CRISIS AND EMERGENCY COMMUNICATIONS AT UNCH-CH

A SYSTEM ANALYSIS PROJECT REPORT

PROJECT TEAM MEMBERS

Kohei Saito
Sanju Rajan
Shilpa Sundar
Sai Tejaswini Velpuri

TABLE OF CONTENTS

1. Executive Summary *3*

1.1 Overview 3

1.2 Existing System and Identified Problems 3

1.3 Methods of Investigation and Design 3

1.4 Proposed Recommendations: Enhanced System and Benefits 4

2. Describing the current system *5*

2.1 Problem Definition 5

2.2 Stakeholders Involved: 6

2.3 Methodology 7

2.4 interview and survey Observations: 8

2.5 Data Interpretation: 9

3. Recommendations for New System *11*

3.1 Addressing unresolved issues 12

3.2 Narrative summary of the proposed changes in the recommended system 12

3.3 Pros and cons of the recommended alert system 13

3.4 Model of the new recommended system 14

4. Implementation Plan for The New Syetem Design *15*

4.1 Comprehensive Implementation Process 16

4.2 Implementation plan: resource estimation 17

4.3 Risk Management 17

4.4 Project Success Assessment 19

5. Client Appendix *20*

5.1 Plans for presenting the proposed recommendations to the client 20

6. Team Appendix *20*

6.1 Additional models 20

6.2 Lingering Issues or Concerns About the Proposed System 21

6.3 Strengths of each team member 22

6.4 Key learnings from this project 22

1.EXECUTIVE SUMMARY

1.1 OVERVIEW

This executive summary provides a concise overview of the proposal for enhancing the Alert Carolina emergency notification system at the University of North Carolina at Chapel Hill (UNC-CH). Designed for upper-level management and clients responsible for implementation, it encapsulates the core aspects of the investigation and proposed solutions, without delving into intricate details.

1.2 EXISTING SYSTEM AND IDENTIFIED PROBLEMS

The existing Alert Carolina system serves the expansive UNC-CH community of 30,000 people, including students, faculty, and staff. Despite its robust infrastructure, it has been identified that the system often faces delays in the delivery of mobile notifications and emails during emergencies. These delays pose significant safety risks, especially given the high dependency of the university population on timely and accurate emergency communication. The main issue lies in the inefficiency of the current system to ensure a near-instantaneous reach of critical alerts to the entire campus community.

1.3 METHODS OF INVESTIGATION AND DESIGN

Our approach to investigating the Alert Carolina system was multifaceted. We employed an agile methodology, combining quantitative and qualitative methods. This included administering questionnaires to students and faculty, conducting interviews with key faculty members, and reviewing system records and operations. These methods provided a comprehensive understanding of the system's performance, user preferences, and areas needing improvement.

Additionally, various analytical models like Identity and Personas were used to interpret the collected data and conceptualize the design of the new system.

1.4 PROPOSED RECOMMENDATIONS: ENHANCED SYSTEM AND BENEFITS

Our proposal encompasses several key enhancements to the Alert Carolina system, each designed to address specific issues and collectively contribute to a more effective emergency communication system:

- **Multi-Channel Alert System:** We propose integrating multiple communication channels (text, email, social media, and campus-wide public address systems) to ensure redundancy and reach a wider audience promptly. This diversity in communication channels will reduce the reliance on any single mode, thereby minimizing the risk of system failures during critical times.

- **Enhanced Mobile Alert Reliability:** Improving the delivery mechanism of mobile notifications is crucial. Our aim is a 99% delivery rate, achieved through optimizing network protocols and collaborating with mobile service providers for prioritized message delivery during emergencies.

- **Family Inclusion Protocol:** Recognizing the concern of students' families during emergencies, we recommend a protocol that allows students to register their family members to receive alerts directly. This ensures that families are informed and can stay connected with their loved ones during crises.

- **Clarity and Comprehensiveness in Crisis Communication:** Alerts will be designed to be clear and informative, providing not just the alert but also guidance on safety measures and resources available. This clarity in communication is vital for effective decision-making during emergencies.

- **Accessibility of Alerts:** Ensuring that alerts are accessible to all, including those with disabilities, is a priority. This includes the use of visual aids, readable text formats, and auditory signals to cater to diverse needs.

- **Preparedness and Training Initiatives:** Regular training sessions, drills, and awareness campaigns will be conducted to familiarize the campus community with the system and emergency procedures. This is aimed at enhancing preparedness and ensuring swift response to alerts.

- **Continuous Feedback and Improvement Loop:** Establishing a feedback mechanism for users to report issues and suggest improvements. Regular updates and system audits will be conducted to ensure the system evolves with technological advancements and user needs.

These enhancements are designed to transform Alert Carolina into a more dynamic, reliable, and inclusive emergency communication system. The anticipated outcomes include significant reductions in communication delays, increased reach and effectiveness of alerts, and a heightened state of preparedness and safety across the UNC-CH campus.

2.DESCRIBING THE CURRENT SYSTEM

In an era emphasizing the paramount importance of swift and effective communication for ensuring community safety, emergency alert communication systems play a pivotal role. Among these systems, Alert Carolina stands out as a beacon of security at the University of North Carolina at Chapel Hill. Tailored to furnish timely and precise information during emergencies, Alert Carolina is the university's all-encompassing notification system, guaranteeing that vital updates promptly reach students, faculty, and staff. Alert Carolina operates as a proactive measure to mitigate risks and safeguard the well-being of the university community. As an integral component of the university's dedication to the safety of its community members, Alert Carolina illustrates how technology and communication strategies can be utilized to establish a resilient and responsive emergency management framework.

Despite its continuous evolution and adaptation, it is essential to note that there are certain discrepancies in the current system, and our project brings attention to these areas that require improvement.

2.1 PROBLEM DEFINITION

2.1.1 PROBLEM SETTING AND DESCRIPTION

In the dynamic academic setting of the University of North Carolina at Chapel Hill, where thousands of individuals are present daily, a robust emergency alert communication system is indispensable. Housing around 30,000 individuals across

diverse academic departments, student residences, and facilities, the University of North Carolina at Chapel Hill takes pride in its robust and essential infrastructure—the Emergency Alert Communication System.

In an era where prioritizing safety and swift responses to critical situations is crucial, this system plays a pivotal role in safeguarding the extensive well-being of the university's community. Within UNC (University of North Carolina at Chapel Hill), this system incorporates email and SMS (Self-Management Support) alerts as integral components of the Alert Carolina emergency notification system. These alerts disseminate crucial messages through various channels to ensure timely communication during emergencies or hazardous situations.

Emergencies, causing significant losses to individuals and/or property and inducing widespread panic, necessitate swift alert networks. A highly effective approach to mitigate the impact of emergencies on communities involves issuing alerts and warnings to the public before, during, and after such events. Public alert and warning systems aim to provide crucial information to alert the public, guide necessary actions for their safety, and deliver messages to populations at risk of imminent hazards. The primary goal is to maximize the likelihood that people take protective actions while minimizing any delay in doing so.

Despite the existence of the current multi-channel communication system, not everyone on campus receives timely alerts, particularly with mobile notifications and safety alerts. This communication gap poses a significant safety concern during emergencies. While emails are sent out, they are not universally read immediately upon receipt. Furthermore, many individuals do not receive mobile text alerts, which are more likely to capture attention. This scenario could potentially lead to danger, where an urgent message is neither received nor promptly read. While UNC navigates its path to recovery following the past campus tragedies, this project endeavors to enhance the resilience of the existing crisis communication system.

2.1.2 PROJECT OBJECTIVES

The primary aim of this study is to address the following two key questions:

1. What are the key findings derived from our current public alert and warning system at UNC?
2. What policy and practical insights can be drawn from the existing research on public alert and warning systems to ensure that crisis communication is not only transmitted but also acknowledged by recipients?

The criteria for success in this endeavor involve *attaining a 95% reading rate* for emergency alerts *within 10 minutes of their issuance* and a *99% delivery rate for mobile alerts* and notifications.

2.1.3 PROJECT SCOPE

The project's scope encompasses all users registered in the university's emergency communication system, comprising students, faculty, staff, and their dependents residing on campus. The primary focus of the project is to improve mobile alerts, without addressing other emergency communication methods like sirens or intercom announcements. The system should be capable of delivering alerts to the approximate user base of 30,000 individuals.

2.2 STAKEHOLDERS INVOLVED:

S.no	Stakeholder	Description
1	University Administration	This group includes top-level administrators and decision-makers who oversee and manage the emergency communication system. They play a crucial role in setting policies, providing resources, and ensuring the system's overall effectiveness.
2	Emergency Management Teams	Teams specifically dedicated to emergency preparedness and response, responsible for coordinating efforts and managing information during crises.
3	Information Technology (IT) Department	The IT department is involved in maintaining and updating the technological infrastructure supporting the alert communication system. They ensure the proper functioning of software, hardware, and communication channels.
4	Communications and Public Relations	Professionals in these departments are responsible for crafting and disseminating emergency messages to the university community and, at times, to the public. They play a critical role in managing the image and reputation of the institution during emergencies.
5	Campus Police/Security	Responsible for enforcing safety measures, providing security during emergencies, and sometimes directly involved in the initiation of alerts related to safety and security concerns.
6	Students, Faculty, and Staff	The end-users of the system, including the university's community members. They rely on the system to receive timely and accurate information during emergencies.
7	Parents and Dependents	If the system extends its reach to include dependents living on campus or parents of students, these individuals become stakeholders with an interest in the safety of their family members.
8	Local Authorities and Emergency Services	Collaboration with local emergency services and authorities is crucial, as they may need to respond to situations on campus or provide additional support during emergencies.
9	Community Representatives	Depending on the outreach of the alert system, representatives from the broader community surrounding the university may also be stakeholders.
10	Regulatory Bodies	Organizations or agencies that may have established regulations or guidelines regarding emergency communication in educational institutions.

2.3 METHODOLOGY

Interaction Platform: Microsoft Teams
Number of Meetings: Over 10
Meeting Schedule: Weekly on Tuesday mornings
Tools Utilized: Microsoft Word, PowerPoint Presentations, Canva
Sources: Surveys, Interviews, Alert Carolina Official Website
We employed an agile methodology throughout the project lifecycle. Our initial focus involved a thorough examination of the organizational structure and functionality of the existing Alert Carolina communication systems. Subsequently, we crafted a questionnaire that was distributed to 25 individuals to pinpoint discrepancies, deficiencies, and areas requiring

improvement within the current system. To streamline our efforts, we defined roles and responsibilities, organized our tasks into sprints, and conducted regular weekly meetings to assess the project's status and progression. These measures proved successful in achieving our objectives.

As a team, we developed two distinct questionnaires—one tailored for students and dependents and the other for faculty and staff. Employing meticulously designed questionnaires, each comprising 14 and 13 questions, respectively, we conducted surveys targeting specific groups within the university community. Utilizing the questionnaire consisting of 14 questions, as a team, we engaged in a contextual inquiry by distributing surveys to various targeted groups. The finalized questionnaire was distributed to 25 individuals, yielding responses from 15 participants. In conjunction with the survey, we conducted contextual inquiries through interviews with two faculty members affiliated with the Department of CHIP, namely Jenny Kaselak and Erika Takeda.

Note: *Please refer to the Appendix for the questionnaire and survey questions that we employed.*

2.3.1 ROLES DURING CONTEXTUAL INQUIRY (INTERVIEWS)

S.no	Role	Participants
1.	**Interviewee**	Jenny Amber Kaselak (Associate Director of CHIP), Erika Takeda (Program Coordinator)
2.	**Interviewer**	Shilpa Sundar
3.	**Recorder**	Kohei and Sanju Rajan
4.	**Observer and Note-Taker**	Sai Tejaswini Velpuri

2.3.2 SURVEY STATISTICS

Survey recipients: 25
Survey responses received: 15
Direct interview participants: 2
Survey completion rate: 15

2.4 INTERVIEW AND SURVEY OBSERVATIONS:

2.4.1 DIRECT CONTEXTUAL INTERVIEWS

Format**:** In-person and Virtual (Zoom)
Recording**:** Recorded with Consent
Findings: The interviews with the CHIP Staff members, yielded valuable insights into the effectiveness of the current alert system at UNC-CH. Interviewee 1 emphasized the importance of achieving a 95% reading rate for emergency alerts within 10 minutes and a 99% delivery rate for mobile alerts. Their experience revealed a preference for text messages due to their accessibility, and they underscored the necessity of involving family members in the automatic alert system. Interviewee 1 acknowledged delays in alerts and advocated for improved consistency in communication for both faculty/staff and students. Their recommendations included clearer, more detailed alerts, simultaneous delivery to various devices, and regular training sessions for faculty and staff.
On the other hand, Interviewee 2 highlighted that while email alerts are received quickly, mobile alerts experience delays during emergencies. They emphasized the preference for text messages and identified UNC Police alerts about campus

crimes as the most frequent. Interviewee 2 expressed the need for more comprehensive information on alerts, including timely updates during emergencies. Their recommendations included improving the timing and consistency of mobile alerts, considering family members in the automatic alert system, and providing regular emergency training for faculty and staff. Additionally, they desired more transparency in emergency alerts, reduced delays in alert delivery across communication channels, and improvements to the website layout for enhanced user-friendliness, especially for disabled individuals. Both interviews emphasized the importance of detailed, transparent, and timely communication to enhance emergency preparedness at UNC-CH.

2.4.2 RESPONSES THROUGH SURVEYS

Format: Questionnaire through Google forms

Findings: The survey conducted at UNC-CH revealed significant challenges in the existing emergency communication system, as participants highlighted issues with timely notifications, technical delays, limited message availability, and accessibility concerns for non-student members. Confusion arising from unclear messages and personal challenges of infrequent phone checks were also noted. Difficulties in the signup process were identified as areas requiring attention. These findings emphasize the need for refining the system to effectively address multifaceted challenges. Additionally, the survey explored diverse channels for receiving emergency alerts, with email, social media, text messages, and mobile app notifications being commonly used. Family members' alert reception varied, highlighting the importance of a multi-channel approach. Participants commonly preferred text messages and email for emergency alerts and reported being informed within the first hour of incidents. Satisfaction ratings varied, with a majority expressing moderate satisfaction, but lower ratings underscore the need for further exploration and improvement in specific areas of the emergency communication system at UNC-CH.

2.5 DATA INTERPRETATION:

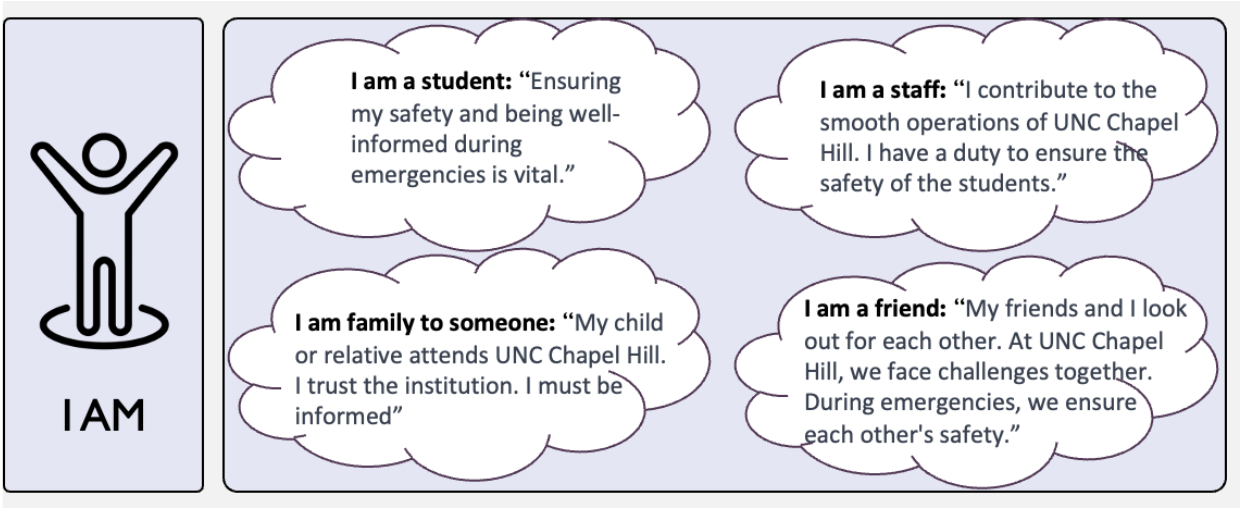
We had created two models based on the current existing system to draw our insights.

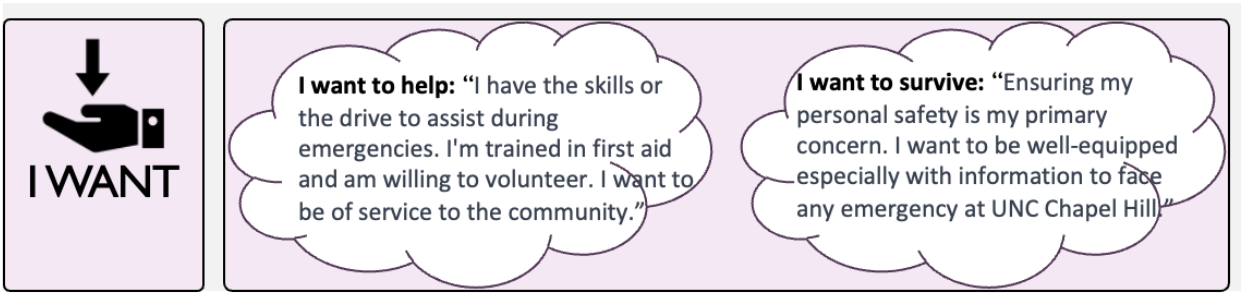
2.5.1 IDENTITY MODEL

The Identity Model is based on the roles and perspectives of various stakeholders within an organization during an emergency. It emphasizes the importance of recognizing not just the roles but the emotions, relationships, and responsibilities that come with these roles. The model is used to refine emergency communication in several ways:

- **User-Centricity:** Communication is tailored to fit the unique needs and contexts of users, focusing beyond just the dissemination of information.
- **Emotional and Relational Consideration:** Acknowledges the personal and emotional dimensions of emergencies and prioritizes user-focused responses.
- **Volunteer Engagement:** Prepares and identifies community members who are eager to contribute during crises.
- **Safety Prioritization:** Maintains the well-being and survival of the community as the core aim of emergency systems.
- **System Gaps Analysis:** Addresses current system shortcomings for better informing family members and suggests targeted improvements.

The model includes different identities such as a student, staff member, family member, friend, and those who want to help or survive, each with their own statement reflecting their stance on safety and information needs during emergencies.





2.5.2 PERSONAS MODEL

The Persona Model creates detailed archetypes of users to better tailor communication and emergency response strategies. Each persona has a distinct description, goals, and key tasks:

- **Lucy the Low-Key Learner:** A student who prefers not to be the center of attention and desires just the facts to stay safe and informed without being overwhelmed.
- **Professor Malcolm the Mentor:** A faculty member who sees his role as a guardian for his students, focusing on their safety and staying updated on emergency protocols.
- **Fiona the Family First:** A parent who trusts the institution to keep her informed and her child safe, relying on the system for accurate updates.
- **Victor the Volunteer:** A medical student ready to offer help and trained in first aid, committed to staying informed and providing immediate assistance during emergencies.

Each persona represents a segment of the community with specific informational needs and engagement levels in emergency situations. This model assists in creating communication that is not only informative but also empathetic and engaging for the diverse users it serves.

Persona	Description	Goals	Key Tasks
 **Lucy the Low-Key Learner** *"I need to know what's going on so I can stay out of the way."*	21-year-old Literature senior at UNC-CH. Prefers not to be center stage, wants just the facts during emergencies.	- Stay safe during emergencies - Keep updated without being overwhelmed	- Check primary emergency alerts - Follow safety guidelines
 **Professor Malcolm the Mentor** *"The safety of my students is my priority."*	48-year-old Physics faculty member at UNC-CH. Sees himself as a guardian for his students.	- Ensure student safety - Stay updated on emergency protocols	- Check emergency alerts and guidelines -Direct students during emergencies - Coordinate with faculty
 **Fiona the Family First** *"UNC takes care of my child, I trust them to keep me informed."*	40-year-old mother of a UNC-CH freshman. Lives a few hours away, is not tech-savvy and relies on the alert system for her child's safety.	- Ensure her child's safety during emergencies - Receive timely and accurate updates	- Subscribe to emergency alerts - Check on child during emergencies
 **Victor the Volunteer** *"I'm here to help, whenever, wherever."*	Senior medical student at UNC-CH. Eager to help others and trained in first aid.	- Stay informed on emergency procedures and training - Provide immediate assistance	- Attend emergency response training - Offer first aid during emergencies

3. RECOMMENDATIONS FOR NEW SYSTEM

The recommendations for the new emergency alert communication system at UNC-CH are derived from the insights gathered from direct contextual interviews, survey responses, and data models. Each recommendation addresses specific findings and utilizes the insights from the identity and the personas models for a comprehensive approach.

The recommendations are as follows:

- ⇒ **Broad-Reach Communication:** Multi-Channel Alert System
- ⇒ **Reliable Alert Delivery:** Improved Mobile Alert Reliability
- ⇒ **Family Inclusion Protocol:** Inclusion of Family Members in Alerts
- ⇒ **Clarity in Crisis:** Clear and Detailed Alerts
- ⇒ **Accessible Alerts:** Accessible System Design
- ⇒ **Preparedness Through Training:** Regular Emergency Training
- ⇒ **Transparent Communication:** Timely Communication and Regular Feedback

1. **Multi-Channel Alert System:** Implement an alert system that simultaneously sends information via text messages, emails, social media, and mobile app notifications. Both interviews and surveys highlighted a preference for text messages and emails.

2. **Improved Mobile Alert Reliability:** Enhance the technical infrastructure to ensure rapid and reliable delivery of mobile alerts. Interviewee 1 emphasized the need for a 99% delivery rate for mobile alerts. The personas model supports the necessity for timely and reliable alert delivery.

3. **Inclusion of Family Members in Alerts:** Develop a system to automatically enroll family members in the alert system, with an opt-out feature. This was a common suggestion from interviewees and aligns with the personas, particularly the concerns of external stakeholders like parents.

4. **Clear and Detailed Alerts:** Design alerts to be concise yet informative, providing clear instructions and updates during emergencies. Interviewees and survey responses indicated a need for clearer, more comprehensive information in alerts. The identity model suggests tailoring alerts to meet diverse user needs.

5. **Accessible System Design:** Ensure the system, including the website and alerts, is accessible and complies with ADA standards. Interviewee 2 stressed the importance of user-friendly designs for disabled individuals, a point supported by the identity model.

6. **Regular Emergency Training:** Conduct regular training sessions for faculty, staff, and students on emergency response procedures. Suggested by interviewees, this underlines the importance of preparedness.

7. **Timely Communication and Regular Feedback:** Timely communication and regular feedback are essential components in maintaining transparency in any organizational or project environment. By providing real-time updates, organizations can significantly reduce confusion and prevent panic among stakeholders. This approach is underpinned by the high value trust in communication. Our interviews also attest to the fact that users tried to communicate with the system administrators unsuccessfully.

3.1 ADDRESSING UNRESOLVED ISSUES

While these recommendations significantly enhance the emergency alert system, some issues, such as technological disparities among users and varying behavioral responses to alerts, might still persist. These challenges require continuous monitoring and adaptive strategies to ensure the system remains effective and inclusive for all community members at UNC-CH.

3.2 NARRATIVE SUMMARY OF THE PROPOSED CHANGES IN THE RECOMMENDED SYSTEM

⇒ The proposed overhaul of UNC-CH's emergency alert system aims to significantly enhance safety communication through a multifaceted approach. Key improvements include the implementation of a multi-channel alert system to ensure wide-reaching communication across text messages, emails, social media, and mobile app notifications. This addresses diverse community preferences and accessibility needs.

⇒ To ensure reliability, the system's technical infrastructure will be upgraded for faster and more dependable mobile alert delivery, targeting a 99% delivery rate. The system will also automatically enroll family members in alerts, responding to community feedback for wider information dissemination.

⇒ Alerts are designed to be clearer and more detailed, providing concise instructions and updates. Accessibility is a priority, with a focus on ADA-compliant, user-friendly designs for websites and alert systems. The proposal also includes regular emergency training for faculty, staff, and students, ensuring preparedness and familiarity with emergency procedures.

⇒ Lastly, the system focuses on maintaining transparent and timely communication to foster trust and reduce confusion during emergencies. These changes collectively aim to create a more effective, inclusive, and responsive communication system for the entire UNC-CH community.

3.3 PROS AND CONS OF THE RECOMMENDED ALERT SYSTEM

Recommendation	Pros	Cons
Multi-Channel Alert System	- **Broader Outreach**: Ensures messages reach the entire university community, accommodating various communication preferences. - **Redundancy**: Provides backup options if one channel fails during an emergency.	- **Resource Demand**: Managing multiple channels requires more human and technological resources. - **Information Overload**: Risk of bombarding recipients with the same message on multiple platforms.
Improved Mobile Alert Reliability	- **Timely Alerts**: Increases the likelihood of alerts being received and read promptly - **Engagement and Response**: Mobile alerts are often more immediate and noticed, leading to quicker responses.	- **Technical Complexity**: Upgrading systems for higher reliability can be technically complex and costly. - **Network Dependence**: Relies on mobile network stability, which might be inconsistent in certain scenarios.
Inclusion of Family Members in Alerts	- **Comprehensive Safety**: Extends the alert system to family members, enhancing overall community safety. - **Emotional Assurance**: Provides peace of mind to families about the safety status of their loved ones.	- **Privacy and Data Security**: Handling additional personal data raises privacy issues and requires secure data management. - **Opt-out Management**: Implementing a user-friendly and efficient opt-out system can be complex.
Clear and Detailed Alerts	- **Effective Communication**: Clear and detailed alerts ensure the message is easily understood and actionable. - **Specific Targeting**: Alerts can be tailored to specific scenarios or audience needs.	- **Content Balancing**: Achieving the right balance between providing enough information and being concise is challenging. - **Diverse Interpretation**: There's a risk of messages being interpreted differently by various groups.
Accessible System Design	- **Universal Accessibility**: Ensures the system is usable by all, including those with disabilities. - **Compliance with Standards**: Meets legal standards like the ADA, avoiding potential legal issues.	- **Higher Costs**: Designing for accessibility can add to the development and maintenance costs. - **Complex Development**: Creating a universally accessible system requires more rigorous design and testing processes.
Regular Emergency Training	- **Enhanced Preparedness**: Improves the community's knowledge and response to emergencies. - **Awareness and Familiarity**: Builds awareness about emergency protocols and system functionalities.	- **Resource Requirements**: Needs dedicated time and resources for planning and conducting training. - **Engagement Challenges**: Ensuring consistent participation and engagement across a diverse community can be difficult.
Timely Communication and Regular Feedback	- **Trust Building**: Transparency in communication fosters trust and credibility within the community. - **Rapid Response Facilitation**: Timely updates can lead to faster and more coordinated emergency responses.	- **Sensitive Information Management**: Balancing transparency with the risk of disseminating unverified or sensitive details. - **Response Pressure**: Maintaining real-time updates can be demanding during ongoing crises.

3.4 MODEL OF THE NEW RECOMMENDED SYSTEM

The new system, informed by the Identity and Persona models, integrates recommendations to enhance emergency communications tailored to the specific needs of different stakeholders, thereby improving the system's effectiveness and responsiveness.

3.4.1 IDENTITY MODEL'S RECOMMENDATIONS AND IMPACTS

For Students: The implementation of a multi-channel alert system and improved mobile alert reliability ensures students miss fewer alerts, staying well-informed during emergencies.
For Staff: Regular emergency training helps staff feel more prepared and contributes to smoother operations during emergencies.
For Family Members: Including family members in alerts guarantees they are directly informed about emergencies in real-time, enhancing the safety and peace of mind.
For Survival-Focused Individuals: Providing clear and detailed alerts with timely communication and regular feedback ensures that individuals receive the information they need to navigate emergencies effectively.
For Friends: An accessible system design ensures that friends can communicate and coordinate easily during emergencies, offering mutual support.
For Volunteers: Regular emergency training and updates enable volunteers to assist effectively and promptly when needed.

IDENTITY MODEL OF THE NEW SYSTEM

Identity	Recommendation	Current System Effect	New System Effect
I am a student	Multi-Channel Alert System Improved Mobile Alert Reliability	May miss alerts if not on top of email or due to unreliable delivery.	Students receive timely alerts through their multiple channels, ensuring they're well-informed during emergencies.
I am staff	Regular Emergency Training	Staff may feel underprepared for emergencies due to insufficient training.	Staff receive comprehensive training, improving their ability to contribute to the safety and smooth operations during emergencies.
I am family to someone	Inclusion of Family Members in Alerts	Family members may be uninformed or receive delayed updates about emergencies affecting their loved ones.	Family members receive direct alerts, ensuring they're kept informed about their loved one's safety in real-time.
I want to survive	Clear and Detailed Alerts Timely Communication And Regular Feedback	Unclear or untimely information can lead to confusion and ineffective responses in emergencies.	Clear, detailed, and timely information enhances personal safety and the ability to navigate emergencies effectively.
I am a friend	Accessible System Design	Friends may face challenges in communicating and coordinating due to a system that is not user-friendly for all.	An accessible system design ensures that friends can easily receive and share information, aiding mutual support during emergencies.
I want to help	Regular Emergency Training Timely Communication And Regular Feedback	Potential volunteers may lack the training or information needed to provide effective help.	Well-trained individuals receive timely updates, enabling them to assist effectively and promptly when emergencies occur.

3.4.2 PERSONA MODEL'S RECOMMENDATIONS AND IMPACTS

Lucy the Low-Key Learner: A multi-channel alert system ensures Lucy does not miss crucial updates and receives straightforward information without feeling overwhelmed.

Professor Malcolm the Mentor: Improved mobile alert reliability allows for consistent and immediate information, enabling effective decision-making and student guidance during emergencies.

Fiona the Family First: The inclusion of family members in alerts ensures Fiona receives direct updates about her child's safety, providing peace of mind.

Victor the Volunteer: Timely communication and regular training mean that Victor receives information and is well-prepared to offer immediate and effective assistance during emergencies.

PERSONA MODEL OF THE NEW SYSTEM

Persona		Recommendation	Current System Effect	New System Effect
	Lucy the Low-Key Learner	Multi-Channel Alert System	May miss crucial updates if not connected to all channels.	Receives alerts through various channels, ensuring she is always informed.
		Clear and Detailed Alerts	Overwhelmed by unclear or excessive information.	Receives straightforward and relevant information for easy understanding.
	Professor Malcolm the Mentor	Improved Mobile Alert Reliability	Uncertainty in timely alert delivery may hinder immediate action.	Relies on consistent and immediate alerts for swift decision-making.
		Regular Emergency Training	Inadequate training could lead to less effective student guidance.	Well-prepared to lead students effectively through crises due to regular training.
	Fiona the Family First	Inclusion of Family Members in Alerts	Lacks direct and timely updates about her child's safety.	Directly informed about emergencies, ensuring peace of mind for her child's safety.
		Accessible System Design	Difficulty accessing or understanding alerts if not intuitive.	Easily navigates an inclusive system tailored for all users.
	Victor the Volunteer	Timely Communication	Lack of immediate information could impede assistance efforts.	Immediate updates enable prompt and effective volunteer action.
		Regular Emergency Training	Sporadic training may lead to unpreparedness.	Consistently trained, ready to respond efficiently in emergencies.

In both models, the new system's effects are clear: enhanced safety and well-being for all community members through more reliable, timely, and clear communication. The system is designed to be inclusive and user-centric, considering the diverse roles and needs of individuals it serves, ultimately leading to a community that is better prepared and more resilient in the face of emergencies.

4. IMPLEMENTATION PLAN FOR THE NEW SYETEM DESIGN

Our survey at UNC-CH has identified various challenges with our current emergency alert system. Key among these are delayed notifications and a lack of system accessibility, leading to confusion and slow reactions in emergencies. There is a critical need for a system that not only warns of immediate dangers but also educates on safety practices and emergency procedures. Moreover, the system should be inclusive, ensuring that everyone, including students, staff, and their families, has prompt and easy access to vital information. Our goal is to develop a system that keeps our entire UNC-CH community well-informed and prepared, not just during emergencies.

In response to these concerns reflected in the recommendations, we're proposing the implementation of a new system that includes clear, interconnected steps, each aimed at enhancing safety awareness and ensuring timely, accessible communication for everyone.

4.1 COMPREHENSIVE IMPLEMENTATION PROCESS

Our approach involves planning an update-type implementation that acts as an add-on to the established system. Here, we are suggesting 7 phases for the implementation for the new recommended system. The objectives are threefold: ensuring prompt and clear delivery of emergency messages, making the system accessible to all campus members and their families, and embedding safety education into daily campus life.

- **Phase 1:** Quick Alert System Upgrade for Faster, More Accessible Notifications
- **Phase 2:** Customizable Alert System for Diverse User Preferences
- **Phase 3:** Expanding the Alert System to Include Family Members
- **Phase 4:** Educational Alerts and Regular Safety Updates
- **Phase 5:** Consistent, Detailed, and Accessible Safety Communication
- **Phase 6:** Regular Safety Training and Workshops for All
- **Phase 7:** Continuous Feedback and System Enhancement

4.1.1 PHASE 1: QUICK ALERT SYSTEM UPGRADE

In this initial phase, we will focus on significantly enhancing the speed and responsiveness in the current alert system. This entails upgrading our existing infrastructure to ensure rapid delivery of notifications, regardless of the communication channel used. The IT team will prioritize integrating technologies that facilitate instant alert dissemination, with rigorous testing for reliability in fast-paced situations.

4.1.2 PHASE 2: CUSTOMIZABLE ALERT SYSTEM FOR DIVERSE USER PREFERENCES

We aim to centralize and streamline the registration process for our alert system to cater to the diverse preferences of our campus community. This update will unify the current disparate channels—email, SMS, and social media—into a single, integrated platform. Users will be able to easily select and modify their preferred contact methods in one accessible location. By doing so, we will enhance the accessibility and user-friendliness of the alert system, ensuring all campus members can receive notifications in the manner most convenient for them.

4.1.3 PHASE 3: EXPANDING THE ALERT SYSTEM TO INCLUDE FAMILY MEMBERS

Our goal is to expand the alert system to include family members of students and staff, enhancing the system's reach and accessibility. This will be achieved by adding a secure and user-friendly feature for registering additional contacts within our system. We will provide comprehensive support and resources to facilitate this expansion, ensuring the process is straightforward and accessible to all.

4.1.4 PHASE 4: ENHANCEMENT OF EDUCATIONAL ALERTS AND REGULAR SAFETY UPDATES

In this phase, our objective is to refine and improve the existing protocol for disseminating educational alerts and safety updates. Our efforts will focus on expanding the reach of these alerts and updates, utilizing a variety of distribution channels to ensure comprehensive accessibility. By doing so, we aim to reinforce the importance of safety practices and emergency procedures, making sure that every member of the campus, regardless of their familiarity with the current system, can stay informed and prepared.

4.1.5 PHASE 5: CONSISTENT, DETAILED, AND ACCESSIBLE SAFETY COMMUNICATION

This phase is dedicated to enhancing the clarity and detail of our emergency communications. We will develop standardized guidelines for crafting alerts, focusing on clear and accessible language. Also, we will train our staff to ensure these standards are consistently met, improving the accessibility and effectiveness of our communications.

4.1.6 PHASE 6: REGULAR SAFETY TRAINING AND WORKSHOPS FOR ALL

We plan to organize regular safety training sessions and workshops for the entire campus community. These will be designed to educate and prepare everyone for emergency situations. Experts in various safety fields will be involved to provide comprehensive and practical training.

4.1.7 PHASE 7: CONTINUOUS FEEDBACK AND SYSTEM ENHANCEMENT

Finally, we will implement a mechanism to gather continuous feedback on the alert system. This feedback will be crucial for assessing the system's accessibility and effectiveness. Based on the community's input, we will make ongoing enhancements to ensure the system remains responsive and accessible to everyone's needs.

4.2 IMPLEMENTATION PLAN: RESOURCE ESTIMATION

This table outlines the resource requirements for each phase of the implementation plan, including periods, personnel involved, necessary equipment or software, and a rough estimate of the associated costs.

Phase	Duration	Key Personnel	Equipment/Software	Estimated Cost
1. Quick Alert System Upgrade	1-3 Months	IT Team, Network Engineers, System Integrators	Advanced Alert Software, High-Speed Servers, Testing Infrastructure	Software licensing costs, IT labor, high-speed server equipment
2. Customizable Alert System	4-5 Months	IT Developers, Communication Specialists, Accessibility Consultants	Multi-Platform Communication Tools, User Preference Management Software	Multi-platform software costs, accessibility design, user testing expenses
3. Family Inclusion Feature	1-3 Months	Software Developers, Database Admins	User Interface Development Tools, Security Software	Database expansion, cybersecurity investment
4. Educational Updates	Ongoing	Content Creators, Safety Experts	Content Management System, Distribution Tools	Content team salaries, update tools
5. Information Consistency	Annually	Training Coordinators, Communication Staff	Guideline Development Resources	Training materials, staff cost
6. Training Workshops	Annually	External Safety Experts, Facilitators	Workshop Materials, Venue	Expert fees, material, and venue costs
7. Feedback	Annually	Data Analysts, IT Support	Feedback system, Analysis Tools	Feedback tool investment, analyst salaries

4.3 RISK MANAGEMENT

Here, we show risk management strategies to identify potential risks and proactively establish countermeasures. By doing so, we aim to protect the project from unexpected setbacks and facilitate a seamless transition to the improved system.

4.3.1 RISK ASSESSMENT METRICS

- **Technical Failures:** Identifying potential technical issues that could interrupt the rollout of new system features, understanding that such problems can cause delays in implementation and diminish user confidence.

- **Resistance to Change:** Acknowledging the risk that stakeholders might resist new changes, potentially leading to a lack of engagement with the system and impeding the project's overall success.
- **Privacy Concerns:** Considering the heightened risk to privacy with the addition of family members' details to the alert system, necessitating robust data security measures to preserve confidentiality and adhere to legal standards.
- **Training Time Cost:** Recognizing the risk that training could become overly time-consuming, which might result in inefficiencies and overextension of resources, underlining the need for efficient and succinct training approaches.

4.3.2 TABLE: PROJECT RISK ASSESSMENT OVERVIEW BY PHASE

Phase	Technical Failures	Resistance to Change	Privacy Concerns	Training Time Cost
1	**High** - Fast delivery of alerts may introduce challenges in system performance and stability.	**Low** - Speed is a welcomed improvement, so resistance is expected to be minimal.	**Low** - Speed enhancements do not typically involve handling sensitive personal data.	**Moderate** - Staff will need to understand the upgraded system to maintain its performance and troubleshoot effectively.
2	**Moderate** - Centralizing various notification methods could introduce technical complexities, requiring careful integration to maintain system performance.	**Moderate** - Users accustomed to the current system may initially resist the transition to a centralized registration process.	**Moderate** - Unifying different communication methods will require handling more comprehensive user data securely.	**Moderate** - Staff and users will need training on the new centralized system to ensure a smooth transition and full utilization of its capabilities.
3	**Moderate** - Developing new features for family inclusion can face technical hurdles.	**Moderate** - Introduction of a new concept might require users to adjust.	**High** - Handling additional personal data of family members raises significant privacy concerns.	**High** - Extensive training needed for both staff and community to use the new feature effectively.
4	**Low** - Primarily involves content creation and distribution, which is less technically demanding.	**Low** - Educational updates are typically well-received and face minimal resistance.	**Low** - Does not involve processing sensitive personal data.	**Low** - Minimal training required as this phase deals with receiving information.
5	**Low** - Focuses on content standardization, which is less technically intensive.	**Moderate** - Staff may need time to adapt to new standards and guidelines for alerts.	**Low** - Not directly involved in managing personal data.	**Moderate** - Staff training required to familiarize them with updated content guidelines.
6	**Low** - This phase is focused on training, which is not heavily reliant on technical aspects.	**Moderate** - Some staff or community members might resist regular training sessions.	**Low** - Training sessions do not typically involve handling personal data.	**High** - The phase's core component is training, emphasizing the importance of effective training methods.

7	**Moderate** - Effective feedback collection tools are necessary, which may face technical issues.	**Moderate** - Requires active participation from the community, which might not be readily embraced by all.	**Moderate** - Collecting and managing feedback may involve some personal data handling.	**Moderate** - Training is needed for efficient feedback collection and analysis processes.

4.4 PROJECT SUCCESS ASSESSMENT

Here, we feature a detailed table titled 'Project Success Metrics and Evaluation Methods'. This crucial component of our documentation outlines our approach to evaluating the effectiveness of our implementation. Key success metrics now include Accessibility, along with Alert Delivery Speed, System Reliability, and User Engagement. These metrics are paired with specific evaluation methods such as time measurements, success ratios, registration rates, and now accessibility audits. This structured approach allows us to gather quantifiable data, pinpoint areas that need improvement, and drive decisions to optimize system performance and user satisfaction. The inclusion of accessibility metrics highlights our dedication to creating an inclusive alert system.

- ⇒ **Alert Delivery Speed: Time from alert issue to receipt**
  Evaluation: Measure average delivery time from alert issuance to user receipt**.**
- ⇒ **System Reliability: Ratio of successful to failed alert deliveries**
  Evaluation: Calculate successful delivery percentage over time.
- ⇒ **User Engagement: User registration numbers, including family members**
  Evaluation: Monitor total sign-ups and rate of new user registrations.
- ⇒ **Feedback Quality: Constructiveness and positivity of feedback**
  Evaluation: Analyze feedback, aiming for a high percentage of positive responses.
- ⇒ **Training Attendance and Evaluation: Participant numbers and post-training performance**
  Evaluation: Tally training attendance and assess skills via post-training evaluations.
- ⇒ **Emergency Response Time: Community response duration to alerts**
  Evaluation: Record and review response times during drills and real emergencies.
- ⇒ **Accessibility: Ease of system use for all users, considering diverse abilities and technology access**
  Evaluation: Conduct accessibility audits, including user experience surveys and system usability assessments, to ensure the system meets established accessibility standards and is user-friendly for individuals with varying abilities and technology access.

4.4.1 TABLE: PROJECT SUCCESS METRICS AND EVALUATION METHODS

Success Metric	Description	Evaluation Method
Alert Delivery Speed	Time taken from issuing to receiving alerts.	Measure the average time from when an alert is sent to when it is received by users.
System Reliability	Percentage of successful versus failed alert deliveries.	Calculate the ratio of successfully delivered alerts to the total number of alerts sent over a given period.
User Engagement	Number of users registered, including family member additions.	Track the total number of users who have signed up for the system and monitor the rate of new registrations over time.

Feedback Quality	Nature and percentage of positive user feedback.	Analyze user feedback for positivity and constructiveness, aiming for a target percentage of positive responses.
Training Attendance and Evaluation	Number of training participants and their post-training evaluation scores.	Count the number of attendees at each training session and evaluate their understanding and skills through post-training assessments or quizzes.
Emergency Response Time	Time taken for community response to alerts in drills or real situations.	Record and analyze the time taken for the community to respond to alerts during emergency drills or actual emergency situations.
Accessibility	The system's usability for all, including compliance with accessibility standards.	Perform regular accessibility evaluations, including user surveys and interface testing, to ensure the system is user-friendly and compliant with standards.

5. CLIENT APPENDIX

5.1 PLANS FOR PRESENTING THE PROPOSED RECOMMENDATIONS TO THE CLIENT

In presenting the alert system to Alert Carolina Services at UNC-CH, the focus will be on how the system meets the needs and preferences of the university community members (i.e., students, their close and faculties), based on what we learned from interviews and surveys. The system uses diverse ways to send messages, like texts and emails, which is what people prefer. The plan to make mobile alerts more reliable is important, aiming for all alerts to reach people right away. Including family members in the alerts is a key feature, addressing concerns from parents and others outside the university. The alerts will be made to be clear and to the point, giving people the right information during emergencies. It is also important that the system is easy for everyone to use, including those with disabilities. Regular training sessions for dealing with emergencies will be highlighted, showing how they help people know what to do in such situations. Lastly, the importance of sharing information quickly and openly will be stressed, to keep everyone informed and maintain trust during emergencies.

6. TEAM APPENDIX

This section includes all the details that our team could not incorporate into the main section of this report.

6.1 ADDITIONAL MODELS

Model	Description
Day-in-the-life model	To delve into the intricacies of the UNC emergency alert system, shedding light on its weak points, user behaviors, and contextual usage scenarios. This model will offer a comprehensive

	visualization of information flow, user touchpoints, and critical moments where the system intertwines with users' daily activities.
Decision point model	The model offers a structured understanding of decision points and procedures influencing emergency communication at UNC-Chapel Hill. It underscores the significance of considering multiple factors before triggering notifications, contributing valuable insights for enhancing the existing system and fostering more effective and coordinated emergency responses.
Relationship model	The model will uncover communication complexities and relationship dynamics, pinpointing potential shortcomings in the current emergency alert system. It aids in comprehending the social and relational context, showcasing stakeholders and their dynamics. This contribution involves observing relationship dynamics and communication flows, guiding improvements to enhance the emergency communication system's responsiveness, targeting, and effectiveness. Identifying key communicators allows the project to strategize more effective engagement, ensuring broader and more efficient dissemination of emergency alerts.
Collaboration model	The collaboration model is a crucial tool for comprehending interactions and collaborations, enabling stakeholders to visualize communication flow and make informed decisions for enhancements. It provides a clear depiction of stakeholder interactions during emergencies, emphasizing the importance of timely collaboration for community safety. By revealing communication inefficiencies, the model guides discussions on streamlining the collaboration process. Its contribution lies in offering insights into existing collaboration mechanisms, fostering brainstorming for improvements, and serving as a reference for efficient collaboration strategy design.

6.2 LINGERING ISSUES OR CONCERNS ABOUT THE PROPOSED SYSTEM

The proposed alert system brings potential challenges. For example, operating it requires substantial resources and coordination, which might prove costly and complex. A particular concern is alert fatigue: the possibility that frequent messages across multiple platforms might lead people to ignore important notifications. Ensuring that the system runs smoothly on mobile devices is another hurdle, as this relies on consistent network service and involves technical intricacies and expenses. When it comes to adding family members to the alert system, we must carefully handle their privacy and security. It’s also crucial to get the whole community involved in regular emergency training, though it may be challenging to engage everyone fully. Lastly, it's vital to share information swiftly and accurately during emergencies, but this rapid dissemination must not compromise the system’s performance.

6.3 STRENGTHS OF EACH TEAM MEMBER

Name of Team Member	Strengths Displayed Suring the Project
Shilpa Sundar	Leadership, Effective Communication, and Contextual Interview skills
Sanju Rajan	Complex Problem Solving, Written Communication, and Teamwork
Sai Tejaswini Velpuri	Proactiveness, Punctuality and Timeliness, and Questionnaire Building skills
Kohei Saito	Inquisitiveness, Written Communication Skills, Effective Presentation Skills

6.4 KEY LEARNINGS FROM THIS PROJECT

This project offered a multitude of valuable lessons, chief among them the critical importance of teamwork. The team members, each bringing their unique expertise and viewpoints, demonstrated an exemplary level of dedication, tirelessly committing themselves to the project's success. Another significant learning from this endeavor was the art of problem-solving. The project presented complex challenges that required innovative and strategic thinking. The team learned to approach problems not as obstacles, but as opportunities to explore new ideas and solutions. Understanding the business problem was another key takeaway.

Systems Analysis is not just a course, but a skill to understand complex organizations and systems. The course taught all of us the different concepts, methodologies, and terminologies that go into understanding and handling a system in its entirety. The project highlighted the importance of not just addressing a problem at a surface level but delving deep into the underlying business needs and objectives. The project was a testament to the power of breaking down a large system into smaller, manageable bits to understand the overall structure better. This approach facilitated a more thorough comprehension of the system’s complexities and interdependencies. By dissecting the system into smaller components, the team could identify and address specific breakdowns more efficiently, leading to a more robust and effective overall system. The team will be carrying all these key learnings to the next project and so on into future careers.
