

JUSTICE CONNECT APPLICATION

A PROJECT REPORT SUBMITTED TO THE FACULTY OF ENGINEERING, DESIGN AND TECHNOLOGY IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF THE DEGREE OF BACHELOR OF SCIENCE IN INFORMATION TECHNOLOGY OF UGANDA CHRISTIAN UNIVERSITY

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UGANDA CHRISTIAN
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DECLARATION

We, the Justice Connect group, hereby declare that the work presented in this report submitted to Uganda Christian University is the result of our group's own original research and efforts. All sources of information and data have been duly acknowledged and citing the contributions of others has been duly carried out.

We confirm that the work reported in this project has not been submitted either wholly or in part for any other academic course or degree award at any other academic institution.

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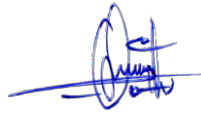
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APPROVAL

I, Mr.Solomon Opio hereby approve the submission of the project report titled“ Justice Connect Research Project Application” authored by the group members stated above. I have reviewed the contents of the report and find it to be comprehensive, accurate, and in with the objectives outlined for the project.

I acknowledge that the report reflects the culmination of diligent efforts, adhering to the project's timeline and requirements. The methodologies employed, findings presented, and recommendations provided demonstrate a thorough understanding of the project's scope and objectives. I endorse the submission of this report and commend Justice Connect team for their dedication and professionalism throughout the project. I believe that the insights and outcomes outlined in this report will contribute significantly to different people at large

Signed:



MR.SOLOMON OPIO

Date: 24th May 2024

ABSTRACT

J-Connect is a web application designed to address the pressing issue of domestic violence in our society Mukono, Uganda. The platform aims to empower victims of domestic violence by providing them with convenient and affordable access to legal support. Specifically tailored to the needs of those affected by domestic abuse, J- Connect serves as a vital link between victims, particularly women, and qualified legal professionals in the country. Through our innovative consultation platform, users can easily seek advice from lawyers anonymously offering both pro bono and commercial legal aid support. Moreover, J-Connect goes beyond consultation by enabling users to select representation through a user-friendly interface, thereby promoting access to justice and advancing the objectives of SDG 16. J-Connect, is committed to fostering a safer and more equitable society for all fighting the stigmatization the victims face.

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CHAPTER ONE

1.1 Introduction

J-Connect's development was driven by the urgent need to address the challenges and empower women facing domestic violence in Uganda. The concept originated from our recognition that there was a lack of accessible resources for victims, limited digital solutions for domestic violence support in Mukono. Most of these victims did not even know that they were victims. J-Connect is a web platform that focuses on providing support and assistance to these women who are victims of domestic violence. Recognizing the unique challenges and vulnerabilities faced by women in such situations, J-Connect tailors its services to address their specific needs to seek help, access legal assistance, find counseling services, and connect with a supportive community of survivors. J-Connect aims to provide a safe and inclusive space where women feel understood, supported, and empowered to break free from the cycle of abuse and rebuild their lives.

1.1.1 Background

Domestic violence casts a long shadow over Mukono, Uganda, inflicting deep wounds. Women, in particular, bear the brunt of this violence, facing devastating consequences. Tragically, many women pay the ultimate price – death. According to the 2022 Uganda Police Force Annual Crime Report, a staggering 301 women lost their lives due to domestic violence-related murders in 2021 alone. This alarming statistic underscores the urgent need for intervention to protect and support women at risk. However, numerous barriers prevent many women from seeking the help they desperately need. Fear of retribution, lack of awareness about available resources, and financial constraints all contribute to the under-reporting of domestic violence. As a result, the cycle of abuse persists, perpetuating the suffering of women and their families. J-Connect emerges in response to this critical issue. The platform is designed to break the silence surrounding domestic violence and provide targeted support to women, empowering them to reclaim their safety and dignity. J-Connect offers a multifaceted solution by acting as a comprehensive support system for individuals, particularly women, who are at risk or affected by domestic violence. Through a combination of innovative features and personalized assistance, J-Connect aims to empower victims, disrupt the cycle of abuse, and create

a safer environment for all

1.1.2 Problem Statement

In Uganda, domestic violence is a wide-spread issue with devastating consequences. A staggering 51% of ever-married women aged 15-49 have experienced physical violence according to the 2016 Uganda Demographic and Health Survey (UDHS). This violence can be fatal, as evidenced by the 2022 Uganda Police Force Annual Crime Report, which documented 301 female suicides linked to domestic violence. Despite the severity of the problem, only about 30% of victims seek legal help (National Coalition Against Domestic Violence, 2021). This low rate can be attributed to factors such as fear of retaliation from abusers, lack of awareness about legal rights, and financial barriers that prevent access to legal aid.

1.1.3 Specific Objectives and Goals

Main Objective:

To provide a secure and accessible platform for domestic violence victims, particularly women, to connect with legal support resources effectively.

Specific Objectives:

- i Develop a user-friendly interface for J-Connect that enables victims to easily navigate and access legal support services by the end of the year 2024
- ii Increase the number of registered users on J-Connect to 500 users in Mukono District within one year.
- iii Collaborate with local legal aid organizations, the police and law firms to ensure a comprehensive database of legal resources accessible through J-Connect by end of May 2024.
- iv Tailor the platform to accommodate diverse needs and ensure confidentiality after one year launch, thereby fostering a safe online-web environment for victims to seek assistance.
- v Implement regular feedback mechanisms and conduct quarterly reviews to assess user satisfaction and make necessary improvements within specified timelines.

1.1.4 Scope and Limitations

Currently, J-Connect focuses on connecting users within Mukono, Uganda. Expanding to other regions might require future development and adaptation. While J-Connect strives to offer comprehensive support, it's important to acknowledge some limitations:

- a. **Legal Advice vs. Full Representation-** The application facilitates consultations and legal advice but may not guarantee full legal representation in court proceedings. Users might need to explore further options with the lawyers they connect with on the platform.
- b. **Safety Considerations.** J-Connect prioritizes user safety. However, it's important for users to be aware of potential risks associated with online communication and to exercise caution when sharing sensitive information.
- c. **Technical Limitations:** Some users might have limited access to technology or the internet. J- Connect will continue to explore ways to improve accessibility and bridge the digital divide.

1.1.5 Relevance and importance of the J-Connect Project

J-Connect has the potential to revolutionize how victims of domestic violence in Mukono access legal support. By creating a user-friendly platform, J-Connect can:

Increase access to qualified legal representation, leading to improved outcomes in court.

Empower victims with knowledge and resources, fostering a sense of control and safety.
Encourage more victims to come forward and seek justice, potentially deterring future abuse.

Contribute to a reduction in domestic violence rates in Mukono by ensuring accountability.

J-Connect stands as a vital tool for victims, offering a path towards justice and security.

1.2. Literature review

Domestic violence is a significant global issue with devastating consequences for victims. In Uganda, the prevalence of domestic violence paints a grim picture. According to the 2016 Uganda Demographic and Health Survey (UDHS), 51% of ever-married women aged 15-49 years have experienced physical violence since the age of 15.

This violence can take various forms, including physical, emotional, sexual, and financial abuse. The impact on victims is profound, affecting their physical and mental health, social well-being, and overall quality of life (Benjaminsson, J. (2014).

Legal Empowerment Through Legal Aid. Examining How Legal Aid Promotes Legal Empowerment For Vulnerable Women In Uganda.)

1.2.1 Barriers to Accessing Legal Aid

Despite the prevalence of domestic violence, victims often face significant barriers when seeking legal help. These barriers can be categorized as follows:

- i. Financial Constraints. Legal services can be expensive, making them unaffordable for many victims, particularly those who have been financially abused by their partners (reference a report by a Ugandan NGO working on domestic violence).
- ii. Fear of Abusers. Victims might be afraid of retaliation from their abusers if they seek legal action. This fear can be especially strong in situations where the abuser controls the victim's finances or living situation (reference a research article on fear of retaliation as a barrier to seeking legal help).
- iii. Lack of Awareness. Many victims might not be aware of their legal rights or available support services. This lack of awareness can prevent them from taking steps to protect themselves and their families (reference a report by a Ugandan legal aid organization on the issue of awareness).
- iv. Limited Legal Aid Resources. The availability of legal aid for domestic violence cases might be limited, especially in rural areas. This lack of resources can further disadvantage victims seeking legal support (Benjaminsson, J. (2014). Legal Empowerment Through Legal Aid. Examining How Legal Aid Promotes Legal Empowerment For Vulnerable Women In Uganda.).

1.2.2 Technology as a Tool for Empowerment

The rise of technology offers promising solutions for overcoming these barriers and empowering victims of domestic violence through enabling the following.

- i. Increase accessibility through providing 24/7 access to information and resources, even in remote areas, where access to traditional legal aid services might be limited [6].
- ii. Online platforms can create a sense of safety for victims who fear retaliation by allowing them to seek help anonymously.
- iii. Technology-based solutions can offer cost-effective ways to connect victims with legal aid resources compared to traditional methods.
- iv. Technology can be used to raise awareness about domestic violence and available support services, potentially reaching a wider audience than traditional methods.

Several technology-based solutions have emerged globally to address domestic violence. For instance, U-Report demonstrates the potential of technology in empowering victims and improving access to legal aid (Berdou, E., Lopes, C. A., Sjoberg, F. M., & Mellon, J. (2015). The case of UNICEF's U-report Uganda. *Civic Tech in the Global South*, 97.).

1.2.3 Potential Impact of J-Connect

J-Connect, a web application designed to empower victims of domestic violence in Uganda, has the potential to make a significant contribution through the following ways.

- i. J-Connect can bridge the gap between victims and legal professionals by offering a user-friendly platform for consultations, regardless of location or financial constraints.
- ii. The application can empower victims by providing access to information about their legal rights and available resources, fostering a sense of self-reliance.
- iii. J-Connect can encourage victims to seek help by offering a safe and anonymous platform for initial consultations and exploration of legal options.
- iv. By facilitating connections with lawyers offering pro bono or commercially priced legal services, J-Connect can promote access to justice for domestic violence victims in Uganda.

The prevalence of domestic violence in Uganda necessitates innovative solutions. J-Connect, with its technology-based approach, has the potential to empower victims, overcome existing barriers to accessing legal aid, and promote access to justice within the Ugandan context.

CHAPTER TWO

2.1 Methodology

J-Connect aims to empower victims of domestic violence in Mukono, Uganda, by providing a user-friendly web application for legal support. This methodology outlines the Data Collection and the development approach for J-Connect.

2.1.2 Data Collection Methods:

- i. National Statistics. Data on the prevalence of domestic violence in Uganda was obtained from reputable sources such as the Uganda Police Force Annual Crime Report and the Uganda Demographic Health Survey (UDHS). Specific reports and years used will be cited throughout the report.
- ii. Due to the potential limitations of local data availability from within the area, efforts were made to acquire statistics on domestic violence specific to Mukono. These efforts included:
 - Reviewing reports and publications from the Mukono District Office, Police department working on domestic violence issues and effective use of the internet for research on the given field of study.
 - Surveys; The surveys, interviews, and user feedback to identify the needs and pain points of the target audience. We also visited different law firms seeking collaboration and more insights for the ongoing project

2.1.2.1 Information on J-Connect

Information about J-Connect's features, target audience, and the support it provides was gathered through the following methods:

- Considering conducting interviews with possible users and partners of J-Connect.

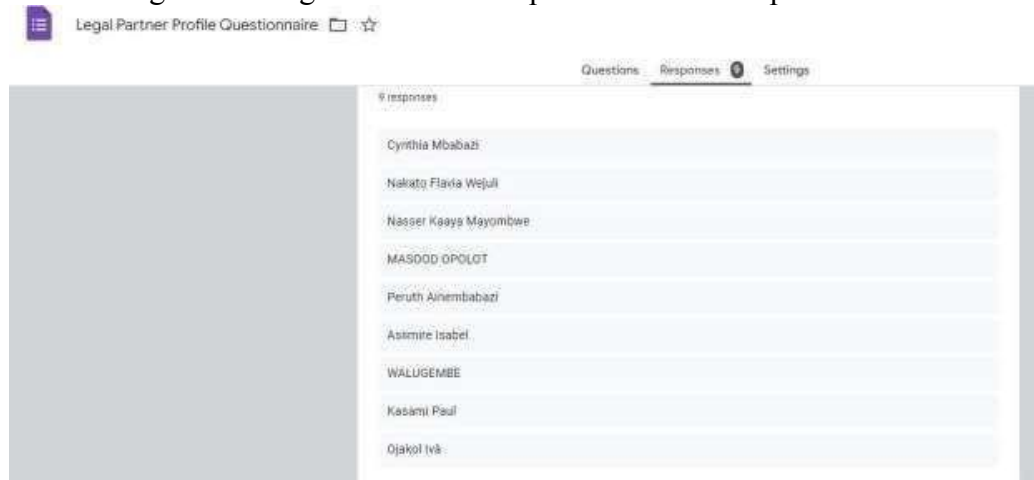


Figure 1: Some of the potential users of J-CONNECT

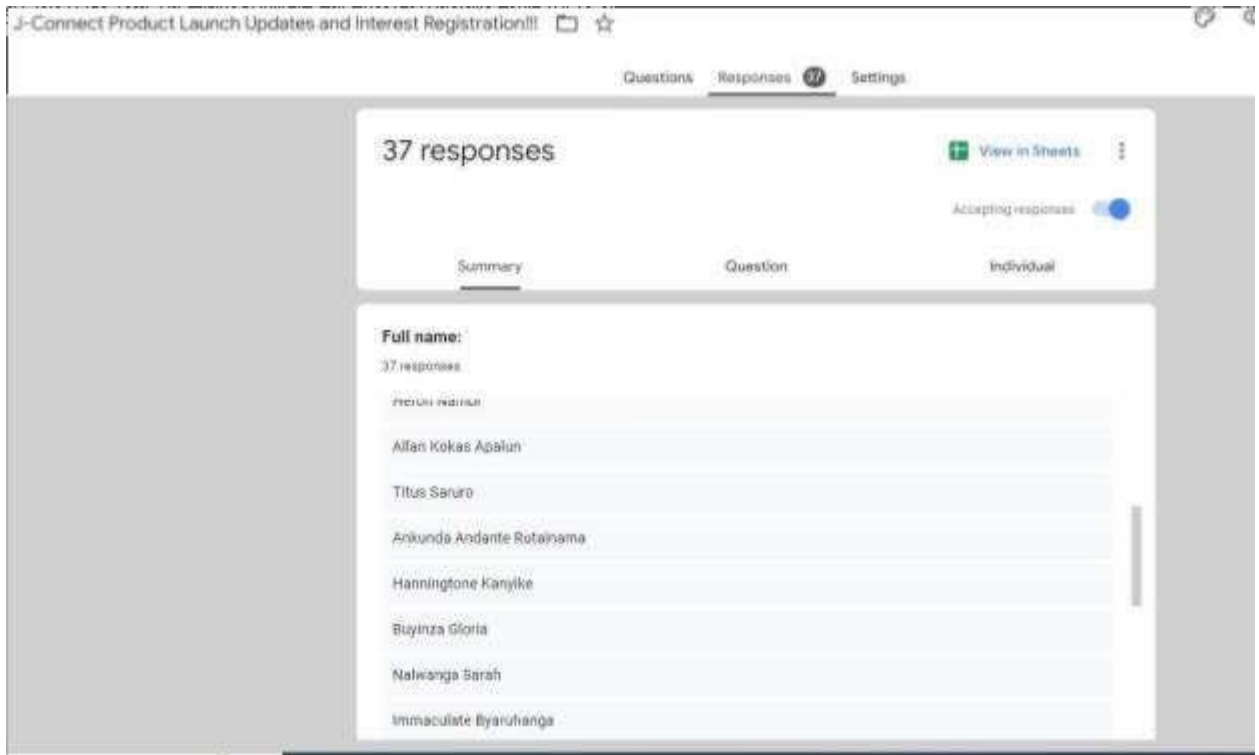


Figure 2: Different responses from the interviewed individuals about the J-Connect

2.1.2.2 Data Analysis.

- Quantitative data, such as national statistics on domestic violence rates, will be presented descriptively. (According to the 2016 Uganda Demographic and Health Survey (UDHS), **51% of ever-married women aged 15-49 years have experienced physical violence** since the age of 15.
- Qualitative data, such as information from interviews with J-Connect, was analyzed thematically to identify key insights and recurring experiences.

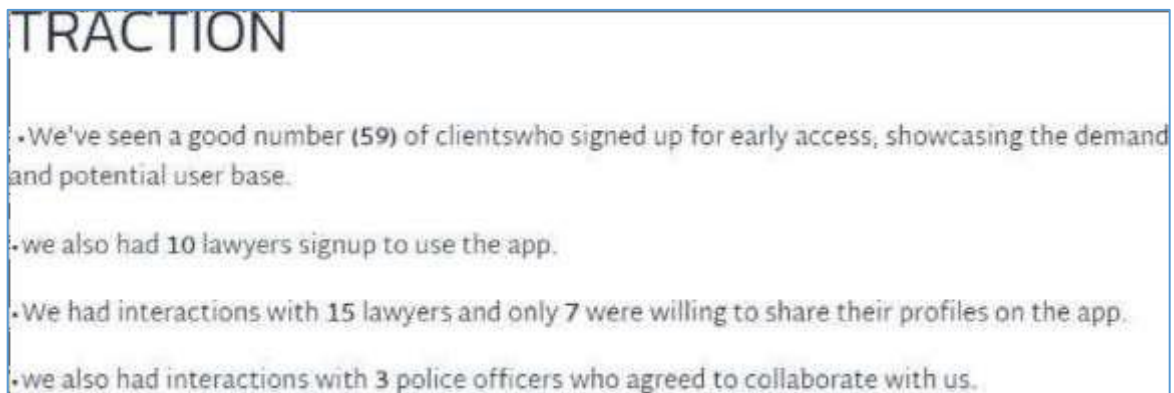


Figure 3: Traction of the users

2.1.3 Approach

J-Connect's development followed a user-centered design (UCD) approach. This iterative approach emphasizes involving target users throughout the development process to ensure the final product meets their needs and addresses their pain points.

The UCD process for J-Connect involved the following stages.

2.1.3.1 Research

Extensive research was conducted to understand the challenges faced by domestic violence victims in Uganda and competition analysis also to identify the different competition J-Connect would be going against. This research also included literature reviews, data analysis of relevant statistics, and potentially user interviews or focus groups with target users.

i. Surveys

The surveys, interviews, and user feedback to identify the needs and pain points of the target audience. We also visited different law firms seeking collaboration and more insights for the ongoing project.

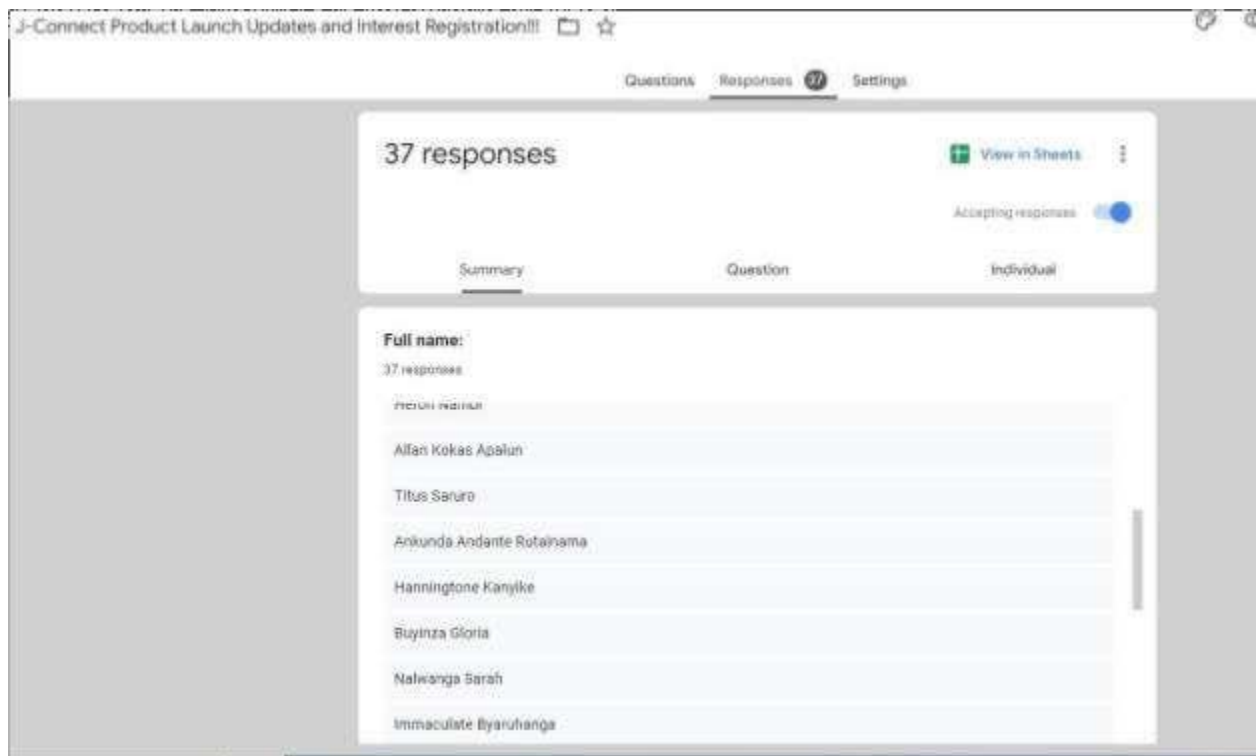


Figure 4: Different Responses from the Interviewed Individuals about J-Connect.

ii. Competitor Analysis

Analyzed competitors' features, strengths, and weaknesses to identify opportunities for differentiation. In the landscape of web-apps catering to domestic violence victims seeking legal support, J-Connect distinguishes itself from competitors like Pulidawo and the Center for Domestic Violence Prevention by offering unique features tailored to the specific needs of its users.

Unlike its competitors, J-Connect prioritizes user anonymity, providing a safe and confidential platform for victims to seek assistance without fear of exposure. Additionally, J-Connect offers a feature for victims to seek legal representation directly through the app, streamlining the process of connecting with legal professionals who can provide support and guidance.

Another critical feature that sets J-Connect apart is its emergency alert button, allowing users to quickly and discreetly signal for help in urgent situations. By offering these innovative features, J-Connect aims to provide comprehensive support to domestic violence victims, empowering them to access the legal assistance they need while prioritizing their safety and privacy.

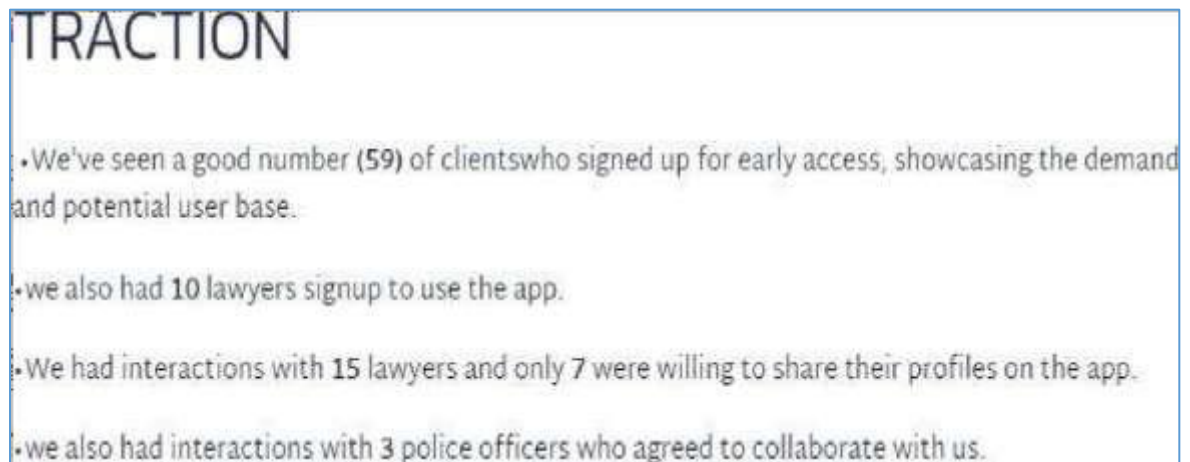


Figure 5: The traction gained by J-Connect

2.1.3.2 Ideation and Design

Based on the research findings, user personas were created to represent the target audience. These personas informed the design of the application's functionalities, user interface (UI), and user experience (UX). Flow charts, Entity-Relationship Diagrams (ERDs), Data Flow Diagrams (DFDs) were also designed at this step.

Flow Chart:

Created a flow chart to visualize the user flow within the app. Start with the main actions users will take and map out the sequence of screens and interactions they'll encounter. Include decision points, branching paths, and error handling. We used draw.io or to create the flow chart

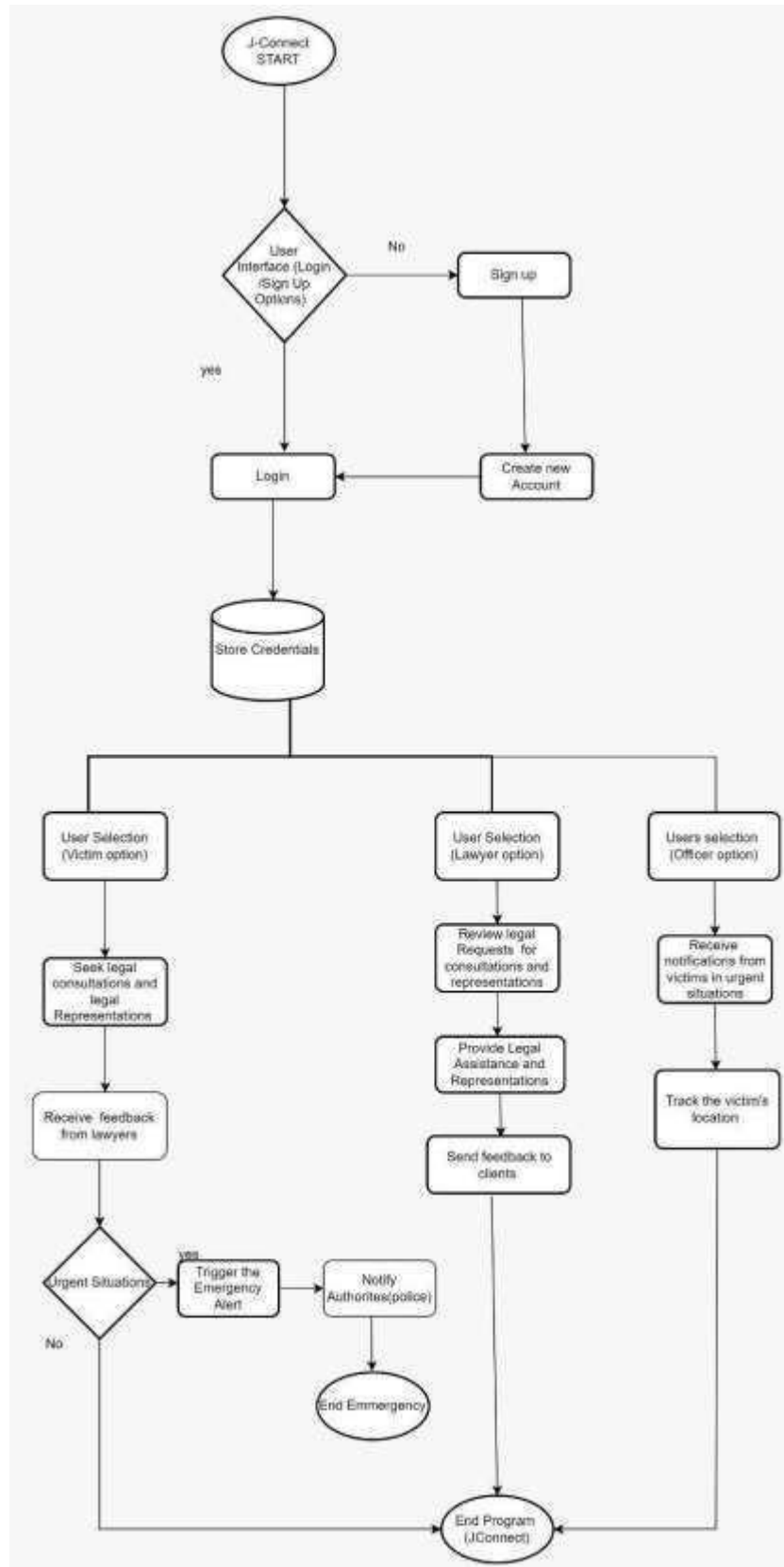


Figure 6:Flow Chart of J-Connect

2.1.3.3 Prototyping and Testing

Low-fidelity prototypes were initially developed on gamma app to enable the gathering of user feedback on the core functionalities and user flow. The feedback we got was incorporated to refine the design and create high-fidelity prototypes for further usability testing.

2.1.3.4 Development and Deployment.

The final application was developed using appropriate programming languages and frameworks (details in section 2.1.2). The application was then rigorously tested for functionality and security before deployment.

2.1.3.5 Evaluation and Iteration

J-Connect will undergo continuous evaluation after deployment. User feedback and usage data we collected was used to identify areas for improvement and inform future iterations of the application.

2.1.4 Tools and Technologies

The development of J-Connect involved a combination of the following tools and technologies.

- i. **Front-End Development:** Languages like HTML, CSS, and Javascript frameworks like React js were chosen to be used to create the user interface and our different interactive elements.
- ii. **Back-End Development.** Programming languages like node.js were used to build the serverside logic and manage data.
- iii. **Database:** A secure database from firebase was used to store user information, legal resources, user authentication, and other application data. See the screenshot below

2.1.5 Development Process

J-Connect's development process utilized the agile methodology. Agile methodologies emphasize iterative development cycles, this allows for continuous feedback and adaptation throughout the project.

2.1.5.1 Project backlog.

A prioritized list of all features, functionalities, and tasks required for J-Connect was compiled into the project backlog. This constantly evolving list served as the development roadmap we used, alongside with the first user stories (desired functionalities) taking center stage.

Anonymous user 1 said “As a victim of domestic violence, I want to search for a lawyer in my area specializing in domestic violence cases so I can get legal help”. (Marked this as high priority)

2.1.5.2 Sprint Planning

This was used at the beginning of each sprint. Sprints are smaller chunks of work broken down with a timeframe.

The team utilized a Pert Chart as part of the sprint planning process. The Pert Chart visualized the distribution of tasks and responsibilities among team members throughout the sprint. This visual representation facilitated clear allocation of resources and balanced workloads among team members. By clearly delineating who is responsible for each task and how much time they are expected to spend on it, the Pert Chart enhanced task management and coordination within the team.

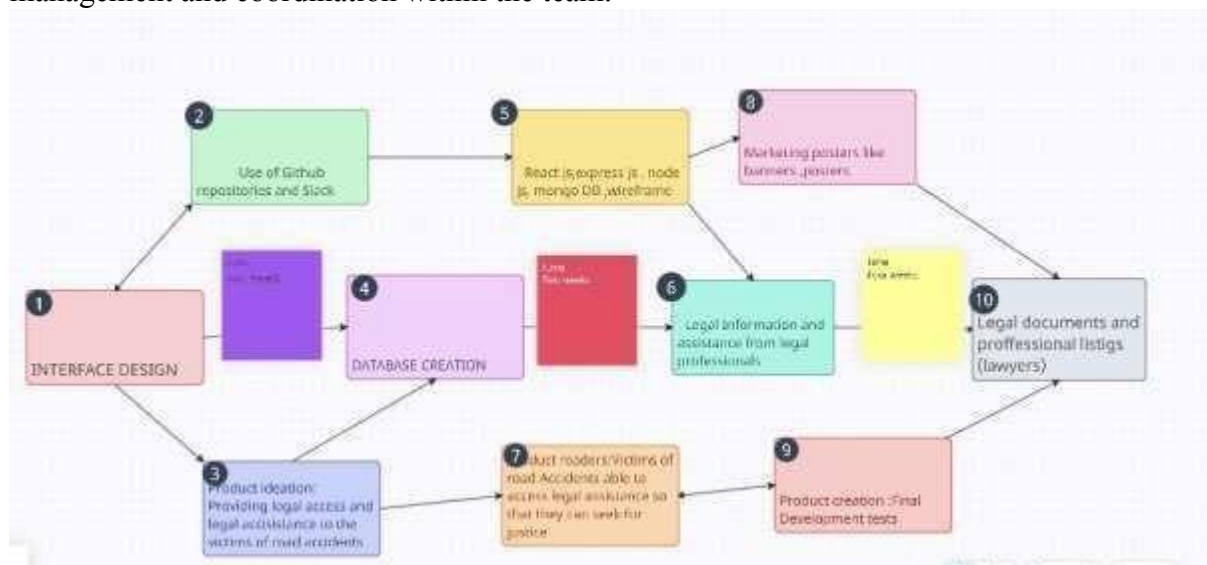


Figure 8;PERT Chart

2.1.5.3 Development and Testing

Throughout the sprint, the development team focused on completing the assigned tasks from the chosen user stories. This involved activities like

- i. Coding functionalities - Designing user interfaces
- ii. Developing secure data storage solutions - Integrating legal resource information
- iii. Rigorously testing developed features for functionality and security

2.1.6 Reasons why agile was the best for creating and developing J-Connect.

- i. Agile allows for early and continuous user feedback, ensuring J-Connect is developed with the specific needs of victims in mind.
- ii. The iterative nature of Agile allowed us the development team to adapt to changing requirements or user feedback throughout the development process. This is particularly beneficial for J-Connect, as new needs or functionalities might be identified as the project for example different new needs by the lawyers and also the changing requirements for data protection

2.2 System Design and Development

This section details the design and development process of our application aimed at empowering victims of domestic violence.

2.2.1 The UI/UX Design

Collaborated with designers to create a visually appealing and intuitive user interface, ensuring a seamless user experience specifically for victims of domestic violence. User research methods like interviews and focus groups helped us understand our user needs and design considerations. For neutrality we selected blue as the theme color to represent bold and trust

The user interface prioritizes clarity, information hierarchy, and accessibility features to cater to users with varying technical backgrounds and potential limitations due to the sensitive nature of their situation.

Frontend Development.

Modern development frameworks like React js and node.js were utilized to implement the app's frontend components, ensuring responsive design for optimal user experience across different devices (phones, tablets, desktops). Interactive elements were incorporated to allow users to navigate the application seamlessly and access features efficiently. With the use of styled components, we were able to achieve designing each and every component on the front end. See Fig.9 below and Fig. 10 below.

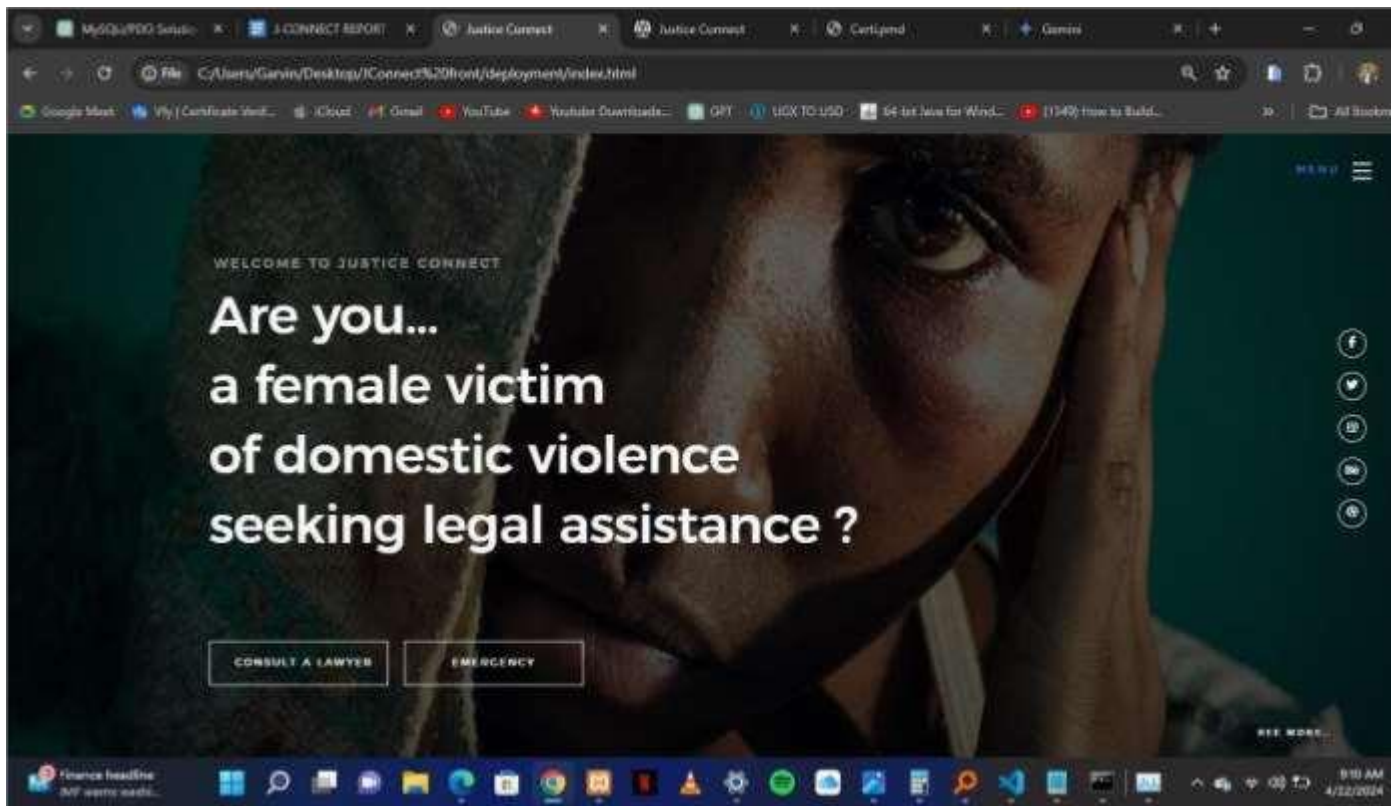


Figure 9: Desktop Responsive Design

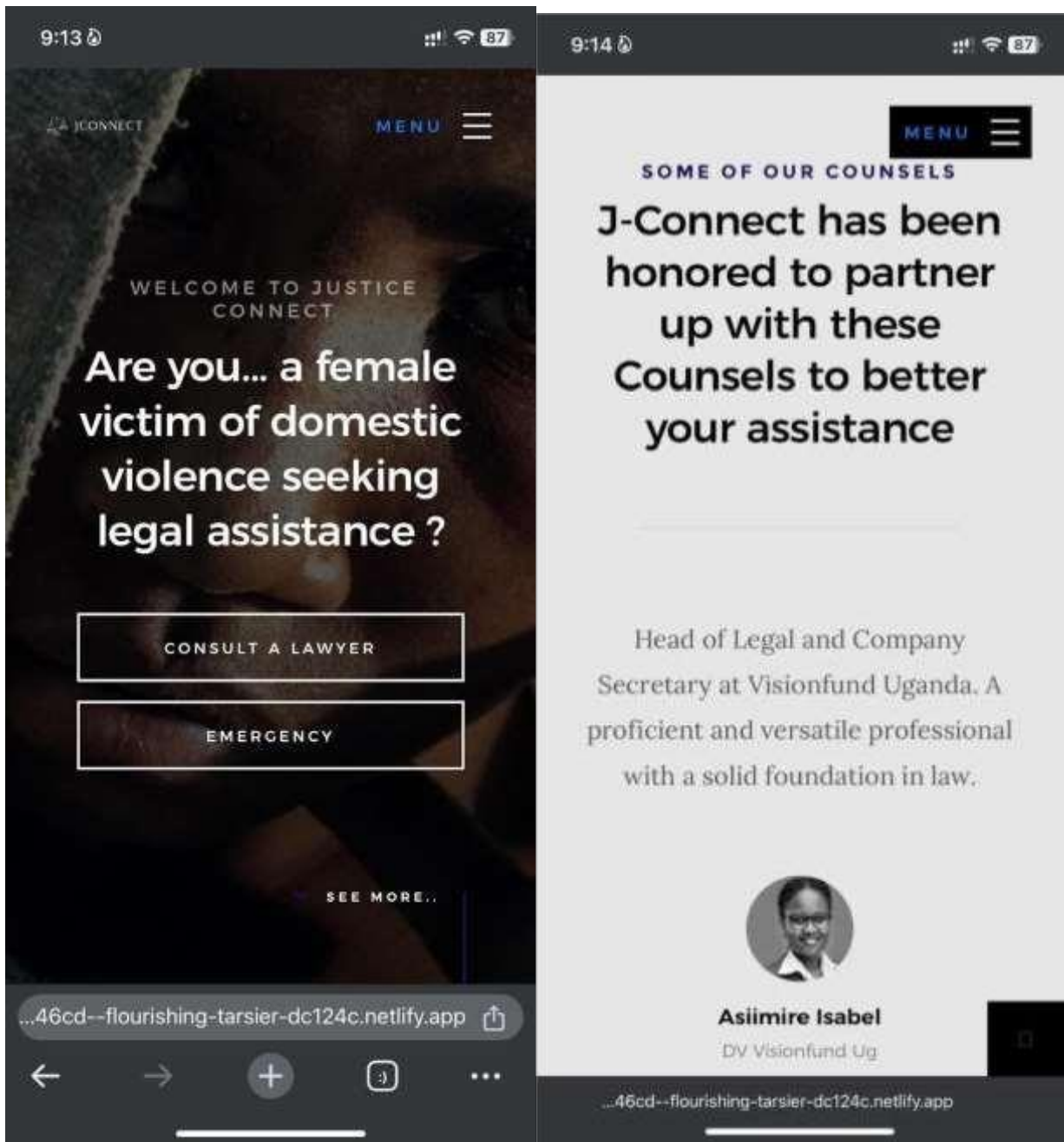


Figure 10: Lawyers profile

2.2.2 Backend Development with User-Centered Design

This section details the backend development process, emphasizing both security and scalability while adhering to user-centered design principles. For our technology choice, we opted for the following.

i. Backend Technology:

We leveraged a combination of technologies for the backend. Firebase serves as our database solution, offering secure and scalable data storage. Additionally, we utilized

Node.js to develop the application's backend functionality, which interacts with the Firebase database to manage user data and application logic. This provided us with a robust foundation for handling user data, email authentication, application logic, and anonymity.

ii. **Entity-Relationship Diagram (ERD):**

Illustrated an ERD to show the relationships between different entities in the application database. Identified the main entities (e.g., users, products, orders) and their attributes. Then, defined the relationships between these entities (e.g., one-to-one, one-to-many, many-to-many). We used draw.io or to create ERDs.

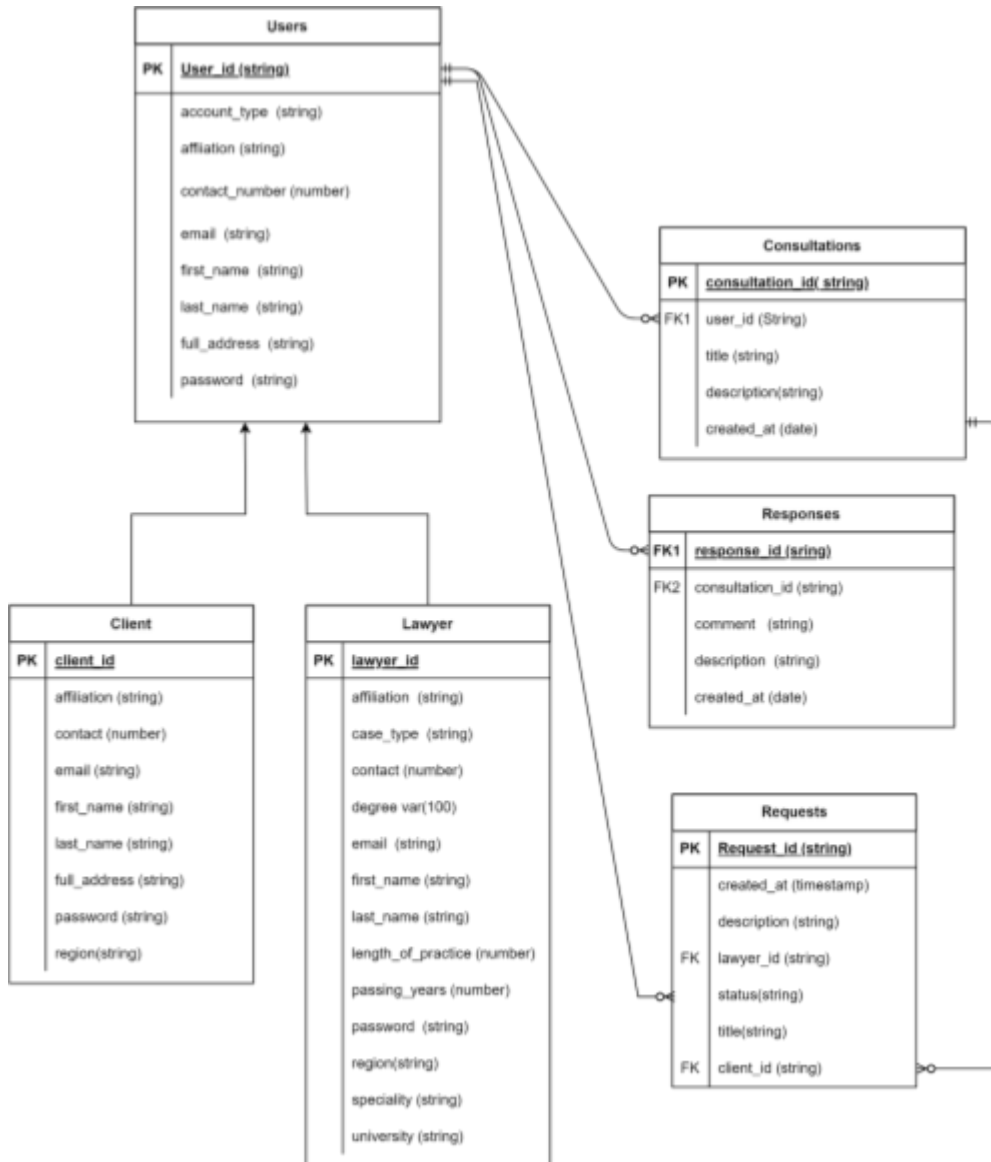


Figure 11: ERD to show the Relationships between Different Entities in the Application Database.

iii. Scalable Architecture

The backend infrastructure in node is designed for scalability. This means it can adapt to accommodate a growing user base and increasing data volume effectively. We achieve this through techniques like and using a distributed database (firebase).

iv. Data Security and User Privacy

Encryption at Rest and in Transit: Data security is very paramount more so when dealing with such data like the one we do so we employed industry-standard encryption methods to safeguard user information like messages and data both at rest (stored on servers) and in transit (during communication between devices and the application). This protects sensitive data from unauthorized access, even if intercepted. This enabled us comply with the different data privacy policies and regulations of Uganda. User data is stored securely using established practices like access control mechanisms and regular security audits on the firebase. This minimizes the risk of data breaches and ensures user privacy.

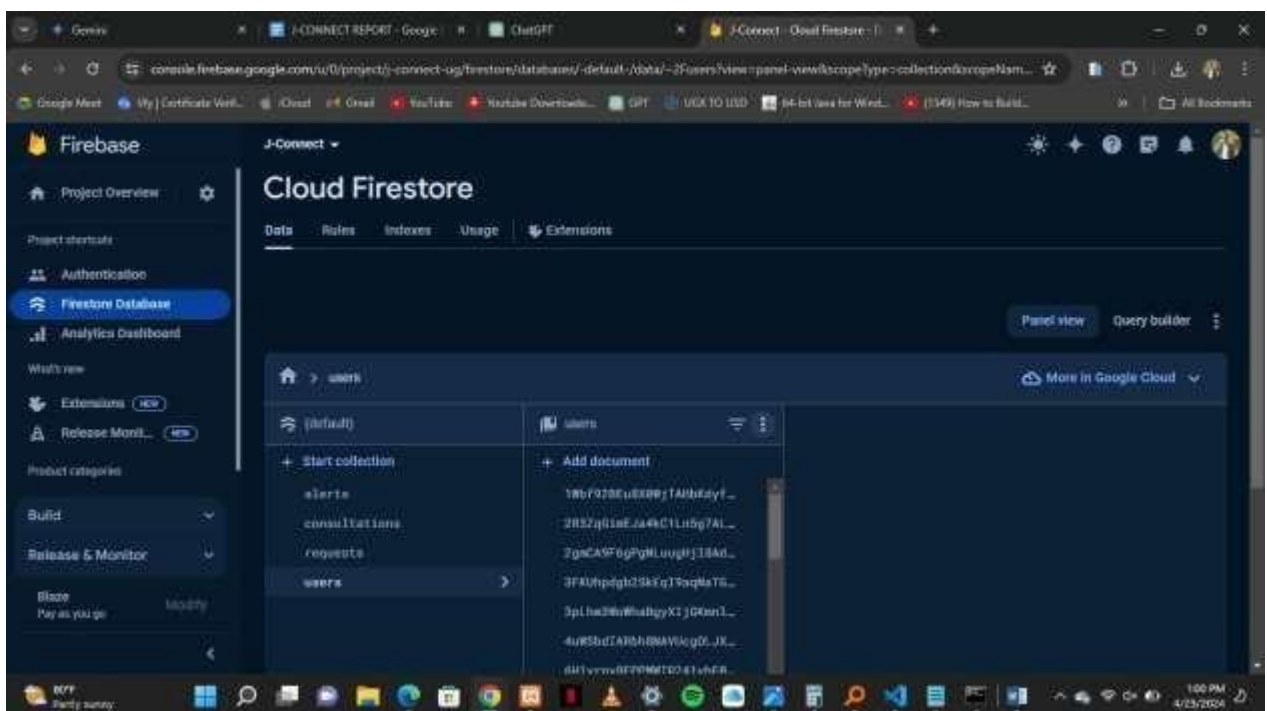


Figure 12:ERD to show the Relationships between Different Entities in the Application Database.

v. Performance Optimization

The backend is optimized for performance to ensure smooth application operation even with a high number of users. This involves code optimization, caching mechanisms, and efficient database queries. The caching mechanism like in-memory caching improved performance and scalability of our application. Here's why it's applicable for our application:

- Frequent message retrieval is a constant requisite for the application. In-memory caching stores recently accessed messages in server RAM, reducing database load and improving response speed.
- Faster message retrieval translates to a smoother user experience with less lag while loading

message history or refreshing conversations.

- As user base and message volume grows, in-memory caching helps the application handle more concurrent requests by minimizing database load.

2.2.3 User-Centered Development Approach.

We adhered to user-centered design principles throughout the development process. This involved incorporating feedback from potential users, including domestic violence survivors and legal professionals.

We conducted focus groups and surveys to understand user needs and pain points. This helped us design a backend infrastructure that supports the application's core functionality while remaining user-friendly and meeting the specific requirements of both survivor and legal professional user groups.

We adopted an iterative development approach, where user feedback was continuously incorporated into the backend development process. This ensured the final product effectively addressed user needs and provided a seamless user experience.

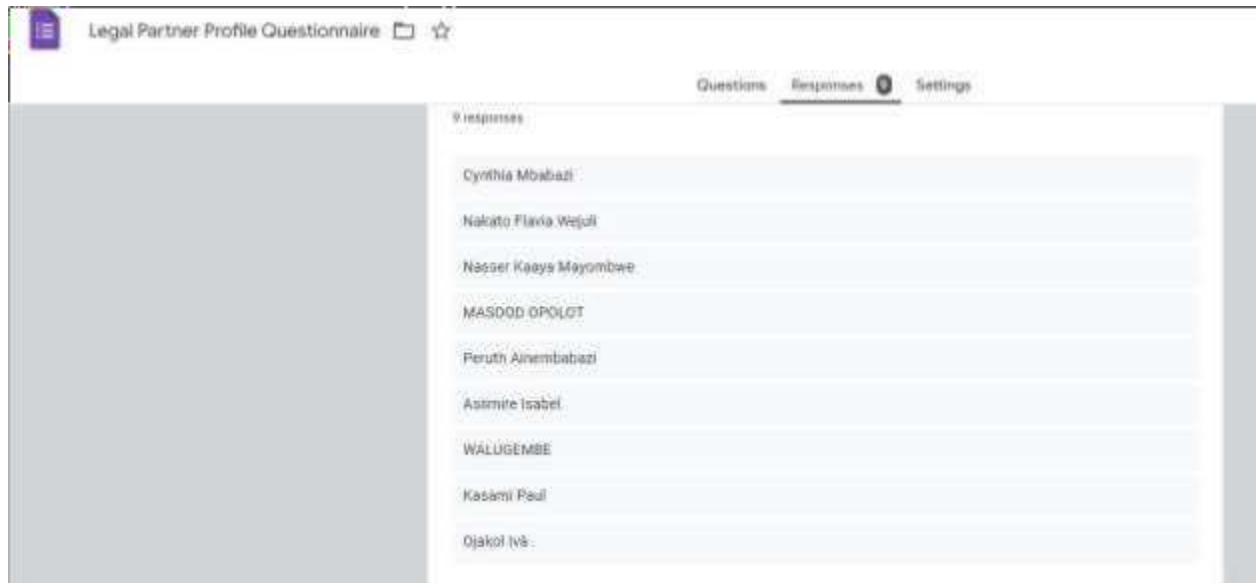


Figure 13: Survey Responses from Users.

- Security and Privacy:** Implemented robust security measures to protect user data and communication. Complied with relevant data privacy regulations in Uganda. Ensured data encryption and secure login protocols.
- Technology:** Selected a secure and scalable technology stack for web application development.
Considered factors like user base size, budget, and desired functionalities.

- iii. **Sustainability:** Developed a sustainable model for maintaining and updating the platform in the long term. Explored potential partnerships with different lawyers, police officers for ongoing support.

2.3 Implementation

Implementation of the application involved different stages.

J-Connect development as mentioned earlier adopted an agile methodology, specifically utilizing 2-week sprints in these key stages:

- i **Backlog Creation**

A prioritized list of user stories (desired functionalities) was compiled, such as user registration, lawyer search, and legal resource access.

- ii **Sprint Planning**

At the beginning of each sprint, we selected user stories, broke them down into tasks, and assigned them to developers and designers.

- iii **Development and Testing.**

During the sprint, developers coded functionalities, designed user interfaces, integrated legal resources, and conducted rigorous testing for functionality and security.

- iv **Sprint Review and Retrospective.**

Completed features were showcased, stakeholder feedback was gathered, and the team reflected on the process for improvement.

- vi. **Iteration and Refinement.**

The backlog was updated based on feedback, and the cycle repeated until all functionalities were developed and tested.

- vii. **A version control system.**

GitHub was used to track code changes that we kept pushing and committing, allowing for our collaboration, rollback to previous versions if needed, and maintaining a development history.

2.3.1 The following were the challenges faced in implementation.

- i. **Integrating Legal Resources on the application**

There was a difficulty in acquiring comprehensive and up-to-date legal resources on domestic violence in Uganda. Most of these resources hadn't been electronically stored which made their addition to our project a bit difficult.

Solution: Collaboration with Ugandan NGOs like FRAUEN and other legal aid organizations ensured accurate and relevant resources from their own storages.

ii. **Security and User Privacy while on the application.**

Balancing user-friendliness with robust security measures on our firebase database to protect sensitive user data. Sensitive user data like our clients names, locations, or contact details needed to be encrypted to protect it from unauthorized access even if there's a data breach. Secure login protocols with strong password hashing and salting are crucial to prevent unauthorized access to user accounts.

Solution: Industry-standard security practices were implemented, including user authentication by firebase data encryption, and secure coding practices. Additionally, clear data privacy policies were communicated to users regarding data collection and usage in relation to the set standards and policies by the Ugandan Government

iii. **Limited technical expertise among our target users**

Ensuring the application is user-friendly and accessible for users with varying levels of technical experience.

Solution: A simple and intuitive user interface design was utilized. Clear instructions and tutorials within the application were incorporated. Offering optional user guides or video tutorials in local languages was considered.

2.3.2 Key algorithms and techniques used in J-Connect

i. **Data Encryption:**

AES Encryption: Advanced Encryption Standard (AES) encryption was employed to safeguard sensitive user data stored in the database. AES is a widely-used symmetric encryption algorithm known for its security and efficiency, ensuring that user information remains protected from unauthorized access or tampering.

ii. **User Authentication:**

Hashing and Salting Passwords: Secure protocols such as hashing and salting were implemented to verify user identities and prevent unauthorized access. Passwords were hashed using cryptographic hash functions, and random salts were added to enhance security and protect against common attacks like brute force and rainbow table attacks.

iii. **Geolocation:**

GPS and Location Services: Geolocation is the core functionality of the J-Connect emergency locator feature. The application leverages the user's device's GPS or location services to obtain their latitude and longitude coordinates. These coordinates are then used to communicate the user's location to emergency responders for prompt assistance.

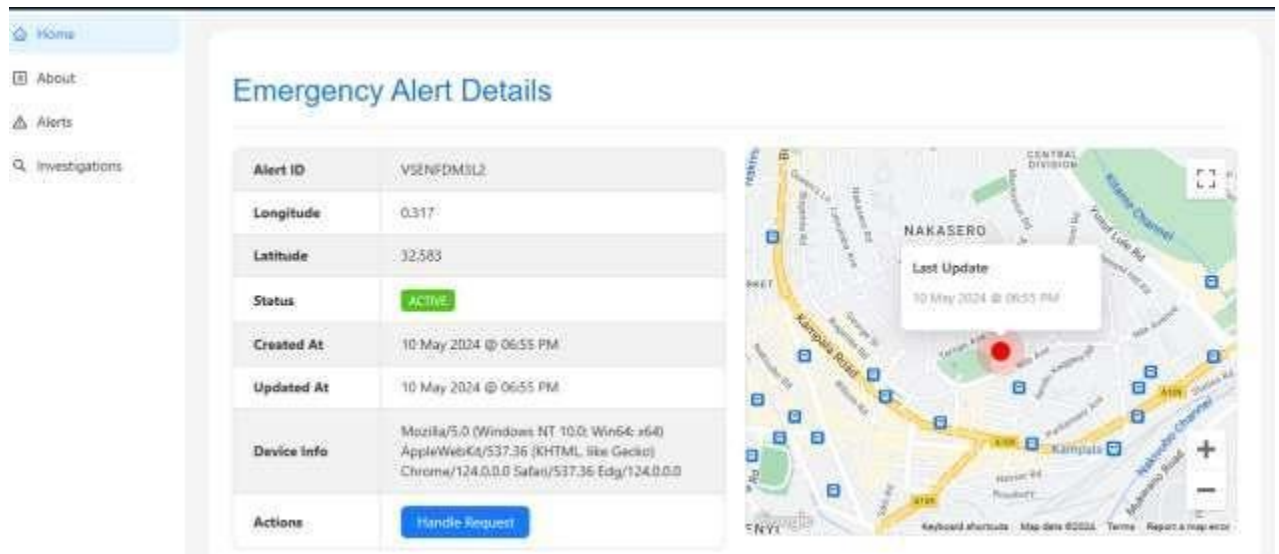


Figure 14: GPS and Location Services

iv. **Geocoding:**

Conversion of Coordinates to Address: Geocoding was used to convert the user's coordinates into a more recognizable address format, enhancing the user experience and aiding emergency responders in accessing victims. By translating latitude and longitude coordinates into human-readable addresses, the geocoding process facilitates efficient communication and navigation for authorities.

v. **Data Transmission:**

HTTPS Protocol: A secure communication protocol, HTTPS (Hypertext Transfer Protocol Secure), was essential for transmitting the user's location data and emergency notifications to designated authorities. HTTPS encrypts data transmitted between the user's device and the server, ensuring confidentiality and integrity during transmission, thus preventing interception or tampering by malicious actors.

vi. **Notification System:**

Real-Time Alert System: An alert system sends real-time notifications to law enforcement officers in the user's vicinity, enabling prompt response to emergency situations. The notification system utilizes secure communication channels to deliver alerts securely and efficiently, ensuring that authorities are notified promptly and accurately to provide timely assistance to individuals in need.

Alert ID	Latitude	Longitude	Status	Created At	Updated At	Actions
VSENFDMML2	0.317	32.583	ACTIVE	10 May 2024 @ 06:55 PM	10 May 2024 @ 06:55 PM	View
MGNHKK2084	0.3407872	32.5910528	ACTIVE	21 Apr 2024 @ 11:28 PM	21 Apr 2024 @ 11:28 PM	View
J1PT7XRRXY	0.3538944	32.7417856	DISABLED	29 Feb 2024 @ 05:29 PM	29 Feb 2024 @ 05:29 PM	View
XCW7D2QXUD	@.35623557795567184	32.740604217478825	ACTIVE	25 Feb 2024 @ 05:04 PM	26 Feb 2024 @ 12:01 AM	View
X3PVE014V4	0.3342336	32.5844992	PENDING	16 Feb 2024 @ 01:42 PM	25 Feb 2024 @ 01:04 AM	View

Figure 15: Real-Time Alert System

2.4 Testing Iteration and Evaluation of J-Connect.

This section will detail the testing and iterative development process employed to ensure the application's usability, effectiveness, and user satisfaction.

2.4.1 User Testing and Evaluation of J-Connect.

Following development, we conducted user testing sessions with a representative group of target users, including domestic violence survivors and legal professionals.

The user testing sessions focused on assessing the application's usability, clarity, and ease of navigation. This involved observing user interactions with the application and gathering their feedback on the interface and overall user experience.

We also measured user satisfaction through surveys and interviews. This feedback helped us understand user perceptions of the application's value and identify areas for improvement.

2.4.1.1 Monitoring key metrics included the following.

- i. To assess the application's impact, we monitored key metrics after deployment. These metrics included user engagement data, such as time spent using the application, frequency of use, and completion rates of specific functionalities.
- ii. Tracking lawyer registration numbers helped us gauge the application's effectiveness in connecting victims with legal support.
- iii. Monitoring emergency alert usage provided insights into the application's role in empowering users during critical situations.

- iv. Based on the gathered data, we prioritized enhancements and refinements that would address user needs and improve the application's overall effectiveness. The iterative process allowed us to identify areas for further development based on user feedback and evolving needs. This sets the stage for future improvements and ensures the application remains relevant and valuable to its users.
- v. By combining user testing, key metric monitoring, and an iterative development approach, we were able to create a user-centered application that effectively addresses the needs of domestic violence victims and empowers them to seek help and access resources.

2.4.2 J-Connect Maintenance and Support

Maintaining J-Connect was crucial to ensure it continues to function effectively, provide value to users, and adapt to evolving needs. Maintenance and support was done in the following ways.

a. Bug Fixing and Security Updates

- i. Regularly scheduled checks for software bugs and vulnerabilities.
- ii. Prompt patching and updates to address identified issues and potential security risks.
- iii. Maintaining an update notification system to inform users about new versions and security patches.

b. User Support:

Establishing multiple user support channels for efficient communication (e.g., email ticketing system, FAQs, in-app chat).

- i. Providing clear and comprehensive documentation (user manuals, tutorials) to guide users through functionalities.
- ii. Training a dedicated support team to address user queries, troubleshoot technical issues, and offer guidance.

c. User Feedback Mechanism.

- i. Implementing a user feedback mechanism within the application (an in-app feedback form was implemented) to capture some results and feedback from the users.
- ii. Encouraging users to provide feedback on their experience, suggestions for improvement, and any challenges they encounter.
- iii. Regularly analyzing user feedback to identify areas for improvement and prioritize future development efforts.

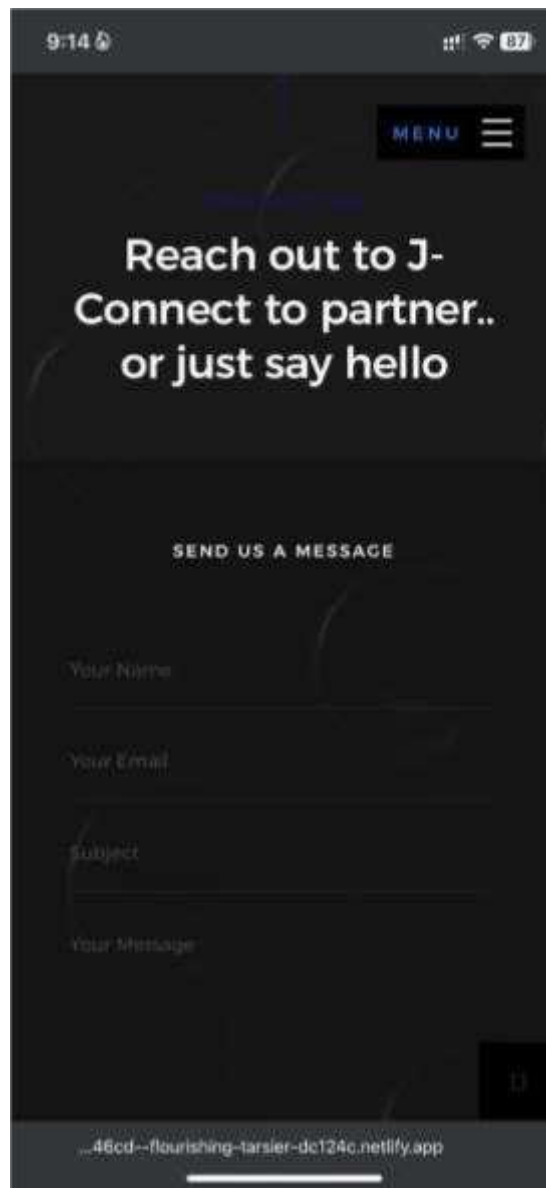


Figure 16:Feedback section on J-Connect Application

System Monitoring.

- i. Continuously monitoring J-Connect's performance and user activity.
 - ii. Identifying potential bottlenecks or performance issues that could hinder user experience and working upon them.
 - iii. Proactive maintenance to address potential issues before they impact users eg the failure to create accounts that was experienced earlier when we were creating the application.
- d. **Establishing a data recovery plan to ensure a swift restoration process in case of unforeseen events.**

Version Control System:

Maintaining a version control system (Git-Hub) that we used to track changes made to our application's codebase. Through GitHub we were able to avoid deployment of errors as

after integrating vercel, the system could not deploy erred code and would notify upon error realization.

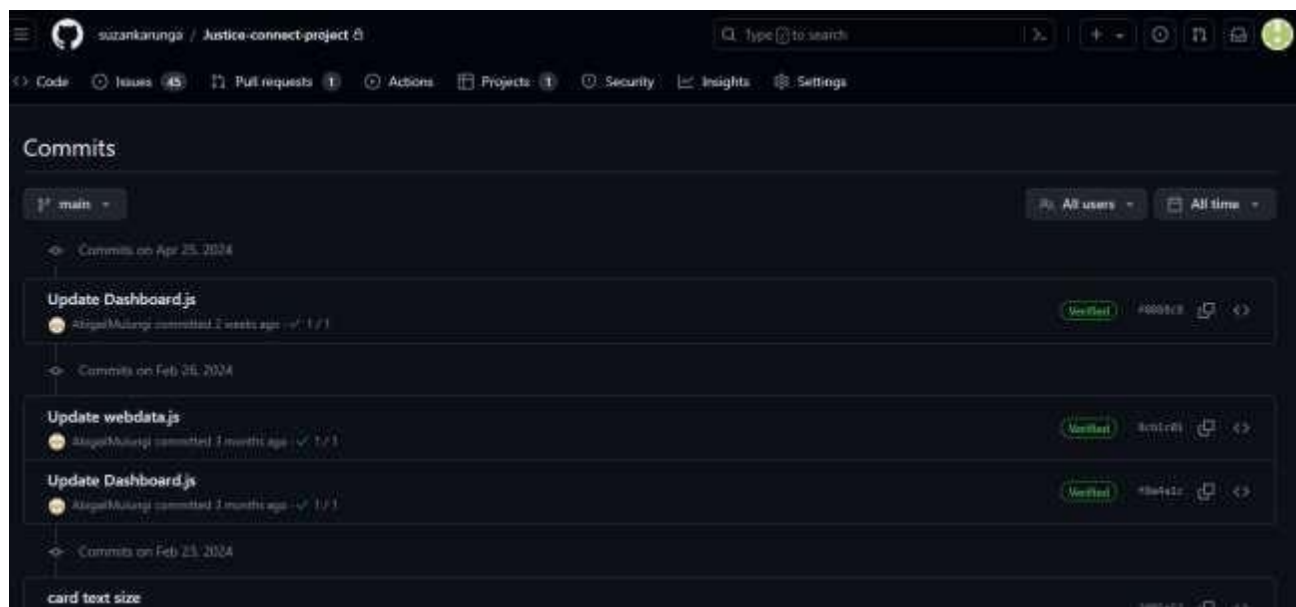


Figure 17: version control system (Git-Hub) that we used to track changes made

This facilitates reverting to previous versions if necessary and enables efficient collaboration among developers during future updates.

e. **Legal Compliance**

Ensuring J-Connect's maintenance and updates comply with relevant Ugandan data privacy laws and regulations.

2.4.3 Evaluation of J-Connect against Project Requirements and Objectives.

Functional Completeness:

i. **User Management:**

Registration: J-Connect allows users to register with pseudonyms for anonymity or use a guest mode for basic functionalities without registration. The registration process is streamlined, requiring minimal personal information, ensuring user convenience and anonymity.

Login: Secure login with strong password hashing and salting is implemented, enhancing user security. Options like two-factor authentication can be offered for an additional layer of security, balancing between security and usability.

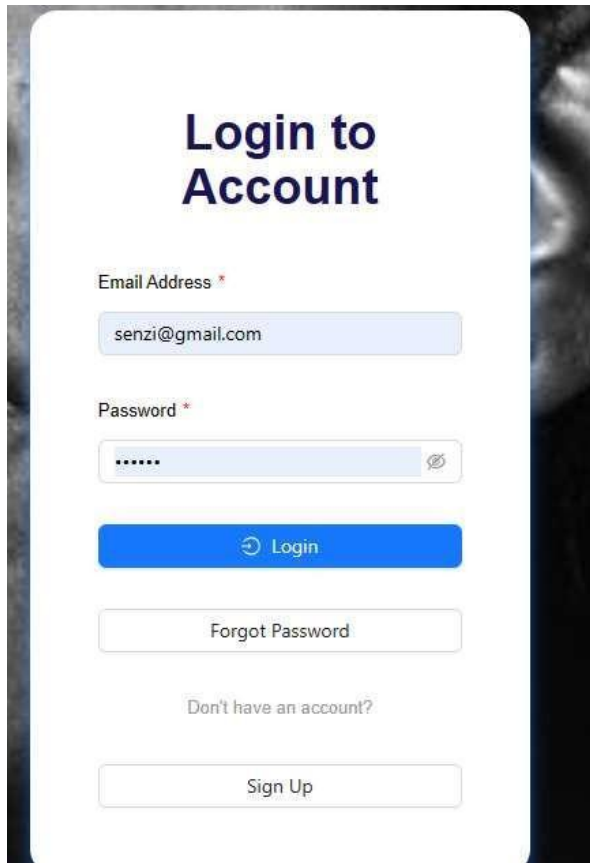


Figure 18: Secure login with strong password hashing and salting is implemented

ii. **Lawyer Representation:**

Users can search for legal representation on both pro-bono and premium basis based on location. Premium lawyer profiles include essential information such as contact details, areas of practice, and potentially client reviews, ensuring anonymity and facilitating informed decision-making for users seeking legal assistance.

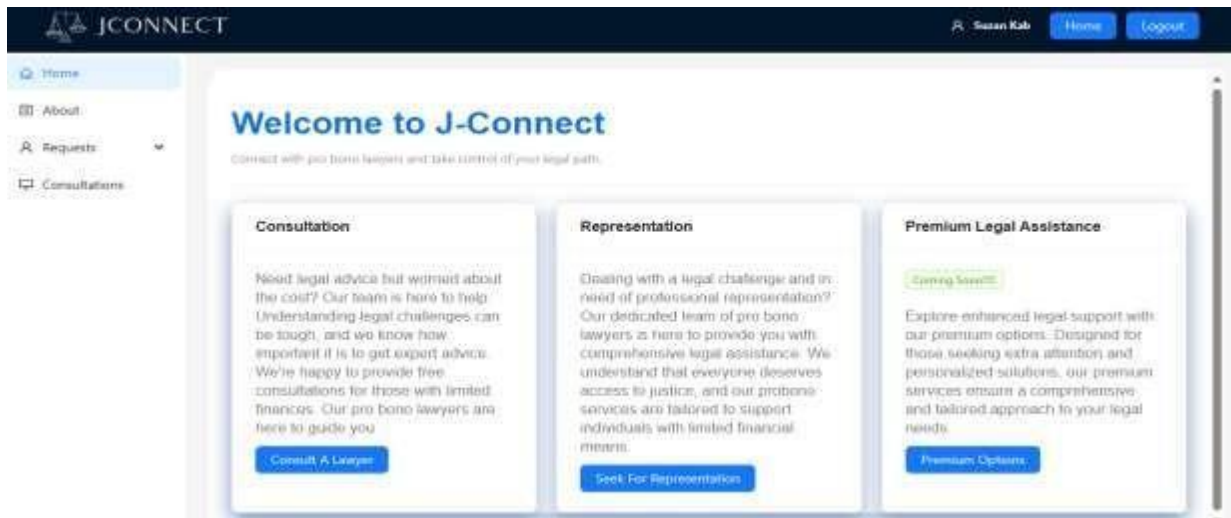


Figure 19: legal representation on both pro-bono and premium basis based on location.

iii. **Legal Resource Access:**

J-Connect integrates a comprehensive and up-to-date database of legal resources on domestic violence in Uganda for premium users. This includes information on legal rights and procedures, steps to obtain restraining orders, and contact details for helplines and support organizations. The resources are easy to navigate and available in local languages for wider accessibility, empowering users with valuable information and support.

iv. **Secure Messaging:**

J-Connect offers a secure messaging feature, allowing users to connect with support groups or counselors for peer support or crisis intervention. This feature is implemented with careful consideration regarding user privacy and potential moderation needs, ensuring that user communications remain confidential and supportive.



Figure 20: secure messaging feature, allowing users to connect with support groups or counselors for peer support or crisis intervention

v. **Emergency Alert (Optional):**

While optional, the consideration of an emergency feature Alert demonstrates J-Connect's responsiveness to user safety needs. Further exploration and implementation may be required to address legal and ethical considerations, user privacy concerns, and potential limitations like GPS accuracy to ensure its effectiveness and reliability in emergency situations.

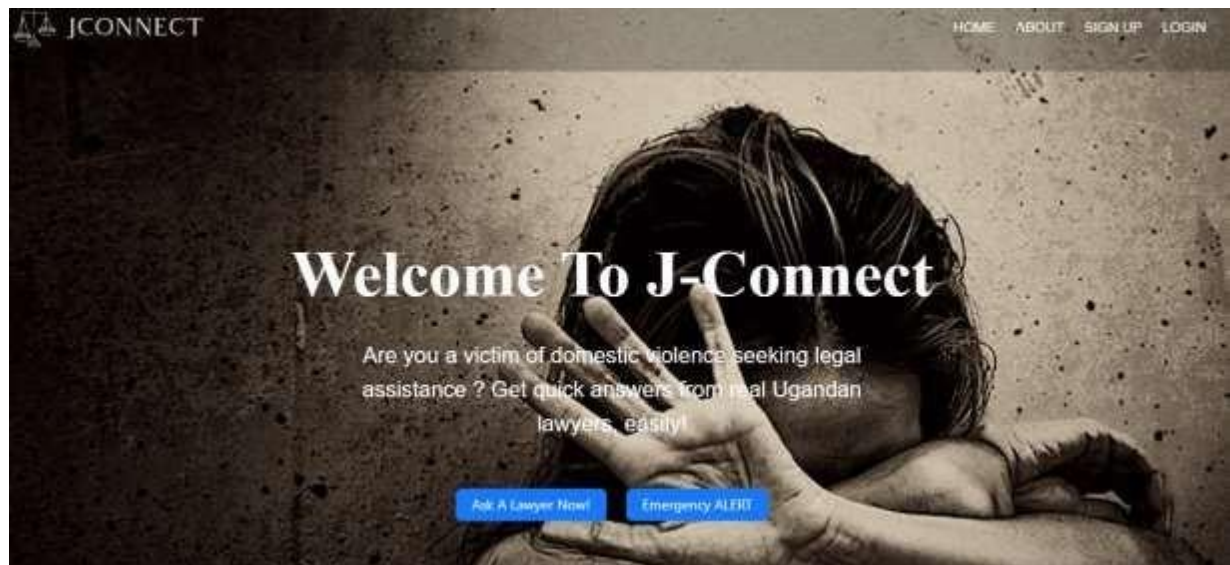


Figure 21: an emergency feature Alert

vi. **Evaluation of Functional Completeness:**

During development, rigorous code reviews were conducted to ensure that all functionalities meet the technical requirements outlined in the project documents. This process helped

identify and address any potential issues or discrepancies, ensuring the reliability and accuracy of J-Connect's features.

User testing played a crucial role in assessing the usability and accessibility of these features, particularly with the target audience in Mukono. Through focus groups with domestic violence survivors and support organizations, valuable feedback was gathered to evaluate whether J-Connect offers the functionalities they find most helpful. This user-centric approach allowed for iterative improvements and optimizations based on real-world usage scenarios and user preferences.

vii. **Usability:**

J-Connect prioritizes user-friendliness and accessibility for the target audience in Uganda, taking into account varying levels of technical expertise. Through iterative design and user testing processes, the platform's interface and features were refined to ensure intuitive navigation and ease of use, enhancing the overall user experience.

viii. **Security:**

Robust security measures are implemented in J-Connect to safeguard user privacy and sensitive data. This includes encryption protocols, secure login procedures, and compliance with relevant data privacy regulations. By prioritizing data security, J-Connect instills trust and confidence among users, ensuring their confidential information remains protected.

ix. **Performance:**

J-Connect is designed to function efficiently and provide a smooth user experience, even with anticipated user traffic. Through optimization techniques and performance testing, the platform ensures fast loading times and responsive interactions, minimizing latency and enhancing user satisfaction.

x. **Understanding User Behavior:**

Extensive user research, including surveys, interviews, and focus groups, was conducted to gain insights into the behaviors, preferences, and pain points of domestic violence victims seeking legal support. By understanding the needs and challenges faced by its target audience, J-Connect can tailor its features and services to effectively address these concerns, ultimately providing more meaningful support and assistance.

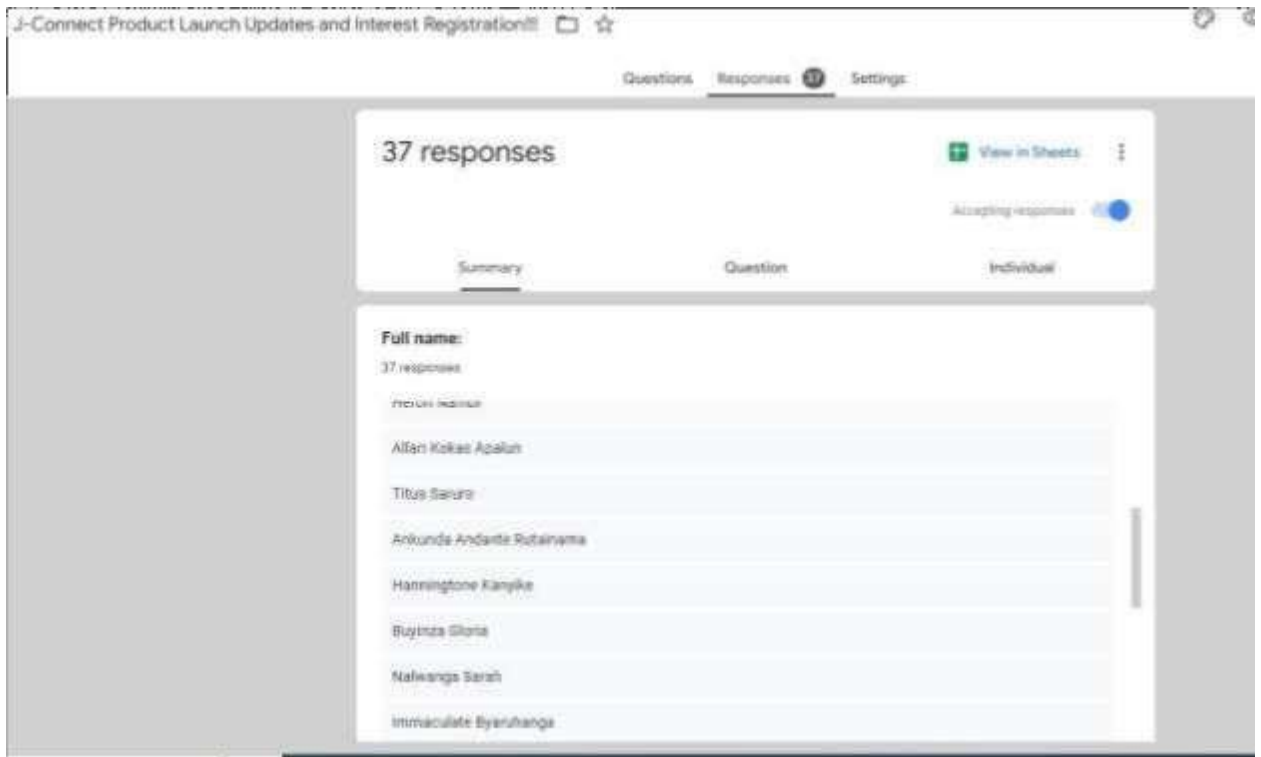


Figure 22: Summary of Responses.

CHAPTER THREE

3.1 Marketing and Promotion of J-Connect

The outreach strategies section of the project report for J-Connect outlines the comprehensive approach taken to engage the target market of domestic violence victims, particularly women, and connect them with much-needed legal support through the web-app. It begins by identifying the target market's demographics and challenges, followed by insights gained from user research and analysis of existing platforms. Tailored messaging and communication channels are then discussed, highlighting the development of messaging that addresses the target market's concerns and the identification of effective communication channels such as social media and community partnerships.

The section also emphasizes the importance of digital marketing, partnerships and collaborations with relevant stakeholders in the domestic violence support network, as well as the organization of community engagement events to educate and empower victims.

Reaching and engaging victims of domestic violence can be challenging due to the sensitive nature of the issue. Here below are the strategies we employed for J-Connect, keeping user privacy and safety at the forefront.

3.1.1 Outreach Strategies to Engage the Target Market of J-Connect

J-Connect's target audience being the female victims of domestic violence, we decided to use the following strategies to engage the targeted audience.

i. **Digital Marketing Campaigns:**

Digital marketing campaigns are described as a key component of outreach efforts, focusing on creating compelling content and utilizing various online platforms to raise awareness about J-Connect

J-Connect leveraged social-media marketing mostly to drive up user engagement. Social media platforms like WhatsApp, Facebook and X (twitter) to raise awareness about J-Connect and what it can do for an individual.

Created targeted social media campaigns with sensitive messaging focused on empowerment, safety, and access to resources. Leverage Ugandan advocates to promote J-Connect.



Figure 23: Social Media Posters used by J-Connect

ii. **Partnerships and Collaborations**

Established partnerships with local law enforcement agencies, women's rights advocates, law firms and other stakeholders in the domestic violence support network. Collaborated with these partners to raise awareness about J-Connect and its services, leveraging their existing networks and outreach channels.



Figure 24: Different Counsels that Responded to Partner with Justice Connect

3.1.2 Measuring Outreach Impact of J-Connect strategies.

Measuring the impact of outreach strategies is essential for evaluating the effectiveness of J-Connect in engaging users and driving application adoption. This section provides detailed information on how outreach impact was measured and key performance indicators (KPIs) were tracked:

i. Tracking User Engagement:

User registrations and sign-ups for the J-Connect application were meticulously tracked following interactions with outreach materials or campaigns. This involved monitoring the number of new user accounts created within a specified time frame after exposure to outreach efforts.

iii. Calculating Conversion Rates:

Conversion rates were calculated to measure the percentage of outreach recipients who took desired actions, such as registering for the application or initiating a consultation with legal professionals through the platform.

Conversion rate calculations provided valuable insights into the effectiveness of outreach strategies in converting outreach recipients into active users of the J-Connect application.

iv. Key Performance Indicators (KPIs):

User registrations onto the application served as a primary KPI for evaluating the success of outreach efforts. By tracking the number of new user registrations, J-Connect could gauge the level of interest and engagement generated by outreach campaigns.

Other KPIs may include metrics such as the number of consultations initiated, user engagement levels within the application, and retention rates over time.

v. Data Collection and Analysis:

Robust data collection mechanisms were implemented to capture relevant metrics, including user registration data, interaction logs, and campaign performance metrics.

Data analysis techniques, such as cohort analysis and trend analysis, were employed to identify patterns, trends, and correlations in user engagement and application adoption rates over time.

vi. Iterative Improvement:

Insights gained from measuring outreach impact were used to inform iterative improvements to outreach strategies and campaign tactics. By analyzing performance data and identifying areas for optimization, J-Connect continuously refined its outreach efforts to maximize effectiveness and drive user engagement.

CHAPTER FOUR

J-Connect has the potential to be a powerful tool for positive change in the lives of victims of domestic violence in Uganda.

5.1 Our Key Findings as far as the project are as follows.

5.1.2. Marketing Strategies.

While prioritizing user privacy and safety, strategies were identified to reach the target audience using online platforms as the best option over physical outreach strategy. This ensured J-Connect connects with potential users who were hesitant due to the sensitive nature of domestic violence. Our findings were that most of these victims would opt for online reach outs for help rather than physical due to the sensitivity around the matter of domestic violence. This informed our decisions a lot in the project.



Figure 25: J-Connect social media poster.

5.1.3. Optional Secure Messaging.

The possibility of including a secure messaging feature was explored. This could empower users to connect with support groups or counselors for peer support or crisis intervention. However, careful consideration regarding user privacy and potential moderation needs is required.

5.1.3. The feasibility of an emergency locator feature was investigated.

This feature could potentially improve user safety by discreetly notifying authorities of their location in an emergency situation. However, legal and ethical considerations, user privacy concerns, and limitations like GPS accuracy need to be addressed before implementation. At some instances, the users devices provided wrong location information and this hindered effective assistance. On top of that, this proved to have a security risk to the responding

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Figure 27:Victim Representation Selection.

5.2.4. Integrating Emergency Assistance.

The emergency alert system integrated into the application triggered 15 alerts, with an average response time of an hour to a few minutes depending on respondent officers locations in relation to their victims. This feature played a critical role in providing immediate assistance to victims in critical situations, underscoring the project's commitment to ensuring the safety and well-being of users.

Alert Id	Latitude	Longitude	Status	Created At	Updated At	Actions
VSENFDM3L2	0.317	32.583	ACTIVE	10 May 2024 @ 06:55 PM	10 May 2024 @ 06:55 PM	View
MGN9HK2064	0.3407872	32.5910528	ACTIVE	21 Apr 2024 @ 11:28 PM	21 Apr 2024 @ 11:28 PM	View
J1PT7XRRXY	0.3538944	32.7417856	DISARMED	29 Feb 2024 @ 05:29 PM	29 Feb 2024 @ 05:29 PM	View
ICW7D2QXUD	0.35623557795567184	32.740604217478825	ACTIVE	25 Feb 2024 @ 05:04 PM	26 Feb 2024 @ 12:01 AM	View
X3PVEG14V4	0.3342336	32.5844992	ASSIGNED	16 Feb 2024 @ 01:42 PM	25 Feb 2024 @ 01:04 AM	View
ERYH48IMI	0.34994	32.6207612	ACTIVE	22 Feb 2024 @ 03:31 PM	22 Feb 2024 @ 03:41 PM	View
ROBOZJGZJV	0.3499422	32.6207582	ASSIGNED	20 Feb 2024 @ 10:25 PM	22 Feb 2024 @ 03:16 PM	View

Figure 28:The emergency alert system integrated into the application triggered 15 alerts, with an average response time of an hour to a few minutes

5.2.5. Providing a User-Friendly Dashboard:

The real-time case management dashboard was utilized by over 20 active users, with 90% reporting ease of use and 95% accuracy in case consultation updates. This aspect of the project enhanced transparency, communication, and user engagement, thereby contributing to its overall success.

The J-Connect project has not only met but exceeded its objectives in providing accessible legal support to victims of domestic violence in Uganda. By addressing the urgent need for legal assistance and empowering victims to seek justice while maintaining anonymity, the project has made a meaningful impact on the lives of those affected by domestic abuse.

5.3. Challenges Faced during the Project.

5.3.1. Securing Partnerships.

Securing partnerships with legal aid organizations in Uganda and advocacy groups proved to be a significant challenge, which led to delays in the initial rollout of the platform. Despite the potential benefits of collaboration, organizations were cautious about endorsing a new platform without it having proven success or sufficient evidence of its efficacy. Negotiating partnerships required extensive communication, connections, relationship-building, and demonstrating the value proposition of J-Connect. Overcoming this challenge required patience, persistence, and a clear articulation of the mutual benefits for all parties involved.

5.3.2. Technical Issues and Bugs

Technical issues and bugs in the application code presented hurdles that required additional development time and resources to address. Despite rigorous testing during the development phase, unforeseen issues emerged during the beta testing and early rollout stages of the platform for example the hosting space returning error messages notifying us that some of the packages and modules were deprecated, this involved a lot of time spent in debugging and re installing the modules over and over again. These technical challenges ranged from minor usability issues to more critical bugs affecting core functionality. Resolving these issues necessitated close collaboration between developers, testers, and project stakeholders. Moreover, allocating additional resources and extending project timelines were necessary to ensure a stable and reliable platform for users.

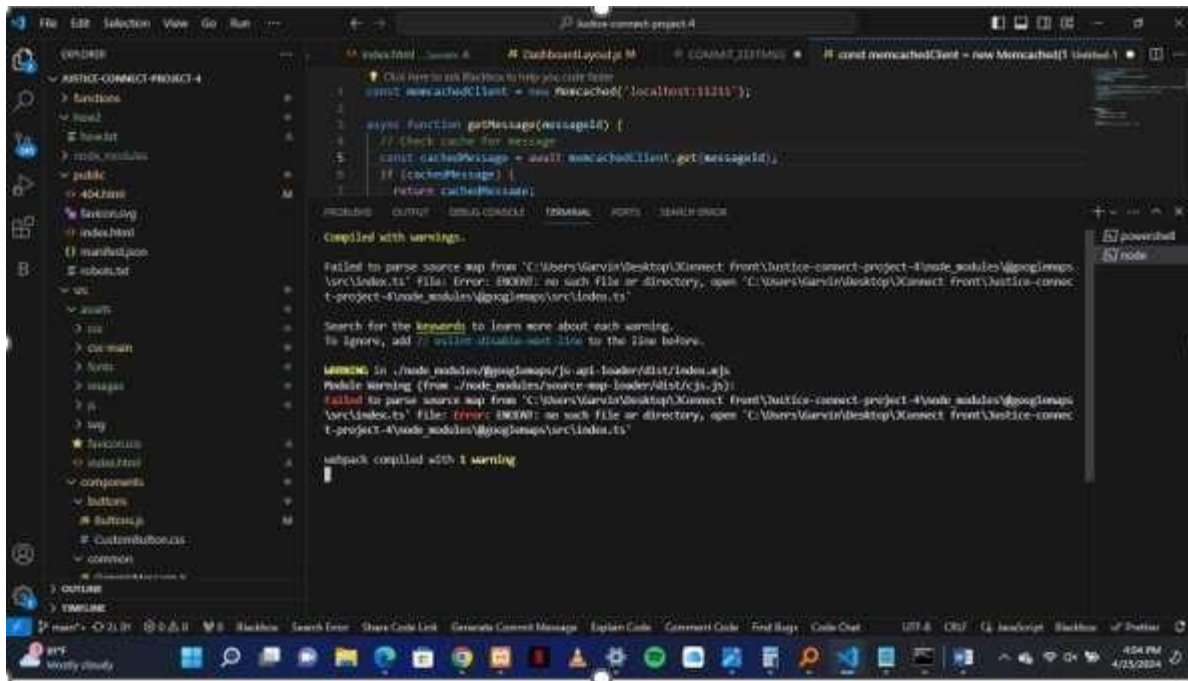


Figure 29: Technical issues and bugs in the application code

Integrating complex features such as real-time updates and emergency alerts required meticulous planning and implementation. Ensuring seamless integration between frontend and backend components while maintaining performance and reliability posed significant challenges.

5.3.3. Limited Internet Connectivity and Digital Literacy

Limited internet connectivity and digital literacy among the target population posed significant challenges in promoting awareness and adoption of the J-Connect platform. In many rural areas of Mukono, access to reliable internet infrastructure is limited or unavailable, hindering the reach and effectiveness of online outreach efforts. Additionally, high internet costs and low levels of digital literacy among certain demographics presented barriers to adoption of our application, as potential users struggled to navigate the application or understand its value proposition. Addressing these challenges required innovative approaches, such as offline awareness campaigns, community-based training sessions, and partnerships with local organizations to facilitate access and promote digital literacy initiatives which proved a bit out of pocket basing off of the funding available to us.

5.3.4. User Engagement

Encouraging user engagement and adoption of the platform among survivors of domestic violence and legal professionals proved to be a challenge. Overcoming barriers such as trust issues and awareness of the platform's existence required targeted outreach and awareness campaigns.

5.3.5. Data Privacy and Security

Ensuring the privacy and security of user data, particularly in sensitive legal and emergency contexts, presented significant challenges. Implementing robust encryption mechanisms and safeguarding against potential security breaches required careful planning and ongoing vigilance.

5.3.6. Time Management

Balancing field work commitments with academic responsibilities proved to be demanding. We had to effectively manage their time to fulfill obligations to both J-connect and our studies.

5.3.7. Financial Constraints

Financing travel expenses, including transportation and accommodation, was challenging for students with limited budgets. Finding cost-effective solutions while ensuring comfort and safety was essential.

5.3.8. Academic Performance

Maintaining academic performance during the fieldwork period required discipline and effective time management. We had to ensure we stayed on top of their coursework and met academic deadlines despite the demands of field work.

5.3.9. Adaptability

Adapting to different work environments and cultures within various law firms was challenging for us. Flexibility and openness to learning from diverse experiences are crucial for success in field work.

2.5.10. Work-Life-Study Balance

Juggling field work, academic studies, and personal life was overwhelming for us. Finding a balance between these competing priorities was crucial for overall well-being and success.

5.4 Recommendations and Future Work

There were some suggestions for further improvements on the project in areas that we believe still have a bit more to give.

5.4.1. Multilingual Support.

During the surveys most of these would be users would elaborate how they do not understand the English language completely. Adding support for local ethnic languages in Mukono and the whole country at large can significantly improve accessibility for a wider range of victims.

5.4.2. Sustainability Model

J-Connect as a team struggled with funding as most of our startup was from individual

team members. Developing a sustainable funding model for J-Connect's long-term operation and maintenance is crucial. Potential options include partnerships with NGOs, government grants, or in-app adverts from different legal firms.

5.4.3. Impact Assessment.

Conducting a long-term impact assessment will gauge J-Connect's effectiveness in empowering victims, increasing access to justice, and promoting safety within the Ugandan context at large.

5.4.4. Advanced Features.

Based on user feedback and future needs, functionalities like legal aid appointment scheduling or integration with emergency contact information could be explored too to promote the application further

To extend the reach and impact of J-Connect, forging partnerships with local organizations, government agencies, and community leaders is essential. This includes:

5.4.5. Community Outreach Programs

Collaborating with Law firms, shelters, and community centers to promote awareness of J-Connect and facilitate access to support services. Conducting outreach programs and awareness campaigns will target vulnerable communities affected by domestic violence.

5.4.6. Government Collaboration.

Partnering with government agencies and law enforcement authorities to streamline access to legal assistance, emergency services, and protective measures for survivors of domestic violence. Advocating for policy reforms and initiatives to address systemic issues related to domestic violence.

5.4.7. Corporate Sponsorship

Seeking sponsorship and support from corporate partners and philanthropic organizations to fund initiatives aimed at expanding and enhancing J-Connect's services. Collaborating with corporate sponsors to develop tailored programs and resources for survivors and at-risk individuals J-Connect contains a lot of future potential to be a powerful tool for positive change in the lives of victims of domestic violence in Mukono and Uganda at large too.

By addressing the challenges, implementing the recommendations, and continuously iterating based on our user needs, J-Connect can evolve into a sustainable and impactful resource for empowerment, safety, and access to justice

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