○	○	○	○	○	○	○	strongly agree	○
		1	**2**	**3**	**4**	**5**	**6**	**7**		**NA**

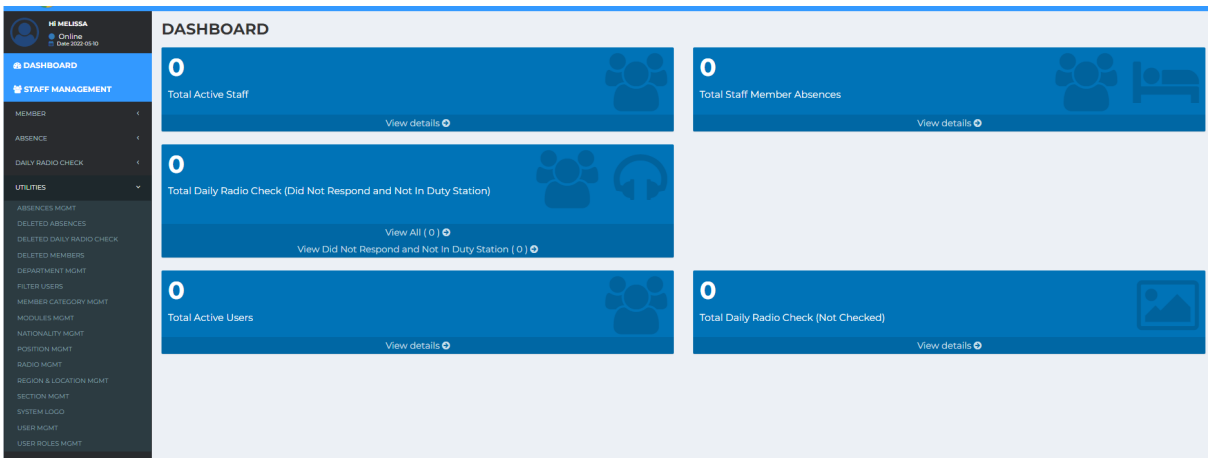
APPENDIX C

SDTS Screen Capture

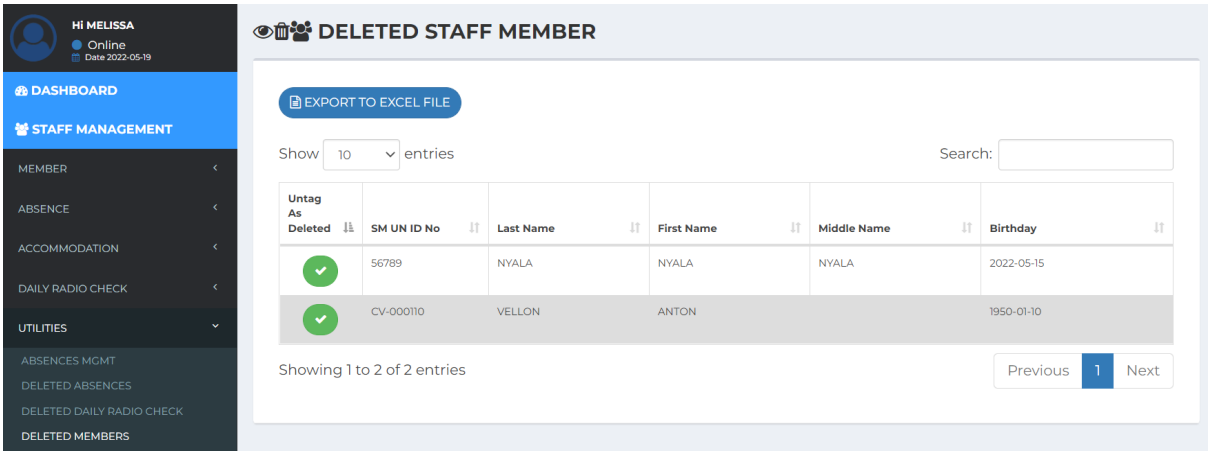
DASHBOARD | STAFF MANAGEMENT MODULE



ADMIN TOOLS MODULE | UTILITIES



ADMIN TOOLS MODULE | UTILITIES | DELETED STAFF MEMBER



APPENDIX D

Glossary

CSS – Cascading Style Sheets

DAST – Dynamic Application Security Testing

HCI – Human-Computer Interaction

HTML – Hypertext Markup Language

IEC – International Electrotechnical Commission

IEEE – Institute of Electrical and Electronics Engineers

ISO – International Organization for Standardization

MUSiC – Metrics for Usability Standards in Computing

MVC – Model View Controller

QUIM – Quality in Use Integrated Measurement

SAST – Static Application Security Testing

SRS – Software Requirements Specifications

SUS – System Usability Scale

USE – Usefulness, Satisfaction, and Ease of Use

UN – United Nations

VLAN – Virtual Local Area Network