

Lab 2 - Care Corner Product Description

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Table 1: Care Corner Features and Descriptions to be Implemented in the Prototype

1 Introduction

Sexual violence prevention is an issue women face on a regular basis. Nearly half of all women in the United States have been victims of sexual violence at some point during their lives (Smith et al., 2015). An annual survey conducted since 1973 has consistently held that women are twice as likely to feel unsafe walking at night alone as men (Smith et al., 2018). Six in ten women regularly take steps to avoid being sexually assaulted (YouGov, 2019). Some ways that women prepare to prevent sexual violence are: 73% report maintaining awareness of surroundings, 68% have a phone prepared, and 64% avoid certain areas (YouGov, 2019).

Care Corner is a mobile application with software features addressing different aspects of sexual violence. By helping to deter an attack, manage situations of an attack, and assist in processing an attack after it happens, Care Corner provides tools to help women handle sexual violence.

1.1 Purpose

Care Corner is a mobile application that provides a toolkit to help deter sexual attacks, take action in the midst of sexual violence, and report a sexual violence incident. By incorporating a reliable and comprehensive feature set, Care Corner provides cohesive functionality for a reliable experience in handling sexual attacks. The functionality of the product focuses on helping to deter sexual violence, dealing with a sexual attack incident, and resources to report a sexual attack.

The Care Corner mobile application has two main features to help deter sexual violence: enabling a user to make a fake phone call and providing contextualized safety tips before going on a walk. If a sexual assault occurs, a panic button is available to record and notify close contacts about the incident. A safe walk function monitors a predetermined walk plan and

notifies contacts if the walk deviates because of a potential sexual assault. In the case that a sexual assault occurs, Care Corner assists in reporting the sexual violence incident and aids in recovery by providing resources. To aid in recovering from a sexual incident, journaling is offered to process the experience.

Women attending Old Dominion University are the initial group identified to use Care Corner. While the initial user group that would find Care Corner useful is women, the application will be used by all genders and members of the LGBT+ community. The application could also be expanded beyond the initial focus on sexual assault in the future to handle other kinds of abuse such as domestic violence. The application would not require any functional changes to apply to these expanded groups of potential users.

1.2 Scope

The goals of the Care Corner prototype are to demonstrate the main product features, evaluate parts of the product that are unique or risky, and to provide a technical foundation to build the final product from. The essential elements of the key product features are implemented in order to demonstrate and ensure there is a need for the product. Features of the application that do not provide core functionality are removed from the prototype so that user feedback can better inform and determine the most useful features for the next version. The Care Corner prototype demonstrates the main functional elements of the solution.

A mobile application and an application programmer interface (API) will be used to demonstrate the prototyped product. The mobile portion of the prototype will consist of an Android application and is primarily responsible for the user interface of Care Corner. An open-source product will be used to emulate a production deployment environment to reduce the prototype's risk and development time.

1.3 Definitions, Acronyms, and Abbreviations

Agile: Set of frameworks and practices where solutions evolve through collaboration between self-organizing cross-functional teams

Amazon Web Services (AWS): Cloud computing platform provided by Amazon

AWS AppGateway: a fully managed service that makes it easy for developers to create, publish, maintain, monitor, and secure APIs at any scale

AWS AppSync: A fully managed service that makes it easy to develop GraphQL APIs

AWS Cloudfront: a fast content delivery network (CDN) service that securely delivers data, videos, applications, and APIs to customers globally

AWS Lambda: a serverless compute service that lets you run code without provisioning or managing servers

AWS RDS: easy to set up, operate, and scale a relational database in the cloud

AWS S3: an object storage service that offers industry-leading scalability, data availability, security, and performance

Android: Mobile operating system primarily developed by Google

API: Application Programming Interface

CDN: Content delivery network

Client-server: Computer system where a central server provides data to a number of networked workstations

Cloud Based Database Server: Virtual infrastructure that performs application and information-processing storage

Data Retention: Storage of an organization's data for compliance or business reasons

Database: Structured data held in a computer

DBA: Database administrator

File Server: Controls access to separately stored files

Geofencing: Using GPS to create a virtual geographic boundary

GitHub: Web-based collaboration platform for software developers

GPS: Global positioning system

Gradle: Build automation tool for multi-language software development

GUI: Graphical user interface

HTML: Standard markup language for documents designed to be displayed in a web browser

iOS: Mobile operating system developed by Apple

JavaScript: Object-oriented computer programming language commonly used to create interactive effects within web browsers

Kotlin: Object-oriented programming language initially designed for Android and Java Virtual Machine (JVM)

Linux: Unix-like, open source operating system for computers, servers, mainframes, etc.

MySQL: A freely available open source relational database management system that uses structured query language (SQL)

Scrum: A process framework used to manage product development and other knowledge work

Stakeholder(direct): Those involved in the company's day-to-day activities

Stakeholder(indirect): Those more interested in the result of the production

Twilio: A developer platform for communications

UI / UX: User Interface / User Experience

Web Scraping: Extracting/scraping data from websites

Web Server: server software, or a system of one or more computers dedicated to running this software, that can satisfy client HTTP requests

Windows: Series of operating systems developed by Microsoft

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1.5 Overview

This product specification provides the hardware and software configuration, interfaces, and features of the Care Corner prototype. The remaining sections will provide a detailed description of each feature and their requirements for implementation.

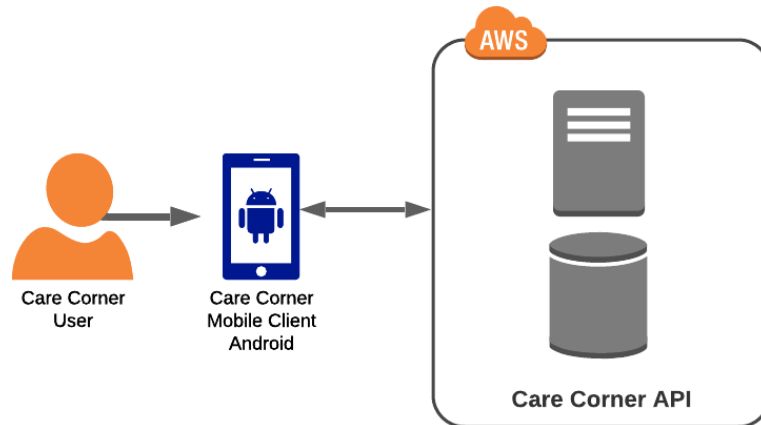
2 General Description

The Care Corner prototype will be a mobile application and API that demonstrates the core features of the envisioned product. The mobile application will be the user interface for the user and the API will provide centralized logic and storage complementing the mobile application.

2.1 Prototype Architecture Description

The main architectural components of the Care Corner prototype will be an Android based mobile application written in Java and an application programming interface (API) based on Amazon Web Services (AWS). The mobile client will be primarily responsible for the user interface of Care Corner and for communicating with the Care Corner API. The Care Corner API will be responsible for the centralized logic and persisting of data that is used by all users such as the audio and video recordings. Figure 1 shows the Care Corner prototype architecture from a high-level perspective.

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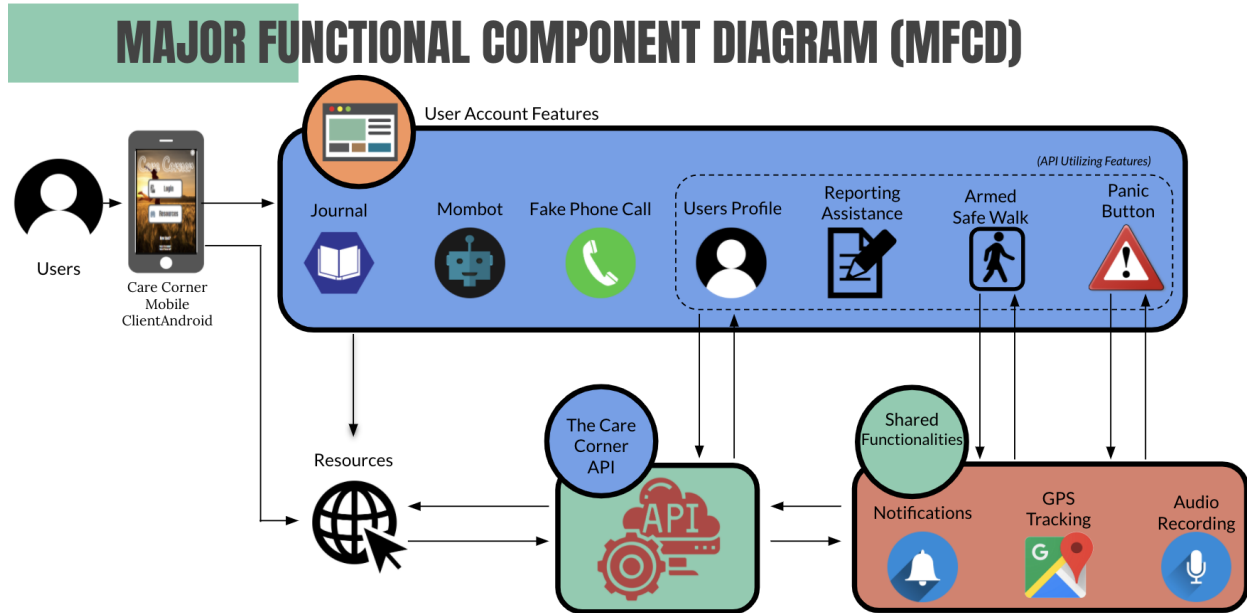
Figure 1*Care Corner Mobile Client and API*

The main functional components of the Care Corner prototype will work in conjunction with the mobile application and the Care Corner API to complete the full feature. For example, the audio and video recording will be stored locally to the mobile application before being uploaded to the Care Corner API. If someone was under attack, the video would be available locally until it was uploaded. Figure 2 shows the main functional components that will be exposed by the mobile application interface and shared with the Care Corner API.

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Figure 2

Care Corner Major Functional Component Diagram

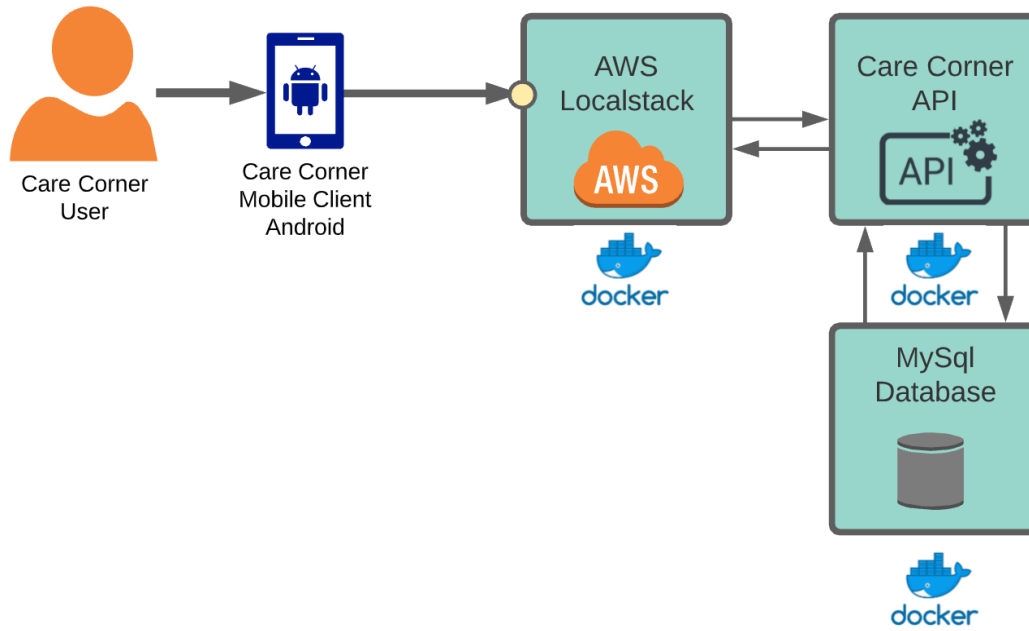


The Care Corner API will rely on a suite of AWS services to provide its functionality. A local environment will be set up using Docker to mock the AWS services, reducing the risk and dependency on AWS. As illustrated in Figure 3., the open-source project Localstack will emulate the entire AWS stack enabling the AWS Services API Gateway, Lambda, Aurora, and S3 to run locally. This prototype architecture will decouple the development process from AWS and simplifies integration testing and the eventual deployment to an actual AWS environment for the production product.

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Figure 3

Care Corner Prototype Infrastructure



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2.2 Prototype Functional Description

The mobile client functional component will be the primary interface through which the user interacts with the Care Corner prototype. This component is the Mobile GUI shown in Figure 1. This mobile interface will expose access to the main functional components to the user: User Accounts, User Profiles, Resources, Notifications, Journal, Fake Calling System, Panic Button, Audio/Video recording, and the Reporting Assistance.

The User Account features will handle authentication and authorization - providing access to a specific user's account and information. This will be exposed to the user of the application through a user login form on the mobile application. The mobile application will connect to the Care Corner API to verify a user account. The prototype version will be limited to a hard-coded username/password scoped to a single user account.

The User Profile features will handle management of a user's profile information. Once the user has been authenticated, the profile information specific to that user will be able to be managed. A user will be able to view their specific profile through the Mobile GUI component and will be able to edit their profile information. The mobile application will then contact the Care Corner API to update their user information in a centralized location. The prototype will be limited to the management of a single shared user account.

The Resources features will provide a local store of text resources to help when reporting and researching a sexual attack. The user will be able to search and view a list of sexual violence resources consisting of hotlines, help sites, and research. Lists of local counselors, shelters, and nonprofits will also be provided. For the prototype, a small subset of resources will be prepopulated.

The Armed Safe Walk features will monitor the user's location and report to selected contacts if the route exceeds the preset time. By monitoring a user's position through a predefined plan, the safe walk feature will determine via GPS when the user has gone too far off the path. Relying on GPS and a downloaded route with coordinates will ensure that the feature will work even if the user loses cell phone reception. The prototype will mock a user's location instead of relying on an actual GPS to demonstrate the functionality of the Armed Safe Walk.

The Panic Button feature will be able to be triggered in the case of an attack. Once enabled, the panic button will notify chosen contacts that there is a problem and will begin to record the incident. The audio and video recording will be backed up off of the user's phone through the Care Corner API so that it can later be retrieved as evidence - even if the victim's phone is lost or stolen.

The Mombot features will be limited for the prototype to generic feedback instead of the full product version that will provide specific, contextualized advice to deter a sexual assault. Advice and checklists will be static and prepopulated for the prototype.

The Notification features will handle the messaging that is sent by the user. The messages for the prototype will notify contacts during the Armed Safe Walk and Panic Button. The prototype will also send location and destination messages.

The Journal features will enable the documentation of a sexual attack through the entry, editing, and storing of journal entries. For the prototype, a user will be able to create a journal entry that documents their experience and save it for later reference. The journal entries will be backed up through the Care Corner API so they will not be lost if the user misplaces their mobile phone. The Journal will be protected by a hardcoded PIN for the prototype.

The Fake Calling features will allow a user selects to activate a Fake Call, they will then be able to select a time for the call to happen, the type of voice they would like to use, and whether it should record an audio or video recording. The user will then be able to receive a simulated call complete with a ring tone and the simulation of a person talking. The component will function exclusively on the local mobile phone so that it will work when the user does not have cell phone service.

The Audio and Video Recording component will be responsible for any feature that needs to activate recording of audio or video. It will provide a common component that the Fake Call and Panic Button component can use to start recording audio and video for later use as evidence. The audio and video will initially reside on the user's mobile phone and will then be backed up to a central location through the Care Corner API in case the user's phone is lost or stolen.

The Reporting Assistance features will aid in the reporting of an actual sexual attack. The Reporting Assistance will help a user to report an incident by providing a set of preset questions that will give specific information needed by authorities to handle the sexual attack incident. The time and location of the report will be stored for documentation.

Table 1

Care Corner Features Descriptions Implemented in the Prototype

Feature		Description	Prototype Implementation
Safe	Walk (armed) mode		
1	Notify contacts via MMS	The user's contacts will be notified via multimedia messages (MMS).	Fully Functional
2	Send location/destination to	The location and destination of the user will be sent to their	Fully Functional

	contacts	emergency contacts.	
3	Audio Recording & Storage on Server	Audio is captured and stored on the server when the user chooses to back up their audio.	Fully Functional
4	Video Recording & Storage on Server	Video is captured and then stored on the server when the user chooses to back up their video.	Fully Functional
5	GPS data Recording & Storage on Server	The users GPS location during the armed mode will be stored on the server	Fully Functional
Panic	Button		
6	Send location	The user's location will be sent to emergency contacts when the panic button is activated.	Fully Functional
7	Send pre-set message	The user's preset message is sent out to their emergency contacts when the Panic Button is activated.	Fully Functional
8	Start recording audio	The phone captures the audio surrounding it.	Fully Functional
9	Start recording video	Video is captured when activated.	Fully Functional
10	Timestamp location and time of panic	That phone will capture and save user's coordinates, time and date when Panic Button is activated.	Fully Functional
Fake	Phone call		
11	Start recording audio	The back camera turns on and begins recording audio until deactivation	Fully Functional
12	Start recording video	The back camera turns on and begins recording until deactivation	Fully Functional
13	Activate Panic	When the End Call Button is held for 5 seconds, the panic feature is activated.	Fully Functional
14	Include fake voice	Depending upon the user's choice of fake phone call voice, that voice clip will play when the Fake Phone Call is started.	Fully Functional
15	Pre-program what name the call appears to come	The user can enter into a text box what name they want to	Fully Functional

	from	appear when the fake phone call is activated	
Mombot			
16	Write plans and receive advice in response	User can text Mombot what their plans are and receive general advice in return	Partially Functional
17	Verbalize plans and receive verbalized advice in response	User can verbally express their intent to visit a location or attend an event. In response, the Mombot will provide appropriate safety tips and feedback	Partially Functional - the prototype will not feature an algorithm to appropriately provide feedback from Mombot based on user input. Instead, feedback will be generic
Journal			
18	Can record in/ view Journal	The user can create new, edit, and delete journal entries. Speech parsing is not functional	Partially Functional
19	Password Protected	A PIN is used to protect the Journal from prying eyes.	Partially Functional - The PIN is hardcoded for the prototype.
Educational Readings			
20	Govt/Official articles (just main sites like RAINN)	Users will be provided a collection of government/official sites that have been gathered via web scraping and RSS feeds.	Partially Functional - The prototype will only feature a few Government/Official Websites in order to show proof of concept. No web scraping or RSS feeds will be implemented.
21	Trusted blogs	Users will be provided a collection of readings from trusted blogs that have been gathered via web scraping and RSS feeds	Partially Functional - The prototype will only feature a few blogs in order to show proof of concept. No web scraping or RSS feeds will be implemented.
22	National hotlines	Users will be given a list of national hotlines they can call	Partially Functional - The prototype will only feature a few National Hotlines in order to show proof of concept. No web scraping or RSS feeds will be implemented.
Geofenced Resources			
23	Shelters	Returns a geofenced list of shelters close to user's location	Partially Functional - The prototype will only have an unfiltered list of shelters
24	Non-Profits	Returns a geofenced list of nonprofits close to the user's location.	Partially Functional - The prototype will only have an unfiltered list of nonprofits

25	Counselors	Returns a geofenced list of counselors close to the user's location	Partially Functional - The Prototype will only have a small selection of counselors as test data to show proof of concept.
26	Campus Police	Returns the campus police information based on user's location	Partially Functional - The prototype will only have a small selection of campus police as test data to show proof of concept.
Websites			
27	Govt Official Sites	A list of clickable .gov websites that handle sexual assault policies. This will not be a filtered list	Partially Functional - The prototype will only have a small selection of unfiltered sites.
28	Trusted non-profits/ other	A list of links to trusted non-profit sites or articles providing support to sexual assault victims.	Partially Functional - The prototype will only have a small selection of unfiltered sites.
Reporting Assistance (Partial)			
29	Time/location stamp at any time	Care Corner will store the time and location when using the Panic Button or Armed Safe Walk Mode in case this information is needed for a future reporting	Fully Functional
30	Assistance reporting via preset questions	All incidence created in the database through Car Corner API with specific user credential can be accessed to generate a report and used as necessary	Partially Functional - The reporting assistance for the prototype uses a limited set of prepopulated questions.
Authentication			
31	User account creation/ authentication	A new user can create an account and the information is stored in the Care Corner Database. The user can then login to Care Corner through this account.	Partially Functional - The prototype will allow users to create new accounts and store the information but the user cannot login using this newly created account.
32	User Credential Authentication	A user credential is authenticated to allow access to the application.	Partially Functional - The username/password is hardcoded for the prototype, only one user account is supported.
33	Password Recovery	A user can recover a forgotten password using some info store on the database at time of account creation	Fully Functional

File	Server		
34	Audio/Video/GPS data stored	Audio, video, and GPS data collected by the user will be saved in the Care Corner Database.	Fully Functional
Database			
35	User/Contacts	User data such as name, email, username, password, and emergency/trusted contacts are stored in the Database. The name and phone number of the contacts are stored as well.	Fully Functional
36	Incident/Audio/Video/Journey	Metadata from an Incident, including the server location of the associated audio file and GPS journey file.	Fully Functional
37	Resources	Data for vetted resources can be stored in the DB for faster user access.	Fully Functional
37	School	Data for US Colleges/Universities and their campus police can be stored for faster user access.	Fully Functional

2.3 External Interfaces

The Care Corner prototype mobile application and API use conventional hardware and software interfaces to demonstrate functionality. The Android SDK and Amazon Web Service will be interfaced with to provide a baseline set of functionality.

2.3.1 Hardware Interfaces

The Care Corner prototype will use Docker and the open-source project Localstack to emulate a set of Amazon Web Services (AWS). The Docker containers will run on a laptop to demonstrate the product infrastructure. The prototype will use the Android SDK to provide an abstraction to the mobile hardware.

2.3.2 Software Interfaces

The Care Corner prototype will interface with the several software interfaces to provide functionality. The Android SDK will be used to enable standard application features. The Android Media Recorder will be used to record audio and video. The Android GPS API will be used to manage the user's geographical location. Twilio will be used to provide SMS functionality. The Localstack and Serverless Framework containerized with Docker will be used to emulate an AWS development environment.

2.3.3 User Interfaces

A touch screen mobile phone will be the user interface for the Care Corner prototype. The prototype supports the Android operating system - following recommended user experience and usability for mobile application interfaces.

2.3.4 Communications Protocols and Interfaces

The Care Corner prototype will use the REST application level protocol to communicate between the mobile application and the Care Corner API. All traffic will be served over HTTP/1.1 and SSL/TLS 1.2. The data format is in JSON requiring the Content-Type HTTP header to be set. An API key will be used in an HTTP header to provide API access.