

Emergensee

Formal Design Proposal

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1. Problem Definition:

To increase the efficiency of emergency response by creating an application that provides public notifications, first responder communication, and simulation planning.

The purpose of the system is to improve the ability of first responders and their effective responsiveness. By creating a system that will collect data about emergency events and alert the public, both first responders and the public will be more informed. Public users can submit and receive reports of current emergencies in their area. First responders can be better coordinated in their attempt to respond to emergencies. Emergency planners will be given the ability to simulate emergencies and coordinate the jobs of first responders.

2. Design Overview:

The proposed system will help bridge the gap between the public and first responders when an emergency arises. First responders will be presented with the best solution to the current emergency. Additionally, the public will be informed about the current situation and given the necessary instructions. These plans will be optimized by the use of an emergency planner, who is able to manage simulations before the emergencies actually happen.

To do so, we will create an application which runs on all five major operating systems (MacOS, Android, iOS, Windows, and Linux). There will be four roles within the app: first responders, the public, the emergency response planner, and the operators.

The operator portion of the app will have a form that can be filled out to notify and direct the first responders. There will be a list of preset instructions to send based on configurations designed by the emergency response planner. There will also be an ability to send custom messages to the first responders. Additionally, a command will allow emergency alerts to be sent to the public. Once again, there will be preset options along with the ability to customize a message. Finally, there will be a list of reports

coming in from both the public and the first responders, which the operator can read and then act accordingly.

The first responder part of the app will provide functionalities such as receiving regular reports about emergencies from the operator with geographical information, sending confirmations and updates of the current situation, and submitting incident summary reports to the command center. The responders will be given instructions based on the emergency that are predefined by an emergency response planner. Premade instructions are stored in the database. Once the operator chooses the type of emergency, the premade instructions are automatically sent to the first responder. This part of the system will give first responders ability to request additional resources such as equipment. Finally, they will also see a list of members of the public who have marked themselves as in danger. Once they rescue someone, they will be able to mark them safe so that other first responders know not to look for them.

The public portion of the app will show a list of notifications from the operator. For each notification, the public will be able to mark themselves safe or in danger. If they mark themselves in danger, then the first responders will be notified of their location and status and they will be prioritized to be saved. The public will also be able to send detailed reports to the operator and the first responders about the emergency. These reports will include information such as location, severity, the category of the emergency, and other user-provided information.

The emergency planner will have the ability to define categories of emergency situations along with each of their actions plans. These action plans will include detailed instructions for the first responders, the public, and the operator. Each emergency category will be predefined with a severity level and a number of initial responders for the emergency. If the emergency is not one of the predefined, the option for “other” can be selected. The operator is presented with these plans upon the time of receiving the initial emergency report and it is retrieved automatically from the database. The operator then selects to send the evacuation instructions to the first responder and any other important information to the public.

Along with the active emergency reporting, the software will also be able to simulate these emergencies. The simulations will be administered by the emergency planner who will initially define the simulation with detailed information about the emergency after deciding to create a new simulation. The emergency planner will act as the public and other first responders in these simulations and send updates about the emergency along the way--having the option to switch their perspective role in the application. The first responders will need to send updates in real time that other first responders and the planner can view. After a simulation is over, the first responders can still send closing reports about the emergency until the planner decides to close the input of any new reports.

Once a simulation has been closed, the system will export data from the simulation and store it for later viewing in the software. This information will include the date of the simulation, any reports by the planner or first responders (with those from the planner being marked as such). Once stored in the system, the planner will have access to a tab with a selection of previous simulations where they can choose to view the data and add any relevant notes. Using the data from these simulations, the planner can then make changes to their emergency plans in order to create the best set of instructions based on real events once the real emergency comes.

3. User Stories:

3.1 Emergency Response Planner Administers a Simulation:

First responders and emergency managers should be able to engage in period exercises--using the software to enhance the communication and cohesion during them. During exercises, the response planner should be able to take on any other role without other participants knowing they are the planner. The information from any simulation should be stored for the ability to do later analysis.

3.2 Emergency Response Planner Uses Simulation Data:

After a simulation exercise, the planner should be able to view detailed statistics about the simulation. These details should include things such as the number of responders and a history of their actions during the exercise. Timestamps should accompany a list of postings of both the public and the first responders responses and submissions. The planner may then use this data to define detailed plans for a list of possible emergencies when the time comes.

3.3 Operator Handles an Emergency Report:

The public should be able to send reports of an emergency to the operator. The operator should be able to see all messages coming in from the public. If the operator feels necessary, they should be able to issue an emergency alert for the region. All members of the public should receive the alert, and the first responders should be sent a predefined plan created by the emergency response planner. The operator and the first responders can see which members of the public are in danger and adjust the response if needed. Additionally, the operator is able to see any updates from first responders on the scene.

3.4 First Responder Responds to an Emergency:

The application should be able to alert the first responder of any local emergency. It should also give the first responder instructions specific to the emergency. After the first responder arrives, they should be able to confirm that the emergency is real and submit a request for additional resources using the app. Users should be able to mark themselves in danger so that the first responder can go to save them first. While the emergency is ongoing, the first responder should be able to keep sending updates about the emergency and their current situation, and they should constantly receive updates from the command center at the same time.

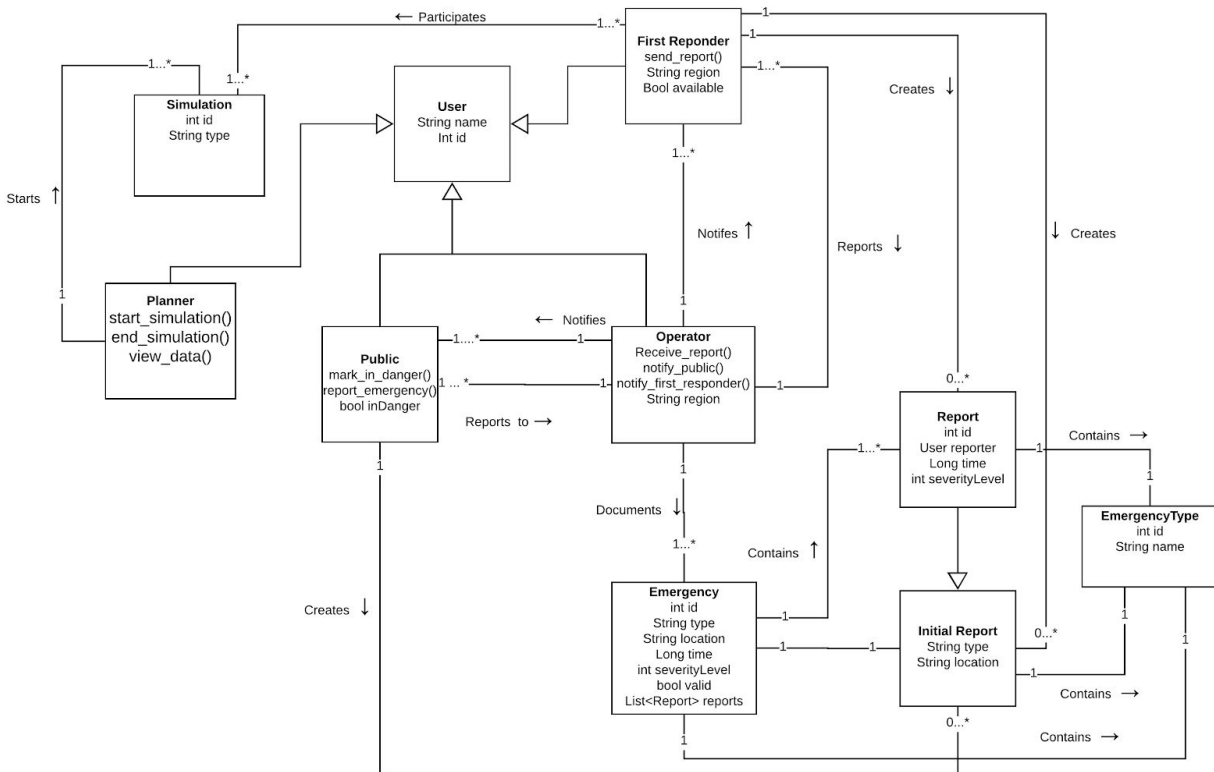
3.5 Public User Finds an Emergency and Sends a Report:

The public should send emergency reports with detailed information if they discover an emergency. Once selecting to create a report, they should be prompted to include information about the type of emergency along with the location, severity, and any other important details. Once complete, the public user selects to send the report which then gets sent to the operator.

3.6 Public User is Near a Reported Emergency:

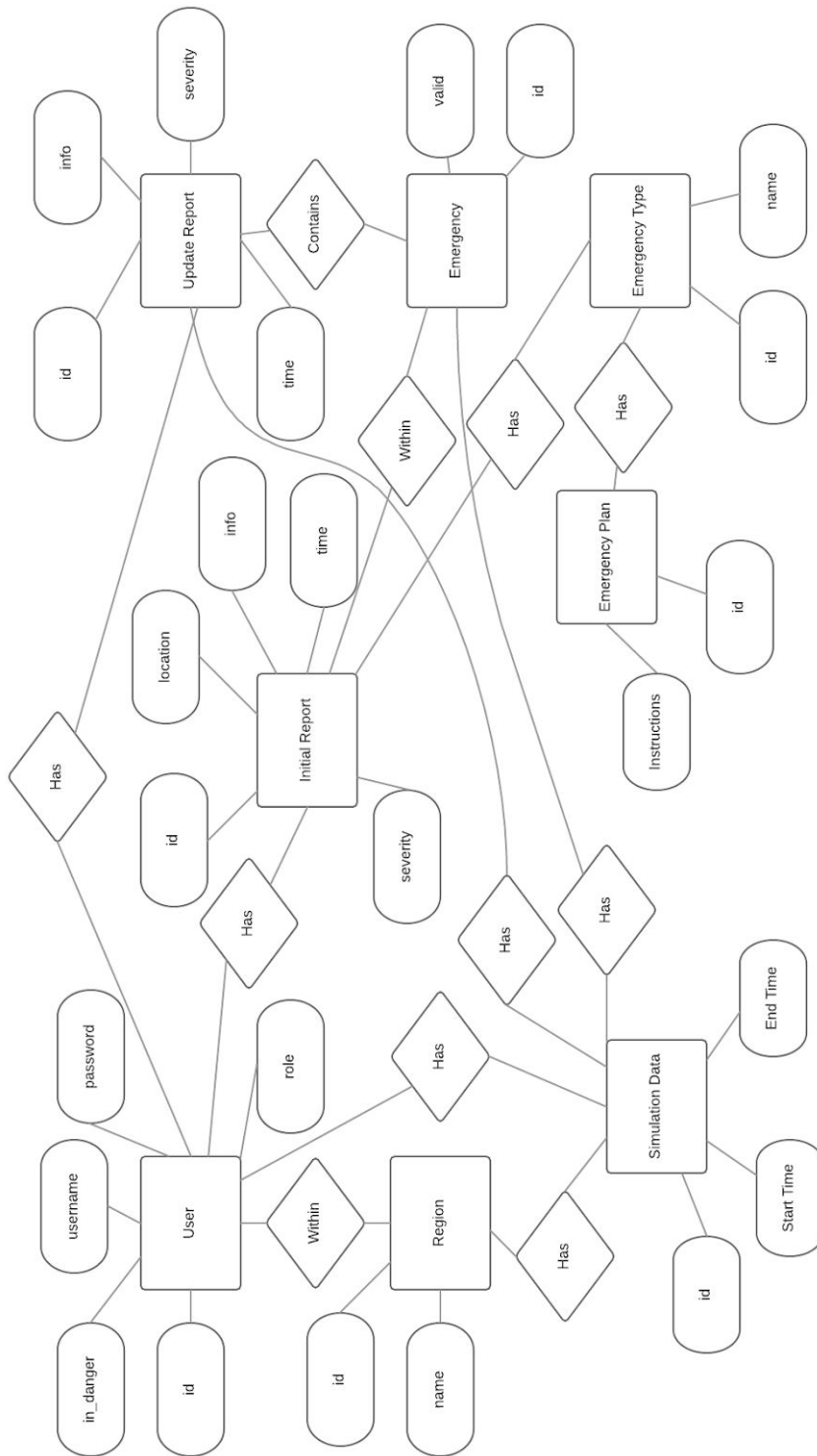
A member of the public finds themselves in the area of a reported emergency. The user should receive updates about the emergency and be able to call for help if needed. The user will be provided with information about the exact location, type and severity of the emergency. They should also receive the suggested route of evacuation and would be asked to evacuate immediately. If the user is unable to leave the site by themselves, they can mark themselves in danger and a first responder will be notified to help them.

4. Logical Design Diagram:

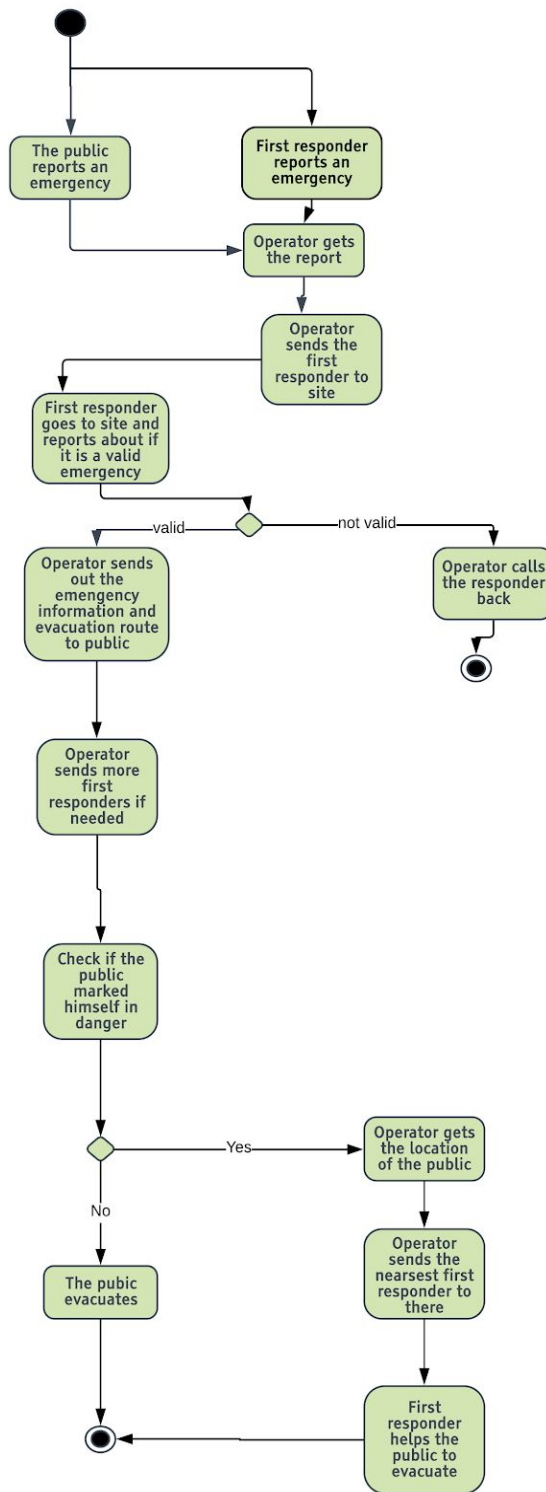


Class Public, Operator and First Responder will extend class User, which contains a String of their names and a int of their unique ids. Each of them will have a unique interface so that they can interact with the system. The operator can notify the first responder to validate the emergency if he/she received a report from the public. The operator can also a send message to the public if the emergency is real. For each emergency report, the operator can make an Emergency class which contains all the information for the emergency. Also, the emergency planner can start a simulation of an emergency. For the first responder class, It provides functions to send reports to the operator which can validate the emergencies.

5. ER Diagram



6. Process View:



As the program starts, the public or first responder have to send an emergency reports to the operator. The operator receives the reports and then sends the first responders to the site of the emergency. The first responders' job is to check if the emergency is valid and send a report back to the operator. The operator receives the report. If the emergency is claimed to be invalid, the operator just calls the first responder back and end the program. If the emergency is valid, the operator will send out the notification to all the public involved about the emergency and evacuation route. If it is needed, the operator will send more first responders to the site. During the evacuation, if the public cannot evacuate by themselves, they can mark himself in danger and the nearest first responder will be notified and go to help. After all public evacuate safely, the program will end.

7. Use Cases:

7.1 Alerting

Use Case Name: Operator alerts the public

ID: 01

Importance level: High

Primary actor: Operator

Use Case Type: Detailed, Essential

Stakeholders and Interests:

1. Operator - wants to alerts the public
2. Public - wants to be alerted

Brief Description: This use case describes how operator alerts the public of an emergency.

Trigger: The operator receives an emergency report from a user or first responder.

Relationship: *Association:* First responder, Operator.

Include:

Extends:

Generalization:

Normal Flow of Events:

- 1: The operator opens the app and clicks “alert the public”.
- 2: The operator types in the detailed information about the emergency.
- 3: The operator clicks “send”.
- 4: The public receives the information.

Subflows:

Alternative and Exceptional Flows:

4a. If communication channels are down, the operator opens the app and clicks “find the contact information of the first responder.” Then the operator calls the first responder, giving the information about the area of the public that needed to be alerted to the first responder. Then the first responder gets to the area and alerts the public.

Use Case Name: Operator alerts the first responder

ID: 02

Importance level: High

Primary actor: Operator

Use Case Type: Detailed, Essential

Stakeholders and Interests:

1. Operator - wants to alert and give instructions to the first responder
2. First responder - wants to follow the instruction and help people

Brief Description: This use case describes how the operator gives the first responder an instruction to deal with an emergency.

Trigger: The operator receives an emergency report from a user.

Relationship: *Association:* First responder, Operator.

Include: Operator generates emergency plans

Extends:

Generalization:

Normal Flow of Events:

- 1: The operator opens the app and clicks “send instructions to the first responder.”
- 2: The operator generates an emergency plan.
- 3: The operator types in detailed information of the emergency and copies the instructions that the system gives.
- 4: The operator clicks “send.”
- 5: The first responder receives the alert and the corresponding instructions.

Subflows:

Alternative and Exceptional Flows:

- 5a. If communication channels are down, the operator opens the app and click “find the contact information of the first responder.” Then, the operator notifies the first

responder, giving the detailed information and instructions to first responder. Finally, the first responder gets to the area, follows the instruction, and saves the public.

7.2 Emergency Reporting

Use Case Name: Public reports an emergency

ID: 03

Importance level: High

Primary actor: Public

Use Case Type: Detailed, Essential

Stakeholders and Interests:

1: Public - wants to report an emergency

2: Operator - wants to send the first responder to the emergency

Brief Description: This use case describes how the public report an emergency.

Trigger: The public has found an emergency.

Relationship: *Association:* The public, Operator.

Include:

Extends:

Generalization:

Normal Flow of Events:

1: The public opens the app and clicks “Report an emergency”

2: The public types in the detailed information about the emergency and clicks “Send”

3: The system sends the information to the operator

Subflows:

Alternative and Exceptional Flows:

3a. If communication channels are down, the public opens the app and click “find the contact information of the operator”. Then, the public notifies the operator, giving the detailed information of the emergency they found.

Use Case Name: First responder sends updates about the emergency

ID: 04

Importance level: High

Primary actor: First responder

Use Case Type: Detailed, Essential

Stakeholders and Interests:

1. Operator - wants to receive the updates about the emergency to give the accurate follow-up instructions along the way.
2. First responder - wants to send the updates about the emergency

Brief Description: This use case describes how first responder sends an update about the emergency

Trigger: Some situation changes in the emergency.

Relationship: *Association:* First responder, Operator.

Include:

Extends:

Generalization:

Normal Flow of Events:

- 1: The first responder opens the app and click “send updates.”
- 2: The first responder types in the change of situation about the emergency.
- 3: The first responder clicks “send”.
- 4: The operator receives the updates about the emergency.

Subflows:

Alternative and Exceptional Flows:

4a. If the communication channels are down, the first responder opens the app and clicks “find information of the operator.” Then the first responder notifies the operator, giving the information about the change of situation of the emergency to the operator.

7.3 Mark in Danger

Use Case Name: Public marks themselves in danger

ID: 05

Importance level: Medium

Primary actor: Public

Use Case Type: Detailed, Essential

Stakeholders and Interests:

- 1: Public - wants to get help to evacuate from the building
- 2: First Responder - wants to help the public to evacuate from the site
- 3: Operator - wants to make sure that public is getting the help needed

Brief Description: This use case describes how the public can mark himself in danger and get help.

Trigger: The public get the emergency information and finds they they can't evacuate from the site.

Relationship: *Association:* The public, First responder, Operator

Include:

Extends:

Generalization:

Normal Flow of Events:

- 1: The public opens the app and gets into the emergency notification sent by the operator
- 2: The public clicks button "mark in danger" on the top of that notification
- 3: The system notifies the operator and the operator notifies the nearest available first responder to help

Subflows:

Alternative and Exceptional Flows:

- 3a: If the connections between first responder and public are down, the operator will try to connect the first responder and provide the location of that public.

3b: If first responders need more people to help, then the operator will allocate additional first responders.

7.4 Simulation

Use Case Name: Create a simulation

ID: 06

Importance Level: Medium

Primary Actor: Emergency Response Planner

Use Case Type: Detail, Essential

Stakeholders and Interests:

1: Emergency Response Planner - wants to start an emergency simulation

2: First Responder - wants to respond to the emergency simulation

Brief Description: This use case describes how the emergency response planner creates an simulation.

Trigger: The emergency response planner has selected the simulation menu on the application after logging in and chooses the option to “Create New Simulation”.

Relationships: *Association:* Emergency response planner, First responder

Include:

Extend:

Generalization:

Normal Flow of Events:

1: The system checks that the planner is not already running a simulation.

2: The system loads the template for the emergency simulation for the planner to fill out.

3: The planner fills out information and then selects “Begin Simulation.”

4: The planner is prompted to select the participants from a list of first responders.

5: The system sends out emergency alert to the selected first responders.

Subflows:

Alternate or Exceptional Flows:

3a: If the planner is already running a simulation, then the simulation creation is cancelled and the planner is notified that they are already running a simulation.

5a: If the planner does not fully fill out the required information on the form, the simulation creation does not continue and prompts the planner to fill in all required info.

Use Case Name: Simulation Administering

ID: 07

Importance Level: Medium

Primary Actor: Emergency Response Planner

Use Case Type: Detail, Essential

Stakeholders and Interests:

1: Emergency Response Planner - wants to administer and run the simulation

2: First Responder - wants to respond to the emergency simulation

Brief Description: This use case describes how the emergency response planner is able to administer the simulation.

Trigger: The emergency response planner has created a simulation and is presented with the simulation operation page corresponding to the new simulation.

Relationships: *Association:* Emergency response planner, First responder

Include: Create a Simulation, Use case 9

Extend:

Generalization:

Normal Flow of Events:

1: Planner creates the reports for the simulation by sending reports as both the public and first responders. (The planner is the one creating the reports for other emergency personnel to respond to as they would in a real emergency. First responders can also create and send reports, but the public isn't actually involved here.)

2: System sends reports from planner to the simulation page for participating first responders and planner to see.

3: Planner is able to view live locations of all first responders on site through automatic geolocation and a map

Subflows:

Alternate or Exceptional Flows:

0a: If a real emergency occurs during a simulation, the planner is prompted and selects whether they want to end the simulation or not. (The emergency could be really small here and only require one first responder, so the simulation doesn't need to end every time.)

Use Case Name: Simulation Participation

ID: 08

Importance Level: Medium

Primary Actor: First Responder

Use Case Type: Detail, Essential

Stakeholders and Interests:

1: First Responder - wants to participate in emergency simulation

2: Emergency Response Planner - wants to see first responders activity

Brief Description: This use case describes how the first responder interacts with the simulation.

Trigger: The emergency response planner has created a simulation and the first responder has been included in the list of notified first responders.

Relationships: *Association:* First responder, Emergency response planner

Include: Create a Simulation

Extend:

Generalization:

Normal Flow of Events:

1: First responder receives an alert of an emergency simulation.

2: First responder selects the "Responding" option.

3: System updates the list of participating first responders.

4: First responder accesses the list of reports being sent by the planner and other first responders.

5: First responder sends their own report of the emergency if necessary

6: System adds report to list of reports for planner and other participating first responders to see.

7: First responder is able to see current locations of other participating first responders.

Subflows:

Alternate or Exceptional Flows:

0a: If a first responder is selected for any emergency notification during the simulation, they are notified and they are prompted to leave the simulation.

Use Case Name: End Simulation

ID: 09

Importance Level: Medium

Primary Actor: Emergency Response Planner

Use Case Type: Detail, Essential

Stakeholders and Interests:

1: Emergency Response Planner - wants to end current simulation

2: First Responder - wants to know that the simulation has ended

Brief Description: This use case describes how the emergency response planner ends a simulation and what happens after it is ended.

Trigger: The emergency response planner has selected to “End Simulation” after having previously creating and starting an emergency simulation.

Relationships: *Association:* Emergency response planner, First responder

Include: Create Simulation, Use case 9

Extend:

Generalization:

Normal Flow of Events:

1: System notifies all participating first responders, reports can no longer be added, and all data from the simulation is exported

2: All access to the previous emergency simulation is removed from the first responders and only appears in the planner's list of previous simulations.

Subflows:

Alternate or Exceptional Flows: none

7.5 Emergency Plans

Use Case Name: Operator generates emergency plans

ID: 10

Importance level: High

Primary actor: Operator

Use Case Type: Detailed, Essential

Stakeholders and Interests:

1: Operator - wants to generate an emergency plan corresponding to the current situation.

2: Emergency planner - wants to provide simulation results to facilitate the operator.

Brief Description: This use case describes how the operator generates emergency plans.

Trigger: First responder sends an updates that confirms the emergency is real.

Relationship: *Association:* Emergency planner, Operator.

Include:

Extends:

Generalization:

Normal Flow of Events:

1: Operator searches the type of the emergency that public reports in the emergency planner database.

2: The system shows the emergency plan and corresponding instructions.

Subflows:

Alternative and Exceptional Flows:

2a: If there is no matching results in emergency planner database, then come up with one.

7.6 Export data

Use Case Name: Export Simulation Data

ID: 11

Importance Level: Low

Primary Actor: Emergency Response Planner

Use Case Type: Detail, Essential

Stakeholders and Interests:

1: Emergency Response Planner - wants to view data about a previous simulation

Brief Description: This use case describes how the emergency response planner is able to view data from a previous emergency simulation.

Trigger: The emergency response planner has selected the "Previous Simulations" tab.

Relationships: *Association:* Emergency response planner

Include:

Extend:

Generalization:

Normal Flow of Events:

1: Emergency response planner selects a previous simulation from a list.

2: System loads in data from the selected simulation.

3: Planner is able to view reports sent during the simulation and can identify those sent by the planner.

4: Planner is able to save notes about the simulation in the “Notes” tab.

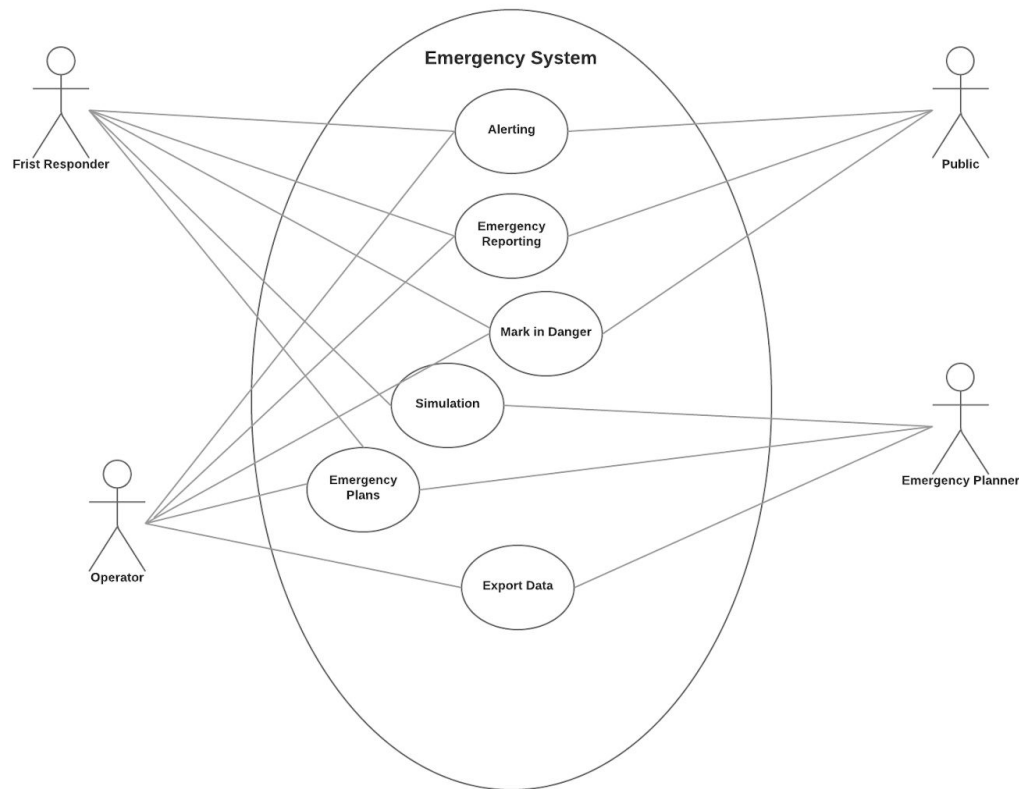
5: Once the planner is finished viewing the simulation they select the “Close” option.

6: The system saves any changes made to the simulation notes and returns the planner back to the main application page.

Subflows:

Alternate or Exceptional Flows: none

8. Use Case Diagram:



This diagram shows the relationships of 4 major actors: First responder, Public, Operator and the Emergency Planner.

Operator can alert public and first responder if there is an emergency. This alert contains any information about evacuation navigation.

First responder, Public can send report to the operator about the emergency; Public can mark himself in danger and both Operator and First Responder will help; Emergency Planner can start simulation and first responder will get involved in the simulation.

Operator have to generate emergency plans and first responder will be involved in these plans in real emergency. Also, for a simulation, emergency planner can generate plans and first responder will get involved.

Operator and Emergency Planner can export emergency data.

9. Major Design Components:

9.1 Message Sending:

The message sending component is used to send reports between the public, operators, and first responders. When a message is sent, it is stored in the database for the message receiving component to process. Users will be able to send messages to certain individuals and groups depending on the context of their message and roles. For example, if the operator sends an emergency alert, all the people using the system will receive it. However, if the operator is coordinating a response effort, the message will only be sent to first responders.

9.2 Message Receiving:

The message receiving component is used to receive reports, updates, instructions as well as confirmations coming to the operator and public. Each user has his own destination address, and there is a regional address that used to sending alerts to the people in the entire region. The address along with the message is being transmitted through the message sending system initially.

9.3 Navigation System:

The navigation component is used to evacuate people as quickly as possible away from the area of danger. To implement this system we can include a map system that shows a radius around the area of danger that is defined by the first responders on site. The evacuation route is then obtained by taking the user's current location and finding the closest location outside of the danger zone and route that user is going to take. Once out of the danger zone, the user may be notified of any further instructions that they should take.

9.4Simulation System:

The simulation component in the software is to be used alongside the current implementation of performing simulations by first responders. Simulations in the software are administered by the emergency response planner who include the first responders that will be participating. Once a simulation is started, the planner can send updated reports as a member of the public or another first responder. First responders are then able to see these updates and continue to use the information to improve their current strategies. First responders can also send update reports that both the planner and other first responders can view. These actions continue until the point where the planner decides to end the simulation.

9.5 Database of Preplanned Emergency Instructions:

Using the simulation system, the other role of the emergency response planner is to create a set of predefined instructions for a vast amount of emergencies. These plans are created best with the accompaniment of the simulation system. Using results from the simulation system, the planner is expected to form a set of flexible instructions for a number of emergency categories that can be automatically obtained and used when one of these emergencies happen.

10. Integration of Design Components:

The design components make up the largest majority of the system functionality. Message sending and receiving are used together in order to create and send emergency reports and updates about each emergency. The “Emergency Reporting” and “Alerting” from the use case diagram mostly uses these two components together to create the basis for the entire system. Whenever a first responder or a member of the public finds an emergency, they first send in a report to the operator. Once the operator receives the report, it is then resent to any first responders in the area--hence message sending and receiving. Not only does this happen when an emergency is first found, but whenever a first responder needs to send an update while on site.

During any emergency, after the public is notified, they are able to alert first responders of their current safety status, and those who are able to evacuate on their own are given information in the alert as to where to evacuate to. In the future this evacuation alert may include unique navigation routes instead of a standard location of safety. This functionality is created once again by the use of the message reporting and sending system that is within the “Alerting” and “Mark Self in Danger” cases in the use case diagram.

When a simulation is occurring, the obvious component in use is the simulation component. This component allows for simulations to be created by emergency response planners, and allows for the participation of first responders. This component has its own case in the use case diagram and once again makes use of the message sending and receiving components when first responders send updates about the simulation emergency. Simulations also make use of the ability to export data for future use.

Finally, the database of pre-planned instructions gets its own case in the use case diagram as well. This component is useful when an emergency report is first received by an operator. The instructions are first created by an emergency response planner, and are most accurate when using data from previous simulations. These

instructions are used to indicate the initial numbers of first responders needed on site, as well as any additional supplies that may be needed for the particular emergency. Parts of these plans are also sent to first responders so that they know which supplies they may need to take before arriving at an emergency.

While the components may not make up the entire system, their usefulness can be seen in presence throughout the diagrams. Altogether, each component comes together to form the framework of the entire system, so that it may be used in everyday practice.

11. CRC Cards:

Class Name: Public	ID: 1	Type: Concrete, Domain
Description: All normal citizens within the location.		Associated Use Cases: 3
Responsibilities: <ul style="list-style-type: none">- Report emergencies- Mark themselves in danger- Follow instructions from the first responders	Collaborators: <ul style="list-style-type: none">- First responders- Operators- Reports- Emergencies	
Attributes: id (int), name (string), inDanger (boolean)		
<u>Relationships</u> Generalization (a-kind-of): User Aggregation (has-parts): Reports, Emergencies Other Associations: First Responders, Operators		

Class Name: Operator	ID: 2	Type: Concrete, Domain	
Description: Coordinates the emergency response system and issues emergency alerts in the event of an emergency.		Associated Use Cases: 4	
Responsibilities: <ul style="list-style-type: none">- Receive emergency reports- Create an emergency- Coordinate first responders according to the emergency response planner		Collaborators: <ul style="list-style-type: none">- First Responders- Reports- Emergency- Emergency Response Planner	
Attributes: id (int), name (string), region (string)			
<u>Relationships</u> Generalization (a-kind-of): User Aggregation (has-parts): Reports, Emergency Other Associations: First Responders, Emergency Response Planner			

Class Name: First	ID: 3	Type: Concrete, Domain
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Responder		
Description: Follows instructions from the operator to assist the public in the event of an emergency.		Associated Use Cases: 5
Responsibilities: <ul style="list-style-type: none">- Respond to emergency- Participate in simulations- Send reports- Rescues public	Collaborators: <ul style="list-style-type: none">- Operator- Reports- Emergency Response Planner	
Attributes: id (int), name (string), region (string)		
<u>Relationships</u> Generalization (a-kind-of): User Aggregation (has-parts): Reports Other Associations: Emergency Response Planner		

Class Name: Planner	ID: 4	Type: Concrete, Domain	
Description: Creates and manages simulations to prepare for a real emergency.		Associated Use Cases: 6	
Responsibilities: <ul style="list-style-type: none">- Create simulation- End simulation- View data		Collaborators: <ul style="list-style-type: none">- Simulation	
Attributes: id (int), name (string), region (string)			
<u>Relationships</u> Generalization (a-kind-of): User Aggregation (has-parts): Simulation Other Associations: N/A			

Class Name: Simulation	ID: 5	Type: Concrete, Domain	
Description: Executes a simulation of an emergency response and exports the results of the test.		Associated Use Cases: 4	
Responsibilities: <ul style="list-style-type: none">- Simulate an emergency response- Export data		Collaborators: <ul style="list-style-type: none">- Emergency Response Planner- Emergency	
Attributes:			
<u>Relationships</u> Generalization (a-kind-of): N/A Aggregation (has-parts): Data export, Emergency Other Associations: Emergency Response Planner			

Class Name: Report	ID: 6	Type: Concrete, Domain	
Description: Contains a description of an emergency along with metadata such as who submitted the report and at what time.		Associated Use Cases: 3	
Responsibilities: <ul style="list-style-type: none">- Contain information about an emergency		Collaborators: <ul style="list-style-type: none">- Users- Simulation	
Attributes: id (int), reporter (User), time (long), description (string), location (string), severityLevel (int)			
<u>Relationships</u> Generalization (a-kind-of): N/A Aggregation (has-parts): Emergency Other Associations: User Simulation			

Class Name: Emergency	ID: 7	Type: Concrete, Domain	
Description: Contains all information about an emergency. It is created by the operator.		Associated Use Cases: 5	
Responsibilities: <ul style="list-style-type: none">- Alert users- Contains data regarding the emergency		Collaborators: <ul style="list-style-type: none">- Simulation- Users	
Attributes: id (int), sender (Operator), type (string), severityLevel (int), time (long), location (string)			
<u>Relationships</u> Generalization (a-kind-of): N/A Aggregation (has-parts): Reports Other Associations: Users, Simulation			

12. Test plan:

12.1 Unit Tests:

12.1.1 Database Utility:

Pull - Ensure that when data is retrieved from the database it matches the expected output. *Compare strings*

Add - Ensure that when data is added to the database, the database updates as expected. *Compare strings*

Delete - Ensure that when data is removed from the database, the database updates as expected. *Compare strings*

Update - Ensure that when a table is updated, the database updates as expected. *Compare strings*

12.1.2 Report:

Update - Ensure that when a report/update is retrieved from the database, it matches with the expected output. *Compare strings*

Set report_validity - Ensure that when a report's validity is set, the database updates as expected. *Compare boolean*

12.1.3 Emergency:

Create - Ensure an emergency is created and that it has the details of the given information. *Compare Objects*

Add report - Ensure that when a report/update is written, the database updates as expected. *Compare list*

Delete report - Ensure that when a report/update is deleted, the database updates as expected. *Compare list*

Alert - Ensure that when an emergency is validated, it generates the proper alert. *Compare Objects*

12.1.4 Public:

Mark status - Ensure that when the public changes their status that the status updates correctly. *Compare boolean*

Create report - Ensure that when the public creates an alert it is properly added to an emergency. *Compare list*

12.1.5 First Responders:

View in Danger - Ensure that the list of public who are in danger is properly updated. *Compare list*

Rescue - Ensure that when a member of the public is rescued that their status is set to not in danger. *Compare boolean*

Receive reports - Ensure that the first responders properly receive reports. *Compare list*

Send reports - Ensure that the first responders properly sends reports. *Compare list*

12.1.6 Operator:

Creates an emergency - Ensure that the emergency is created with the proper data. *Compare Objects*

Receive reports - Ensure that the operator properly receives reports. *Compare list*

Send reports - Ensure that the operator properly sends reports to first responders. *Compare list*

12.1.7 Simulation:

Create - Ensure a simulation is created and that it has the details of the given information. *Compare Objects*

Add First Responders - Ensure that all added first responders are then added to the simulation. If the responder then accepts to join the simulation, make sure they are added to the list of participators. *Compare list*

Prompt for Real Emergency - Ensure that if a real emergency occurs during a simulation that the emergency response planner is notified and has the ability to immediately end the simulation. *Compare list*

End Simulation - Ensure that the simulation is no longer ongoing after the emergency response planner ends it. It should be removed from the list of emergencies. *Compare list*

Export Simulation Data - Ensure that the simulation data is correctly exported as an entry to the simulation database, and that the emergency response planner is given access to the results. *Compare Objects*

12.1.8 Planner:

Receive data - Ensure when a simulation concludes, the correct data is exported to the planner. *Compare Objects*

13. User interface standards:

13.1 Design Standards:

Each user type (user, operator, first responder, and planner) will have their own interface layout, but all of them will have the same general layout standards. In the top left corner there will be info about the user type, username, and user id. Moving along the side to the rest of the top of the interface, each user will have general options as creating emergency reports, view settings, and logging out. If a user has the ability to view special details about an emergency, such as a list of public in danger or update reports, then these options will be presented to them along the left side panel. The remaining majority space will be used to display by default the current list of emergencies. If the user has the ability to select other information (like the list of public members in danger) it will remove the list of emergencies and then be replaced by this new info if selected.

13.2 First responder interface:

First Responder [User name] [User ID]	Home	Create reports	Setting	Log out
	Emergency 1			
Details	Emergency 2			
Instructions				
Public in danger	Emergency 3			
Updates				

- a. User type (first responder), user name and ID number are shown on the top left corner of the interface.
- b. The home page shows all the emergencies that the first responder needs to deal with. By clicking on each emergency, it will show the detail information of the corresponding emergency, the instructions, a list of public that currently in danger as well as the history of all the reports.
- c. “Create reports” button allows the first responder sending reports and updates about an emergency to the operator.
- d. “Setting” button allows the first responder to change notifications, sound, language, font, etc.
- e. “Log out” button allows the first responder to log out.

13.3 Public interface:

Public [User name] [User ID]	Home	Create reports	Setting	Log out
Emergency Info Instructions				
Navagation system				
Mark in danger				

- a. User type (public), user name and ID number are shown on the top left corner of the interface.

- b. The home page shows the emergency information near the user. It also shows the instructions and navigation system. The public user is able to mark themselves in danger by clicking the “Mark in danger” button.
- c. The “Create reports” button allows the public user to send reports about an emergency they spotted to the operator.
- d. The “Setting” button allows the public user to change notifications, sound, language, font, etc.
- e. The “Logout” button allows the public user to log out.

13.4 Operator interface:

Operator [User name] [User ID]	Home	Seach plans	Notify first responder	Alert public	Log out
					Setting
Public reports	Emergency 1				
First responder reports	Emergency 2				
Public in danger					
Details	Emergency 3				

- a. The user type (operator), user name and ID number are shown on the top left corner of the interface.
- b. The home page shows all the emergencies that has been reported by either public users or first responders. By clicking on each emergency, it will show a list of public reports, a list of first responder updates, a list of the public who currently in danger, and the emergency details.

- c. The “Search plans” button allows the operator to search plans in the emergency planner database.
- d. The “Notify first responder” button allows the operator to send emergency details and instructions to first responder.
- e. The “Alert public” button allows the operator to send emergency details to the public in the area where emergency happens.
- f. The “Setting” button allows the operator to change notifications, sound, language, font, etc.
- g. The “Logout” button allows the operator to log out.

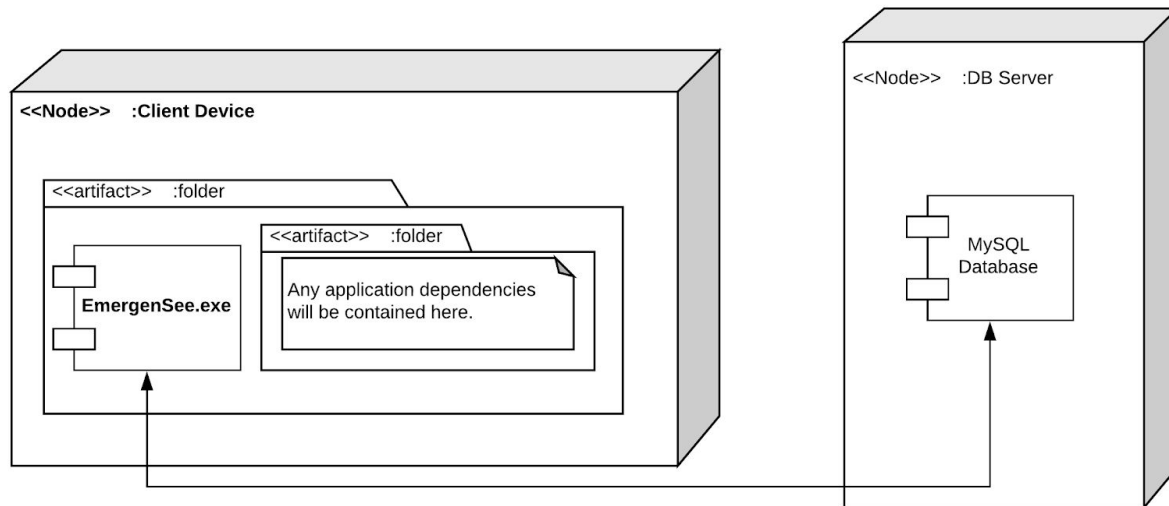
13.5 Emergency planner interface:

Emergency Planner [User name] [User ID]	Home	Create Sim	Operator reports	Setting	Log out
Export data Details	Simulation 1 Simulation 2 Simulation 3				

- a. The user type (emergency planner), user name and ID number are shown on the top left corner of the interface.

- b. The home page shows all the simulations that has been finished. By clicking on each simulation, it will shows the detail of that simulation. Emergency planner is able to export data by clicking "Export data".
- c. The "Create Sim" button allows emergency planner to create a new simulation.
- d. By clicking on "Operator reports" button, emergency planner will see all the reports sending from the operator, requesting new simulations that have not been in the current database yet.
- e. The "Setting" button allows the emergency planner to change notifications, sound, language, font, etc.
- f. The "Logout" button allows the emergency planner to log out.

14. Deployment Diagram:



15. Installation:

To use the application, the user must first download the installation file for their given operating system from the provided Google Drive link. The installer will be on Google Drive for easy and simple accessibility. Once the installer is downloaded, the user must run the installer which will then go through a series of prompts for installation, such as install location on a desktop. Once all prompts are complete, the installer will create a folder in the designated location containing the EmergenSee application executable and a folder containing any application dependencies (as shown in the deployment diagram above).

Once the application is installed, the user should be able to run the executable where they will then be prompted to login. The user must have network access in order to connect to the application server containing the database. Once logged in, the user will then have access to the interface of their user type.