University College Cork, Ireland
Coláiste na hOllscoile Corcaigh

CORK UNIVERSITY BUSINESS SCHOOL

IS6611 FINAL BUSINESS PLAN

1ALERT APPLICATION

Group 1

Yoshita Bangalore Vijayakumar
Neha Thakur
Nirmal Kumar Mathiyazhagan
Mayur Shailesh Sawant
Aman Sri Narayana

Submission Date: 16/07/2021

Table of Contents

Executive Summary

Effects of climate change are evident around the world through weather anomalies, untimely rains or the recent wildfires in California and Australia. This translates into a rather unfortunate fact that natural calamities are bound to occur more frequently than before. The US faced 16 natural calamities in September 2020 alone and each incurred economic destruction amounting to more than $1 billion. (Andrea Thompson, 2020) Governments are investing billions for disaster management annually. However, disasters can be unpredictable and are often disorganized and chaotic when they occur. Ragini et al. identifies 3 main stages of disaster management viz., (1) Planning and preparedness, (2) Impact and response, (3) Mitigation. (Ragini et al, 2018) Thus, during a disaster it is crucial in reaching out to the affected people for help. However, because of no or minimum direct communication with the immediately affected people, the disaster management team has to rely on incomplete or incorrect information or messages. This demands for a solution to bridge the communication gap between the affected people and the disaster management teams.

When we consider the technological advancements that we have made in computing or big data domains, we have not leveraged it ahead of a primitive level for disaster management. Qadir et al. believe that big data tools can be of great use to process huge amounts of disaster-related data to provide a helpful insight of the dynamically changing disaster situations and thus inspire a fruitful response for aid. (Qadir et al, 2016) However, when we consider the emergency and disaster management solutions already available in the market, most of them are either merely informative services, or they are meant for smaller geographical areas, or they lack the optimization component in their solution.

The proposed solution: 1Alert, which is a robust, easy to use mobile application covers all the above-mentioned shortcomings of the present emergency and disaster management solution. Apart from sending alerts only for disasters, the application goes a step further and covers almost all the emergencies that an individual may find himself in. As the application and its service would be collaborated with local government and municipal bodies, with a view to scale up the geographical cover from cities to counties to entire countries, this application can potentially be a universal medium to use during times of distress. Direct collaboration with the government bodies ensures that the application and its service would be free of cost for the civilians. Apart from just generating alerts which would be sent to the respective authorities, the application makes use of optimized machine learning algorithms to assign priorities to the

victims based on various circumstantial details. The responders would thus have access to a better picture of the situation and can make informed decisions, thus reducing human and financial losses.

This report provides an in-depth analysis of the entire business plan and unfolds all the nitty-gritties inherent to this project. The product/service section provides an entire overview of the application and the technology supporting it. A thorough market research was carried out in order to understand how the current disaster and emergency management market looks like, what are the factors which impact this market, provides an insight of the different competitors in the market and then the value that this product delivers to the customer has been highlighted. Considering the criticality and rising demand in the market for disaster and emergency management solutions, there are ample of marketing channels available which could be harnessed to promote the product into the masses. Further, the operational details and requirements have been illustrated for making sure that there are no loose ends left to address. Financial analysis is the lifeblood to keep any business running up and forward and all the financial granularities like the expenses, revenue, sales projections, return of investment etc. have been discussed in the financial section of this report.

The product that is being proposed is meant for general safety of the public during disasters and emergencies. Placing the motto of humanitarian logistics at the centrepiece of our product's campaign, we are appealing to the authorities who are responsible to tackle such disasters and emergencies to come forward and join hands in creating a safety net for its citizens.

The Problem

Disasters or accidents give rise to formidable demands from its victims. The effort taken to meet these demands can create unique problems which can further convolute the response efforts. In such unpredictable times it is vital to have a sense of urgency, minimal operational friction and a coordination between different agencies which are trying to help (Karagiannis et al, 2017). Disasters or accidents being dynamic in nature, may give rise to new necessities which may call for suitable changes for its response. It happens that by the time the response teams learn about this, it is already late.

Multiple helping hands lead to multiple decision-makers; and this coupled with a massive information inflow, could severely cripple the response system (Karagiannis et al, 2017). According to Karagianis et al., the decision-making speed is equally important during a disaster and by the time some decisions are made they are no longer rendered useful. It was also studied that the more the organizations who share jurisdiction and made decisions based on remote information, the more it slows down the decision-making (Karagiannis et al, 2017). In the absence of a strong ground report right from the affected people, the Government may find it difficult to estimate the magnitude of the help that is required. An underestimation of the disaster could be a fatal blunder and would lead to the Government not mobilizing its resources well.

If there was a centralized information system which all these agencies could leverage, it would help them to fast adapt to the changing disaster response requirements and help them make quick decisions and dispatch help accordingly. However, currently in the disaster and emergency response market, there is barely any solution which provides a streamlined system which collects data, analyses it, sends alerts, and further summons the required authorities based on the location. The current market alternatives provide solutions pertaining to a particular disaster or situation. For example, Siemens provided a fire system monitoring solution; but it is limited to fire-related emergencies in smaller premises. Also, there are a number of mobile applications which send SOS alerts in situations of distress. However, they are just informative services, and moreover they contain several in-app purchases. The aspect which most of these solutions lack is optimizing the response strategy. Our proposed product which intends to merely benefit the victims would bring response teams, government agencies, NGOs, hospitals etc. under one single umbrella by collaborating them together. It would also

send the respective department precise victim details so that they can optimally plan and utilize their resources to save the victims and minimize human and financial losses.

Product/Service: 1Alert

Influenced by the "911" which is an emergency response framework implemented in the USA, we have developed a mobile application "1Alert" that will help the victims during any kind of distress to notify and receive assistance from the appropriate help centres. We have chosen to develop an application as an alternative for making calls. In case of busy calling lines, bad network, noisy environment which is commonplace during disasters, the victim being specially abled or the victim unable to speak due to trauma, the use of a mobile application would be more convenient as compared to a physical phone call. We believe that during disasters, it is important that all the scattered agencies and help centres like hospitals, fire brigades, police stations etc. are brought under one umbrella and work in synchronization and have access to accurate ground level data. This data can help in analysis of most frequently occurred disasters, the cause of disasters and most affected areas which can help in predicting and preparing the natives in prior and our application aims at facilitating this.

The rationale behind choosing the name "1Alert" for the mobile application is that an alphanumeric name would take up the top position in the list of mobile application tray of every individual's phone making it easily accessible, especially at the time of distress. The mobile application will thus collect live data from the victim at the disaster or emergency site. The step-by-step process of real-time application usage is explained in the following section.

Lead Users

The lead users for this application could be anyone who is a victim of any disaster or accidents or is stuck in an emergency and needs immediate attention or anyone who witnesses any kind of disaster nearby and wants to send help for the victims which could be a family member, friends, or even strangers. Especially during disasters, where a lot of people are affected, they try to emergency helplines for assistance, but with this heavy traffic it can be difficult for the help centre to prioritize people in the queue based on the criticality and there are high chances that the person who needs the response in the earliest might be unknowingly neglected which might lead to fatal consequences. To overcome such situations, this application considers time and disaster recovery management as the crucial factor and help the

government agencies and help centres/NGOs to send help to right people at right time, in the most optimal way possible.

Identifying the Stakeholders

The stakeholder map gave our team insights of the key stakeholder and their relationship who are basically the people who are involved in the service or somehow affected or are influenced by it. This toolkit as shown below in the screenshot helped to identify those who provides/performs the service, those who are directly impacted by this service and finally those who are indirectly impacted by the service. The reason why stakeholder map is an excellent resource for the team because it helps to get proper information of all stakeholders involved which is essential for a project to keep going towards success.

With the help of the stakeholder map, we were able to set a primary target who would be the mobile users who wish to seek assistance at the time of need, the govt agencies such as "Enterprise Ireland" and local authorities with whom we would like to collaborate with for funding and expansion of our business.

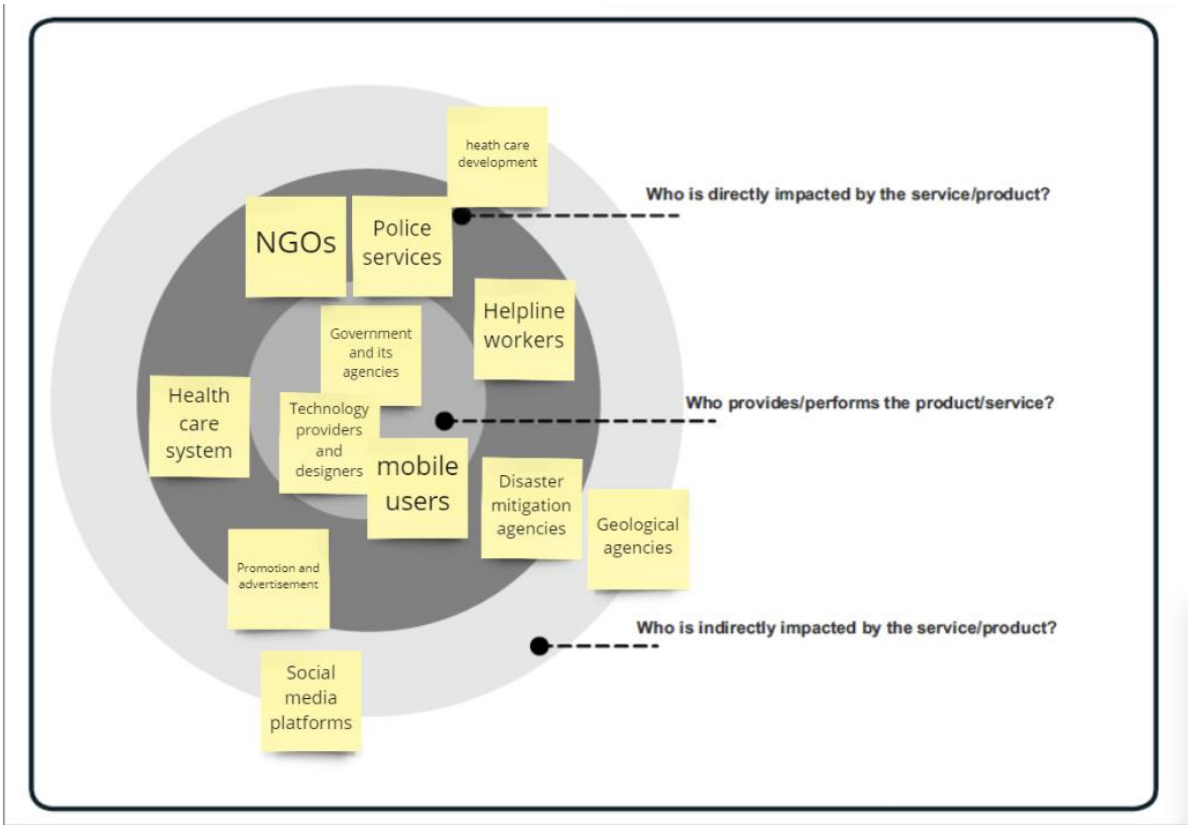


Image: Stakeholder map

How does 1Alert work?

"1Alert" is an android mobile application designed with simple to use user interface, minimum content and minimum screens which enables the users to quickly seek for assistance. To use this application, the users will have to download it from the Google Play Store (or AppStore in the future once the application is released on iOS platform) on to their mobile devices. Once the application is downloaded, the users are required to fill out vital details such as name, mobile number, email, age, gender, address, emergency number, blood group and password. This will be a one-time registration and the application will be ready to use.

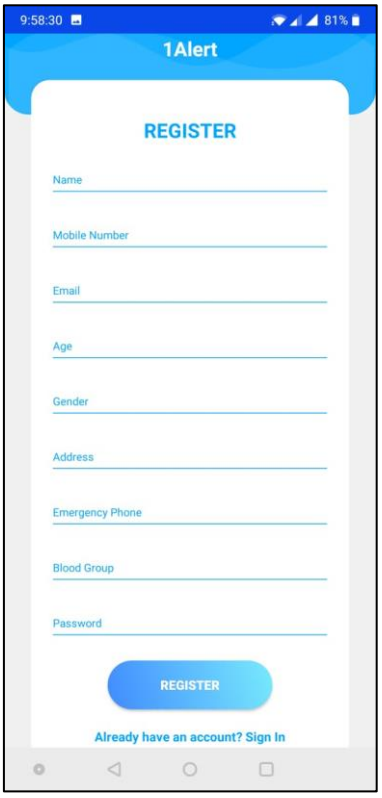


Image: 1Alert Registration Page

At the time of distress, the person can use the app by entering the log-in details and choose the appropriate option from the list of situations mentioned as shown below.

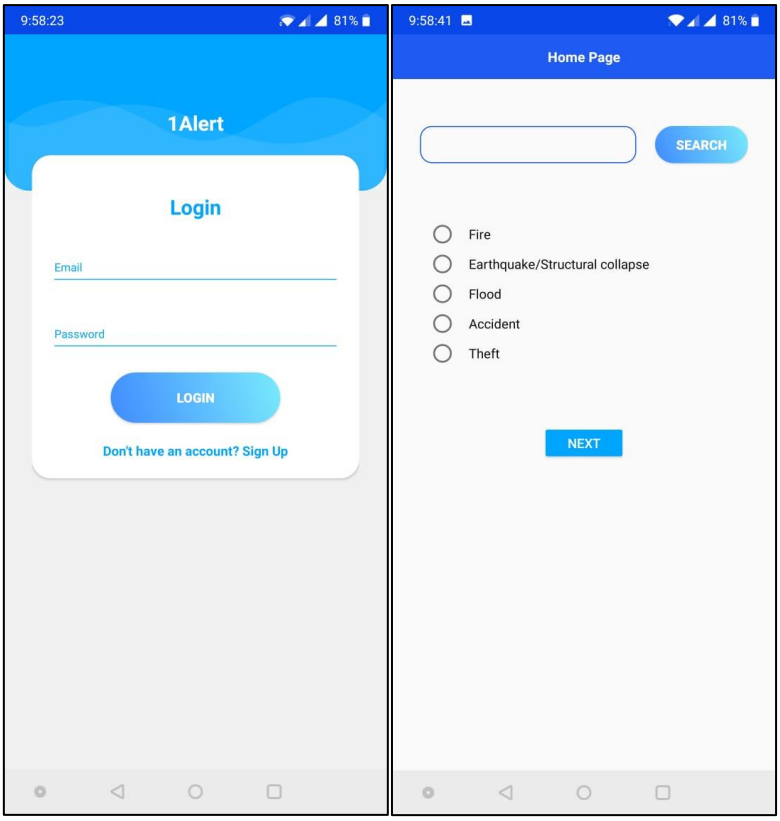


Image: 1Alert Login and Home Page

The user is then given an option of selecting the assistance is needed for themselves or the user can be a witness and seek help for others in distress by selecting the “others” option. An option to add the number of dependents (as in the number of people in distress with them) has been provided which would help the authorities to have a rough idea about the expected number of victims. The application also provides a text box which enables the user to provide any additional information that could of help for the authorities.

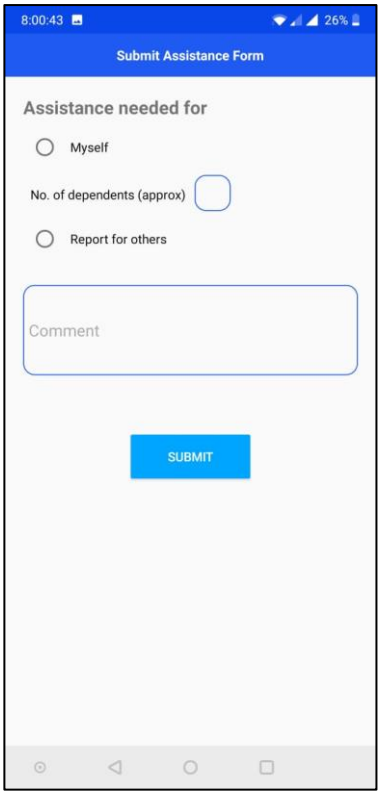


Image: Assistance Form

Upon clicking the “Submit” button, the option of enabling the location is provided if it is not enabled initially. Once GPS is enabled, it would help the authorities to send help based on the received geolocation.

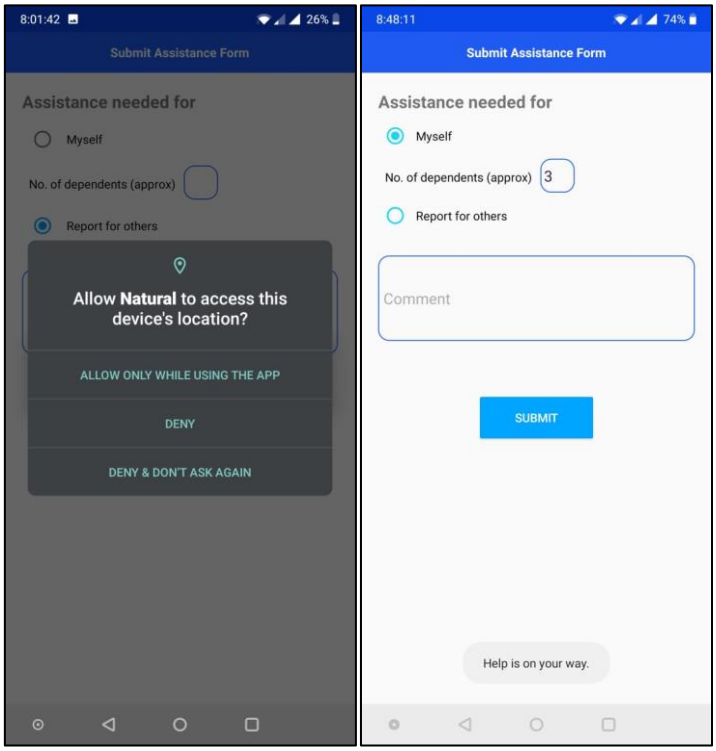


Image: GPS Enable Option and Assistance Request Submission

Activity Diagram

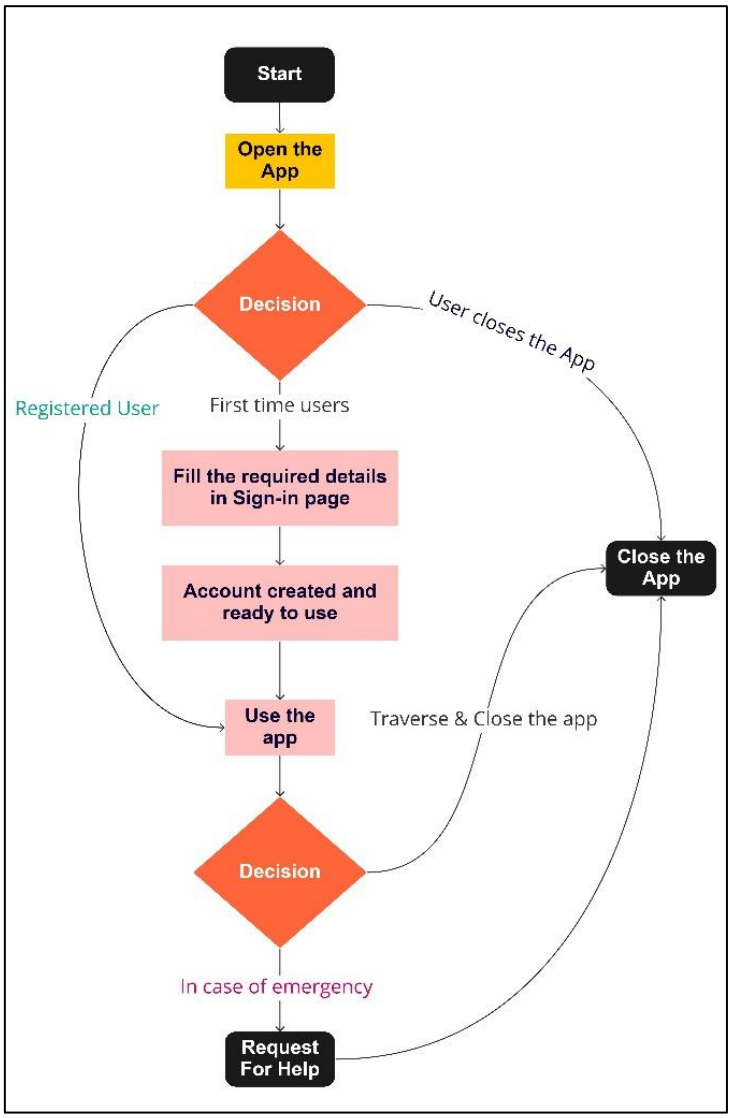


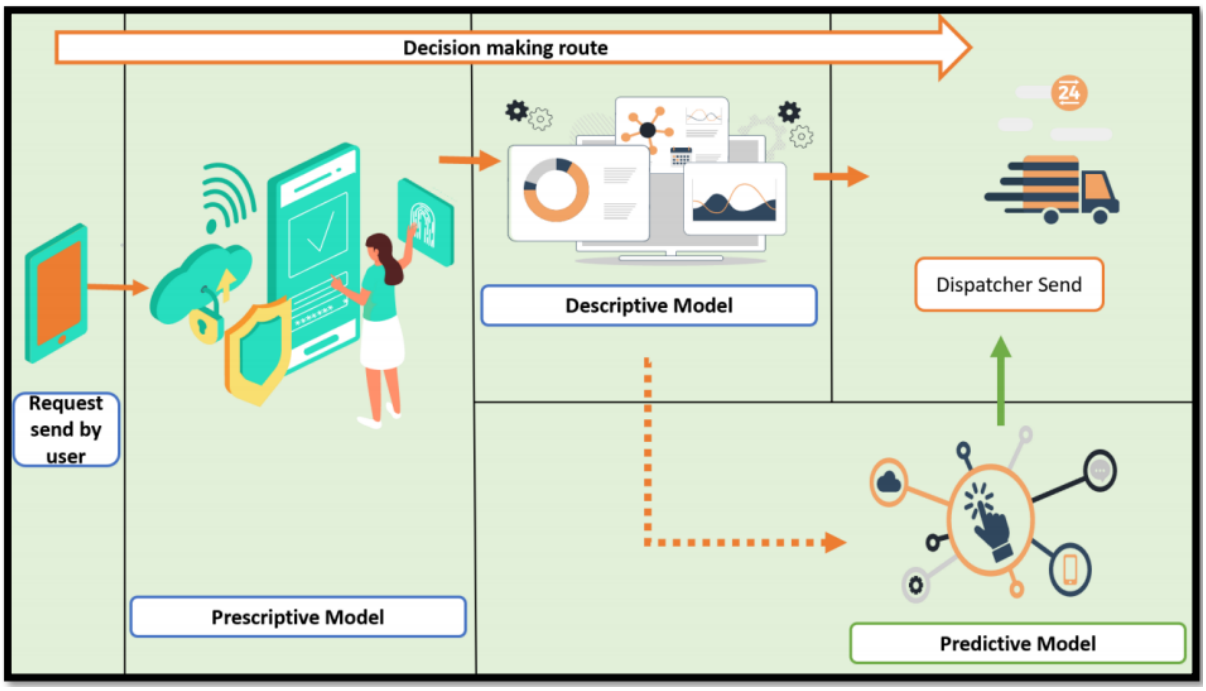
Image: Activity Diagram

To describe the dynamic aspects of our system and to show the various activities provided by our service at various levels, we have used Activity Diagram. It has helped us to demonstrate the workflow the application and clarify any complication in the use cases. It has also played a huge role in simplifying and improvising the use cases of our application.

When a first-time user opens the application, they are required to register themselves with appropriate details like name, age, blood group, etc. to create an account. Once registered, the users can then use the application in case of emergency to request for any kind of assistance from the authorities or simply close the application if they do not want to.

Stages of Development

Analytics Pipeline



Prescriptive Model

When the application is logged in, the user is given a choice to choose from a list of situations. The data then collected from the application is cleansed to remove any incorrect or duplicate data from the dataset. It is then processed where severity for the situation will be assigned to set the priority. The severity is assigned by the developer based on parameters such as “age”, “gender”, “type of situation” and “no. of dependents”. This prescriptive algorithm runs in regular intervals so that all the data between each run will be captured and processed to produce an appropriate priority list.

As part of future enhancement, prescriptive analytics can be used for route optimization. This would ensure further reduction in the response time and would help the authorities reach the victim in a minimum amount of time, by following an optimal path.

Descriptive Model

Based on the priority of the situation, an alert is sent to the Disaster Recovery Centre where they can decide on the type of dispatch to be sent to the location based on the situation. The location can be traced from the geolocation of the request received.

Predictive Model

For now, the severity of a situation is assigned by the developer based on the different parameters. This can be optimized in the upcoming versions using Machine Learning where the code will automatically be able to assign the severity on its own based on its previous analysis making it eligible for the future scope. Also, the data collected can help in analysis of most frequently occurred situation, the cause of situation and most affected areas which can help in predicting and preparing the natives in prior.

Preliminary Investigation

In order to demonstrate the proof of concept, a dummy data set was created with 300 users records and 83% entropy. The format of the dummy data set was identical with the data received from the 1Alert mobile application. Below Priority Catalogue was used as the base for the predictive modelling of the dummy dataset.

Priority Catalogue

Rank	Criteria	Priority Order
1.	**Situation**	1. Accident 2. Earthquake/Structural collapse 3. Fire 4. Theft 5. Flood
2.	**Gender**	1. Female 2. Male
3.	**Age**	1. 60-above 2. 0-20 3. 40-60 4. 20-40
4.	**Number of Dependent**	1. 5- above 2. 0-5

Priorities were calculated and assigned to the victims by using the formula mentioned below. If a victim is assigned Alert 1, then it has the highest priority followed by Alert 2 and Alert 3. Alerts (1,2,3) were assigned by taking the ceiling values of the result obtained from the below mentioned formula.

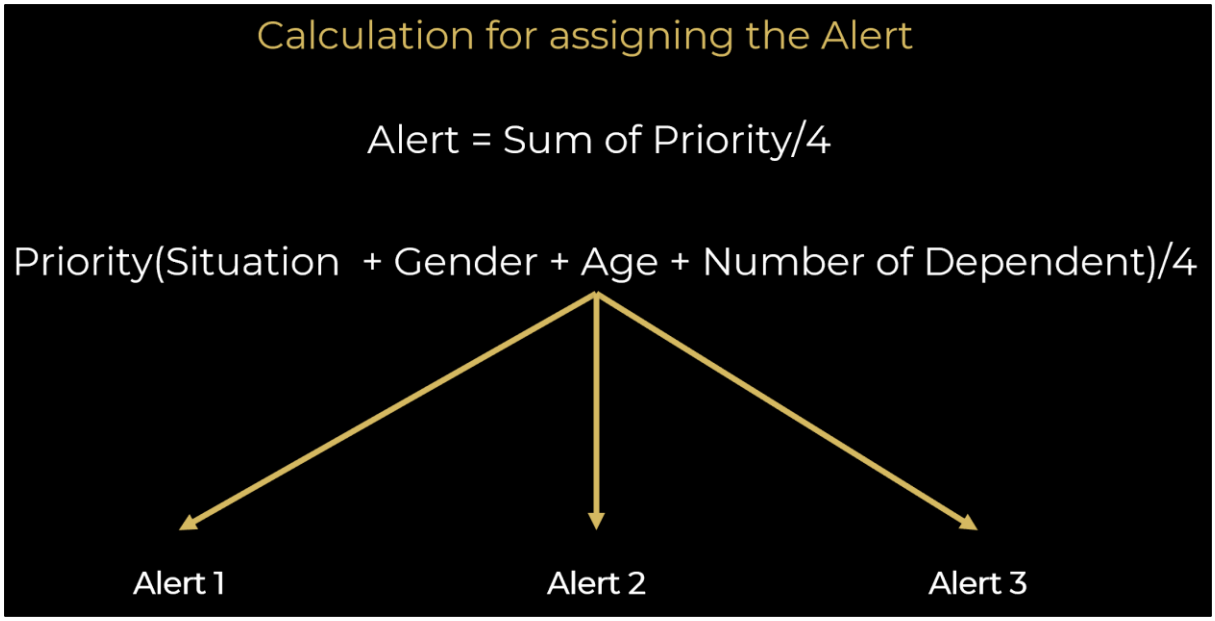


Image: Formula for calculating priorities

For example:

Imagine a situation, where a 60-year-old lady met with an accident! In this case the alert would be set using the above formula i.e.,

Alert = Sum of Priorities (accident+ Female+ 60-year-old + with no dependent)/4

= (1+1+1+2)/4

=1.25 ~ = 1

So, alert assigned would be 1.

Information Gain

The information gain for the dummy data set clearly highlights that the "Number of dependent" attribute has the highest information gain. This means that this attribute has the highest impact on the dependent variable, which in this case is the priority level. Thus, the priority level would be highly influenced by the number of dependents stuck with the victim, followed by other parameters.

```
> information.gain(Alert~., training_set, unit="log2")
                    attr_importance
    Situation            0.10429770
Request.For              0.12640622
Number.Of.Dependents     0.28066051
Age                      0.10235525
Gender                   0.02776095
```

Analytical Modelling Technique

In order to build the predictive model, 5 widely used machine learning algorithms were used which are as below.

1. Kernel SVM
2. Naïve Bayes
3. Decision Tree Classification
4. Random Forest Classification
5. Decision Tree classification using C5.0

The Dummy data set was divided into training and test data set with a splitting ratio of (80:20). The 5 models were then built and trained on the training data and in order to test and evaluate the performance of the models, parameters like Accuracy, Kappa Value, Sensitivity and Specificity of all the 5 models were compared.

Classification Model	Accuracy	Kappa	Sensitivity	Specificity
Kernel SVM	0.9167	0.8135	0.8095	0.7727
Naïve Bayes	0.8333	0.6355	0.6667	0.9231
Decision Tree Classification	0.9167	0.8232	0.8571	0.9487

Random Forest Classification	0.9	0.7857	0.8095	0.9487
Decision Tree Classification using C5	**0.9333**	**0.8524**	**0.8571**	**1.0000**

As evident from the above comparison table, C5 model was leading in terms of all the performance parameters. The confusion matrix built for C5 on the test data provided an accuracy of 93.33%. Thus, based on the model testing and evaluation of the performance parameters, C5 was finalized to proceed with for making predictions on the live data.

The finalized C5 model was built using R Programming language which created a decision tree classifier as depicted below.

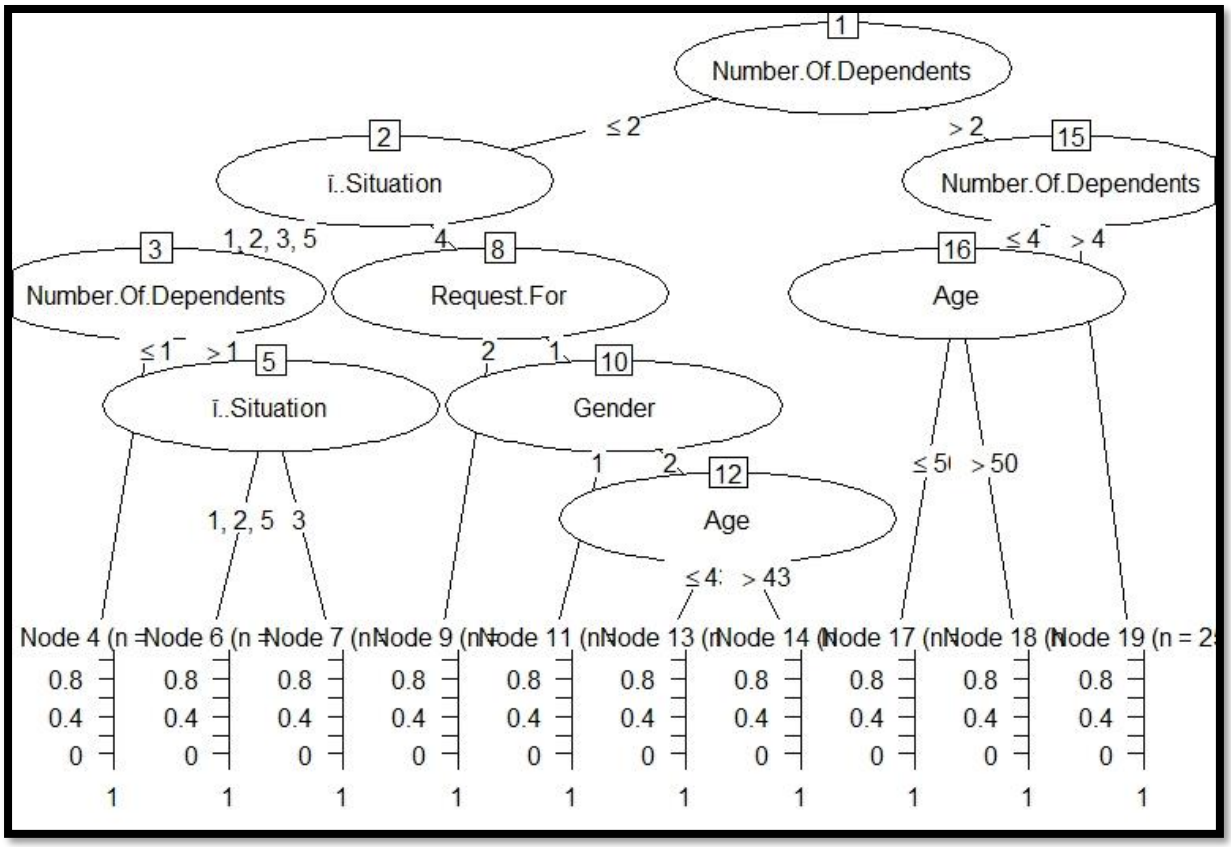


Image: C5 Classification Tree

In order to visualize the application metrics, a dashboard was required. Hence, an admin panel was created which could showcase the number of current users and the requests being raised.

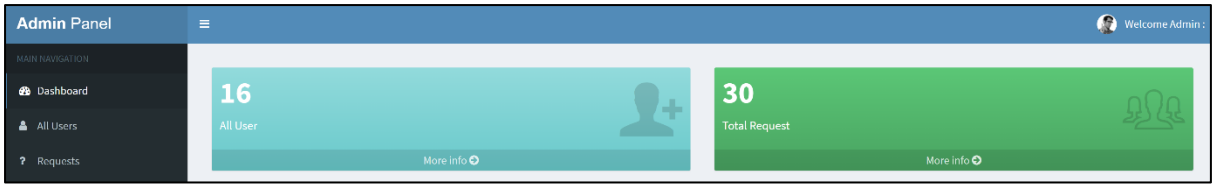


Image: Admin Panel

The request list allows to view the live data and can be downloaded in CSV and Excel formats. This live data set was then analyzed by extracting it as a CSV file and then using the C5.0 predictor, which is discussed above, the alert priorities were assigned.

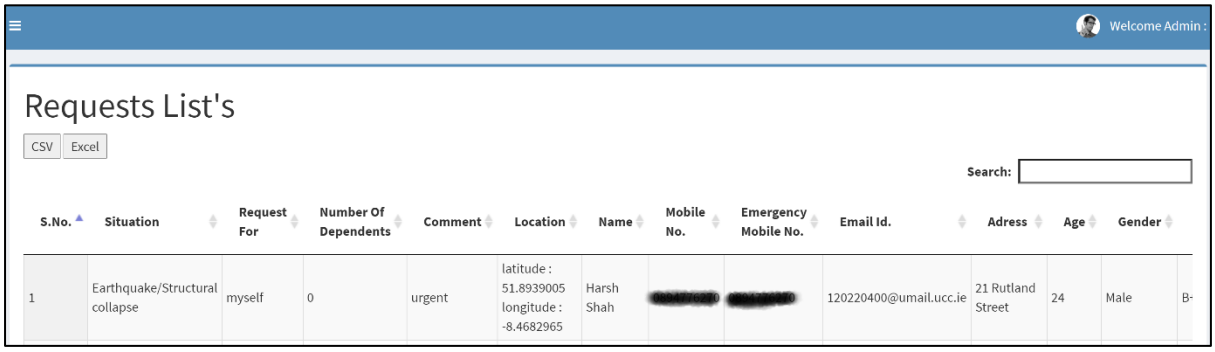


Image: Request List

A better visualization of the live data was built using a Tableau dashboard which is depicted below.

Image: Tableau Dashboard

Future Scope for Expansion

If the 1Alert application is meant to make a mark on the disaster and emergency management market in the future, the application would call for many enhancements so as to increase the number of users and cover a majority of the European market. Some of the strategies which form a part of a future scope to this application are discussed below.

1. **New Features**

   As an application upgrade, we would be adding more options for the list of situations and provide the users with an option of uploading a photo or a video of the current situation which would help in getting better clarity of the situation. Also, as we expand the availability of our application to other regions/countries, we would be performing localization for the application making it easy for the non-english speaking users.

2. **Third-part Integrations**

   The functionality of the application can be extended with the thrid-party integrations which can help in faster "Go To Market". The "Go To Market" strategy mainly focuses on utilizing the resources from the outside to deliver a unique value proposition to the customers which can help in achieving a competitive advantage in the market.

3. **UI/UX Optimzations**

   Changes to the current design of the application or adding new functionality to the design can help in increasing the efficiency and productivity of the application.

4. **Performance Evaluation**

   To monetize the application and grow our users, we can ensure the performance metrics are high by considering the parameters such as active users, session time and retention time to know the total no. of users, the amount of time spent in the application which will give a better idea about customer satisfaction.

5. **Addressing User Feedback**

   With the help of feedback got from the application users, it will help us get a better understanding of what went well and what did not, and improvisations can be done based keeping them in consideration.

6. **Multiple OS and Device Compatibility**

   Making our application compatible to new OS platforms and other devices will help in reaching out to new users while delivering strong performance.

7. **Commercial Version of the Application**

   Making commercial version of the application that can be used by other private sectors for their internal usage with similar needs can help in expansion of our business.

Market Research

Market Size

A lot of research and surveys have been conducted to study global disaster and emergency management market by various market research companies like MarketsandMarkets Research, GlobeNewswire, Allied Market Research. This research has been instrumental to study and analyze the market for the 1-Alert application.

The total market size for the disaster and emergency response market varies slightly according to the market research company. GlobeNewswire's calculations say that in the year 2019, the global market cap for this domain was about $107 billion and was estimated to grow to $148.5 billion by the year 2024 at a Compound Annual Growth Rate (CAGR) of 6.8%. (GlobeNewswire, 2019) MarketsandMarkets Research on the other hand has calculated the total market cap to be $117.2 billion in the year 2020 and has predicted the market size to rise to $156.1 billion by the year 2025 at a CAGR of 5.9%. (MarketsandMarkets, 2020) Allied Market Research's figures indicate a market share of about $76 billion in the year 2017 and projected the market to growth up to a massive $423 billion by the year 2025 at a CAGR of 24.2%. (Allied Market Research, 2018) Allied Market Research's numbers seemed to be overly ambitious considering the other two research companies. Thus, going the majority, the global market size for the 1-Alert application can be considered as $107 billion as of 2019.

Total Available Market (TAM)

There are various factors which are driving the need of disaster and emergency management solutions around the world. Although these driving factors are discussed in the following section of this report, it is important to note that the rising need for these solutions is a matter of concern globally. Thus, for 1-Alert application, which acts as one of the many solutions in this domain, the total available market (TAM) is the global disaster and emergency management market which stands at a valuation of $107 billion as of the year 2019 which has been discussed above.

Serviceable Available Market (SAM)

The start-up in its early years intends to target the European region for its business expansion. As the start-up is based in Ireland, it would start with local cities in Ireland and then cover the entire country after which it would expand initially to the neighboring countries.

Disaster and Emergency Management Market research indicates that European market share in this domain is about 40%. (European Commission, 2021) Thus, the serviceable available market (SAM) is 40% of $107 billion which is about $42.8 billion.

Serviceable Obtainable Market (SOM)

The practical market which can be garnered by the start-up is further narrowed down from the SAM. The main factors which narrow downs the SAM is the current mobile OS compatibility. The 1-Alert application is currently available only for Android OS platform, which filters out all the iOS users. The total ratio of mobile users in Europe who have Android phones is 71.22%. The major reason for such a high ratio is that there are a lot of mobile companies in the market which deploy Android OS on their phones, as compared to iOS which is restricted only to iPhones. (Market Share of Leading OS, 2021) Considering that about 40% of these android users would use the 1-Alert applications, the sales projections and revenue from the SOM has been calculated in the following sections of this report. 40% is a practical and modest ratio which is being considered. Based on the sales projections and the total income during the first 3 years, the serviceable obtainable market (SOM) comes down to approximately $250,000.

Customer Profile

1-Alert application has 2 separate customer profiles which are being targeted via this business plan. These 2 profiles are as follows:

1. **Local governing / municipal bodies**

These bodies or authorities are government institutions whom the company is considering its primary customers and thus, a major chunk of the total revenue would be generated from this customer profile. The company aims at targeting the bodies pertaining to small cities, and then increasing the geographical coverage from cities to counties and finally bringing many counties together until it has the whole country under its umbrella.

The company intends to sign contracts with these local bodies which would initially be on a monthly basis. Once a contract is signed, that city can leverage our application and our framework of a cohesive disaster and emergency management solution which has an integration of different response teams and departments like police, health services, rapid action forces, NGOs etc. As discussed above, the contracts would be extended from local cities

level to county level authorities and then finally with the central government of the country. The revenue generated from these contracts would be critical for the company's growth.

2. Civilians

These are the end-users of the 1-Alert application. The civilians living in a city/county/country which has an active contract with the company can make use of the application to send SOS alerts and distress calls under critical and emergency situations. These civilians, based on the situation, the surrounding scenario and the condition they are in would be given suitable priorities, which would help the responders attend to them in an optimal time.

1-Alert application is intended to help all the civilians who are under distress owing to disasters and emergency situations and thus, would not charge them to use the services. Thus, there is no revenue generated off these civilians. Only a passive revenue would be generated in the case of civilians which would be sponsored by Google from the application downloads from Google Play Store (since current version of the application is only supported by Android OS).

Market Trends

The study of the disaster and emergency management market has helped to devise 4 major factors which are strongly influencing the market. These 4 factors are discussed below.

Increasing Market Demands

Climatic changes arising out of global warming and other ecological factors are causing an increase in unpredictable climate extremities and disasters. Such disasters have caused enormous financial losses too. To put it into numbers, the world economy suffered losses of about $306 billion in the year 2018 because of such calamities. (Allied Market Research, 2018)

World has been witnessing an increase in number of riots, mob attacks and terrorist attacks in the recent years. In the year 2019, the European region witnessed 110 terrorist attacks, which is a concerning number. (Statista Research Department, 2021) These reasons have led to an increasing need of safety and security solutions, formulation and implementation of regulatory policies for public safety and an overall need of emergency preparedness.

Lately, there has been a global trend of developing smart cities which call for intelligent evacuation, surveillance and alerting systems. (Allied Market Research, 2018) The commercial and industrial segment is placing safety and security systems as a centerpiece of their planning

and infrastructure and thus drives a sharp growth in demands for solutions. (GlobeNewswire, 2019)

All these factors are providing an impetus to drive up the demand in the disaster and emergency management market.

Smartphone Penetration

Smartphones, even though is an invention of just the last decade, have today become an indispensable part of our lives. The convenience and flexibility that these small devices provide is unparalleled. With the onset of Covid-19, where the world has shrunk into isolation, the number of such technological gadgets being purchased and owned is increasing even further. The global smartphone penetration rate was 49.35% in the year 2016 and has drastically grown to hit the 78.05% mark in the year 2020. (Global Smartphone Penetration Rate, 2021)

Evolving GPS Technologies

For tracing out the location of the victims correctly during the disaster and emergency situations is critical for the success of the solution that is being provided. The current GPS technologies available in the market can detect a location within an accuracy of a few meters. However, GPS technologies which can be even more accurate are now almost on the verge of being released into the market. Ambitious entrepreneurs like Elon Musk are at the forefront of this race. The Starlink satellite project launched by Elon Musk's SpaceX contain GPS receivers which cannot be jammed, and which can pinpoint any location within an accuracy of centimeters, thanks to their advanced algorithms. (Mark Harris, 2020) Disaster and emergency management solutions which would harness this technology the earliest would make a mark on this domain’s market.

Advanced Analytics

Ever-growing development in Machine Learning and AI are driving technological revolution in the disaster and emergency management market. Better prediction methods can help predict the climatic changes and the resulting disasters in a better way, while the optimization and automation methods can help to serve the victims in the most efficient and quickest way possible.

Barriers To Entry, Challenges and Risks

Achieving Collaboration and Integration

A main USP of the 1-Alert application is that it helps the government bodies utilize their limited resources in an efficient way, ensuring that they are neither overused nor underused. For this purpose, there needs to be a uniform collaboration and integration between different departments like the police, health services, blood banks, NGOs, rapid response teams etc. Being able to achieve this collaboration and integration would be a major challenge as it would mean binding all the teams together with a common purpose of welfare by overcoming internal issues, team dynamics, biases etc.

Competitors and Substitutes

The market trends suggest that the disaster and emergency management market is growing which is also leading to a rise in competitors and their solutions which can act as substitutes or alternatives to the 1-Alert application. The key factor which would provide a competitive edge to our application would be minimizing the response times. The market player who can use the technology at their disposal in the most efficient way would have a better chance at establishing a monopoly in this market domain.

Language Barrier

As the target market for the start-up is Europe and the application is currently developed only in English language, expanding the business into non-English speaking European countries would be challenging unless the application is developed with support for languages local to the European countries that would be targeted for expansion of the product.

False Alarms

The next challenge is that of tackling the false alarms. According to multiple reports, false alarms cause losses of around €1 billion annually because of disruption and loss of productivity in business. (BRE Group, 2019) Further, they create unnecessary fear and panic among the people and leads to resources being wasted. False alarm rates can thus affect the growth of the disaster and emergency response market. (GlobeNewswire, 2019)

Finding Suitable Investors

The mobile application market is extremely competitive. Gartner report in 2018 indicated that about 80-90% of the mobile applications are abandoned after single use. (Arun

Goyal, 2019) This extreme competition with high chances of failure makes it really difficult to find suitable investors. This, coupled with a start-up based on an almost non-profitable business idea might make the investors reluctant to invest in the business.

Competitor Analysis

			
Strengths	Offers satellite communication even without mobile connectivity.	One-click alerting system. Easy to use mobile application. Internet connectivity is not mandatory.	Sites can be monitored remotely in real-time. Established market player. Very interactive dashboard.
Weaknesses	Works only on 4G phones. Hassle to use compared to a simple mobile application.	Only an informative service. Manually need to put in emergency services numbers. In-app purchases.	Currently the software is best suited only for fire safety and management. More of a precautionary software.

Our Competitive Advantage	Faster response time. Works on any android phone.	Automatically alerts concerned authority based on the situation. Free for end-users.	Can be scaled to a larger geographical area. Suitable for all kind of incidents.

Customer Value Proposition

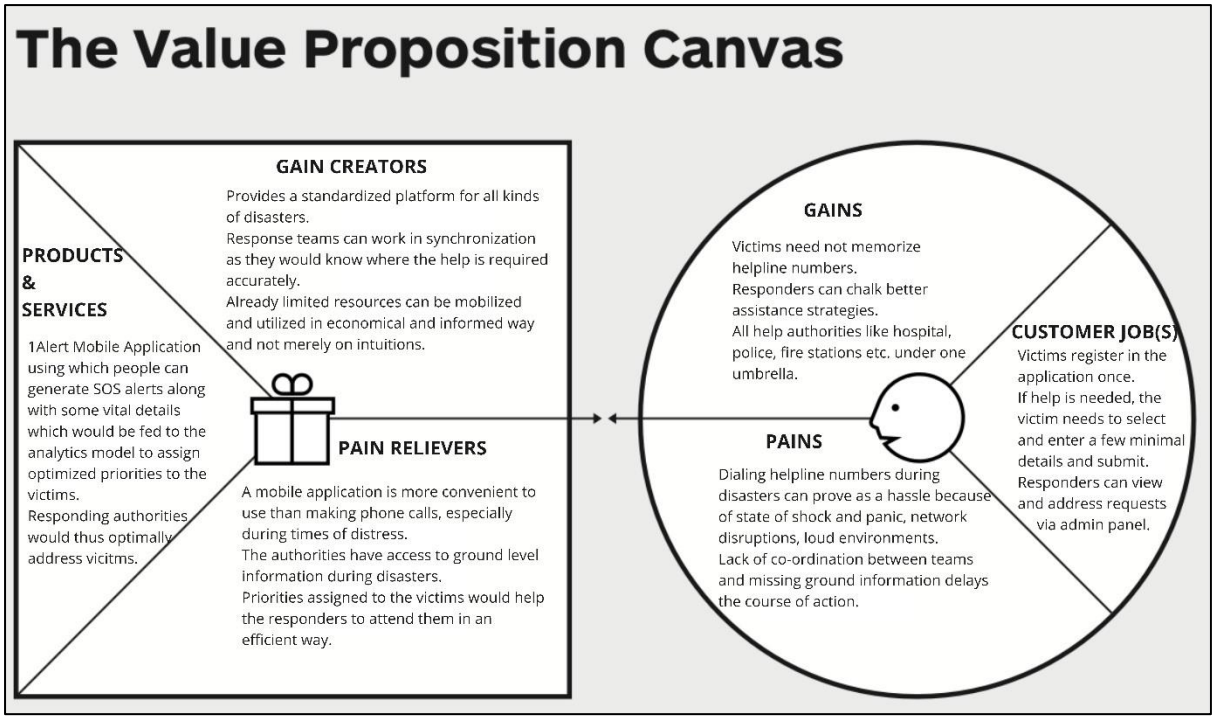


Image: Customer Value Proposition

Marketing and Advertisement Strategy

The goal of marketing for any company is to raise brand awareness, but it also helps with a variety of other factors that are important for success. Building a company's foundation, regardless of its sector, is vital in maintaining loyal consumers and establishing brand in a crowded competitive market. The elements of a great marketing plan include many aspects of a company and help to drive sales, enlist new customers, and increase brand awareness. Below are few listed effective marketing strategies that will be used for the application promotion:

Social Media Marketing

Social media platform can act as an effective tool to increase the application visibility for our target audience. Business account can be created on Facebook, Instagram, twitter or any other social media platform in which simple and unique ideas like images, GIFs, screenshots, quoted texts, blog posts can be used to engage customers. A demo video can also act as an easy and beautiful way to highlight the basic features of the mobile application. Traffic can also be generated using unique and appropriate hashtags, which these days are turning out to be a powerful feature to maximize the reach. The hashtags can be used for almost every social media channel to diversify the reach of our audience.

Search Engine Optimization

App Campaigns in Google Ad can analyse over 300 million potential signal combinations in real time to make the best selection possible for showing each ad and can act as a very powerful tool to accelerate app promotion. The benefit of using Google Ad is that, people who search for keywords and apps that are relevant to our application may see our advertisement on Google. Also, people that browse the app details page of an app that is similar to our app may also see our advertisement. App store optimization can also be used as a vital method for encouraging app downloads. The ranking of the product in app store can be improved by working on metadata like- keywords, ratings, description.

Leveraging the Government Machinery

The application is a non-commercial product and is dedicated to serve humanity. Government platforms and agencies like HSE, Garda can play a very important role in promoting the app in public. Advertising in public places through campaigns, distributing pamphlets and showcasing the features of the app can also create awareness amongst potential customers.

Online Reviews and Referrals

Improving downloads requires more than just increasing the application visibility to the audience. Once people find the application, they must be convinced enough to find the product valuable and trustworthy enough to download it. This is where reviews are useful. Reviews will not only inform potential downloaders about the quality and relevancy of the app, but they will also allow us to interact with consumers. Engaging with customers helps a brand to gain customer trust and in return further motivates them to make referrals to their known. To further encourage them small incentive can be provided each time they refer to their knowns.

Application Pre-installed in New Phones

Once, the application has gained a decent popularity, telecommunication companies like MI, Nokia can be approached to consider our application being pre-installed in their devices considering the need and usefulness of the product.

Intellectual Property

Intellectual property (IP) is a term used to refer to using one's ideas to create something new or unique. IP can come in many forms, including a new innovation, a brand, a concept, or an artistic endeavour. IP comes in a variety of different types. In today's economy, intellectual property is a valuable asset that should be effectively managed.

This section will go over the Intellectual Property that is at present relevant to our project.

Background IP

Android Studio

It is used to develop the mobile application using JAVA as the programming language. Here, Java is preferred, because the application is an android application and Java is one of Android's preferred programming languages. Java has many benefits, it is an open-source programming language, requires low investment, builds robust and secure mobile application with many other advantages. The source code developed will be secured using proper security protocols, there can be business agreements with our users or any third-party vendors.

R Programming Language

R programming language is used to perform analytical modelling. R is a robust, dynamic programming language that can be linked into BI platforms to help make the most of business-critical data. R is available as Free Software under the terms of the Free Software Foundation’s GNU General Public License in source code form. (R-Project Documentation)

Tableau

It is used for visualization to draw useful insights from the data collected. It helps in simplifying raw data in a very easily understandable format. Tableau helps to create the data that can be understood by professionals at any level in an organization.

Tableau's license agreement does not permit its users to copy, publish, frame, download, transmit, modify, rent, lease, loan, sell, assign, distribute, license, sublicense, reverse engineer, or create derivative works based on the Site, or its Materials. For the scope of this project, we only intend to use Tableau for visualization purposes.

PHP

The PHP framework is used for retrieving CSV file containing the data from the application. Since, importing and exporting csv data is very easy and convenient using PHP framework. PHP holds an open-source license and hence can be used in our project without any restrictions. (PHP Documentation)

Foreground IP

Brand Name

1ALERT brand name and icon would be registered as trademark to secure its genuineness.

Domain & Hosting

For domain name (1-alert.org) the team has used Go-daddy and for hosting Namecheap. This registered domain name would ensure that it is not used by any unauthorized entity.

Pixel 4XL API 30

This is an emulator which is used to display the working of our application in the desktop with almost all the qualities of a real android device.

Source Code

The team will retain the ownership of the source code which was created as a part of the android application development as well building the machine learning models. Apart from ensuring appropriate security measures to safeguard the technological stack used as a part of the project, contracts signed with the customers would contain elaborated details about the rights and ownership of the technology.

Operations

Personnel Details

Growth plan

Growth plans assist organisation to plan and track the growth of the organisation in terms of revenue, gaining customers, shareholders, employees etc. The below mentioned team structure explains about the growth plan of the employees for the next three years based on their skillset.

Team Structure: Year 1

The team currently consists of 5 members which will expand eventually based on the increasing requirements in future. The designations and salaries are mentioned in the table below for the first year:

DESIGNATION	SALARY(MONTH)	SALARY(YEARLY)
Developer	€ 2,240	€ 26,880
QA/Tester	€ 2,000	€ 24,000
Data Analyst	€ 2,160	€ 25,920
Digital Marketer	€ 1,920	€ 23,040
Project Manager	€ 2,400	€ 28,880

In the first year considering less traffic on the application, the developer along with handling the coding part will also take care of the support and maintenance of the application. The tester will be responsible for testing and verifying the software's functionality on a regular basis to ensure that it is safe from hackers and viruses to protect the personal information of the users. Any bug concerning the programme will be noticed and addressed as soon as possible. To avoid future difficulties, a record of all complaints will be preserved. The data analyst will analyse and interpret data to bring more users by tracking and studying different kinds of metrics like app store impressions, number of downloads, total reviews, search engine ranking, number of referrals etc. The digital marketer's job would be to create leads and raise brand awareness through digital platforms. Finally, the project manager would be responsible for handling everyday activities and different aspects of project such as schedule, finances, resources, project risk etc.

Moving forward as the project expands in second and third year, we plan to hire Cloud Architect, Business Analyst, Customer Support and Sales Executive and also provide a certain hike in the salaries of the employees every year based on the income.

Team Structure: Year 2

DESIGNATION	SALARY(MONTH)	SALARY(YEARLY)
Developer	€ 2,400	€ 28,800
Tester	€ 2,100	€ 25,200
Data Analyst	€ 2,300	€ 27,600
Business Analyst	€ 2,080	€ 24,960
Project Manager	€ 2,600	€ 31,200
Marketing agent	€ 2,020	€ 24,240
Cloud architect	€ 2,320	€ 27,840
Customer support	€ 1,600	€ 19,200
Sales executive	€ 1,840	€ 22,080

Team Structure: Year 3

At the start of third year, we estimated our company will be established in multiple places within European union, so we focus on hiring a greater number of resources in these roles as per the needs.

DESIGNATION	SALARY(MONTH)	SALARY(YEARLY)
Developer	€ 2,600	€ 31,200
Tester	€ 2,310	€ 27,720
Data Analyst	€ 2,530	€ 30,360
Business Analyst	€ 2,288	€ 27,456
Project Manager	€ 2,860	€ 34,320
Marketing agent	€ 2,222	€ 26,664
Cloud architect	€ 2,552	€ 30,624
Customer support	€ 1,760	€ 21,120
Sales executive	€ 2,024	€ 24,288

Technological Requirements

Mobile Application Cost

The cost of developing a medium mobile application costs around €38,700. (Application Development Costs, 2021) This cost structure is derived based on the following application development breakdown.

- Application functionality and its purpose.
- Mobile platforms used and types of devices that needs to support.
- Third-party integration points.
- Usage of visual objects.
- Use of in-build hardware features in a smartphone.

Hardware Cost

Our hardware requirements are limited during our initial setup of the company. We need 5 laptops that cost approximately €500 each. Therefore, in total the hardware cost will be €2,500.

Legal and Accounting Fees

Legal fees would be essential to hire a solicitor who would assist in preparing the required legal documentation as well as would defend and represent the company's legal interests. Further, the presence of an external accountant for managing and keeping a track of financial transactions can help the company's employees focus on other technical and business critical process. The legal and accounting fees will cost around € 38,500 per annum, which comes to an approximate of € 3,200 per month.

Financials

Set-up Costs

One-time Expenses

The below mentioned expenses are one-time investments for our company and it may not vary over a period.

- **Business License**

In Ireland, the cost of forming a limited company with a basic share capital and constitution is €320 including registered office. The procedure for completely register a limited company in Ireland usually takes 3 to 4 business days. (Irish Company Formation Fees)

- **Business Insurance**

The commercial insurance policies for our company have been estimate as €5,400 for the first year. Followed by €6,600 and €8,040 for the second and third year. So, the estimated cost for three years will be around €20,000.

Monthly Expenses

- **Employee Salaries**

Being a start-up company, we are planned to provide basic salary for all the employee during the first year and eventually increase the package for each employee for the upcoming years. The generalised salary split-up for the first three years is mentioned in the below table.

Employee Salaries	First Year		Second Year		Third Year	
	1 month	12 months	1 month	12 months	1 month	12 months
	€ 10,720	€ 1,28,640	€ 19,260	€ 2,31,120	€ 35,464	€ 4,25,568

- **Marketing and Advertising Cost**

Based on our study our marketing costs are expected to be about € 2,500 per month. Our marketing strategies are mainly based on social media marketing, search engine optimization, online reviews, referrals, and government support.

- **Professional and Consultant Fees**

Our estimated professional and consultant fee for our company from a third part consultant's costs around € 17,100 per annum, which comes to be rough sum of € 1,400 per month.

- **Utility Bills**

Renting an office, storage space, telecommunication, and electricity charges come under utility bills. We have an estimate of around € 21,700 per annum, which comes to an approximate of € 1,800 per month.

Sales Projections

Our sales projection is based on the number of customer/users downloaded our mobile application from play store. Our initial target is to develop this mobile application in the android platform and later expanding it to other platforms like iOS, Windows, etc. Also, during our first year, we will be planning to target the entire Ireland market. Owing to this factor we are targeting to cover 40% of the total Ireland mobile user during our initial period. Later, for the second and third year, we are planning to target the top European countries like Germany, UK, France, Italy, etc. Based on the population in these countries and the frequency of people using mobile applications with different platforms, we have an estimated sales projection for the three consecutive years.

Revenue Model

There are 3 sources of revenue for the start-up, 1 of which is significant compared to the other 2, which are more like passive incomes.

1. **Contracts with the local Governments/Municipal bodies**

This would be source of a major chunk of revenue. During the early years of the startup where the primary focus would be on garnering more customers and bringing wider geographical areas under the cover of the application's scope, the price of the contract would be € 100 per month.

2. **Play Store Downloads**

By Default, Google Play Store will be providing € 0.02 to the application developer every time if its users download any free mobile application. (How much do average applications make, 2013)

3. **Banner Advertisements**

During the early years of the application's launch, in order to support the revenue, the application would host banner advertisements of other applications or software. Every time the banner advertisement is displayed, € 0.01 would be earned.

Churn Rate

The average annual churn rate for mobile applications is around 71% within the first 90 days. However, considering the criticality of the application's utility along with the fact that the application is free to use, with no in-app purchases, would result in a low churn rate. We are considering a churn rate of about 35% annually. (Average Apps Churn Rate, 2021)

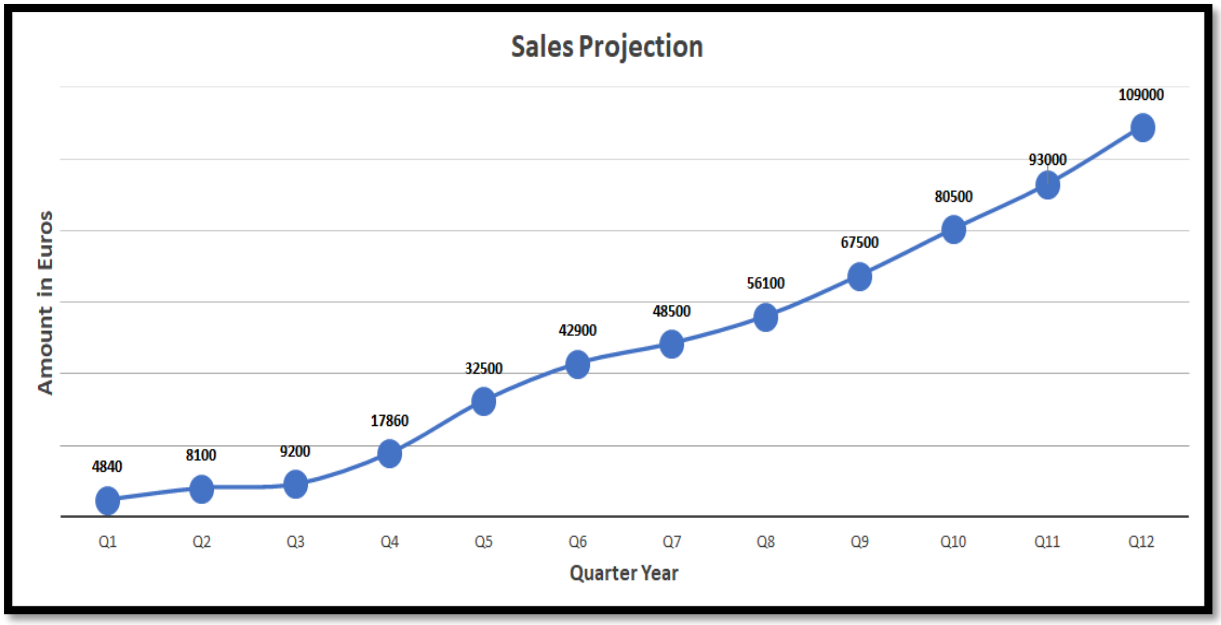


Image: Sales Projections

Based on these inferences we estimated the sales projection in the below mentioned table for the next three years.

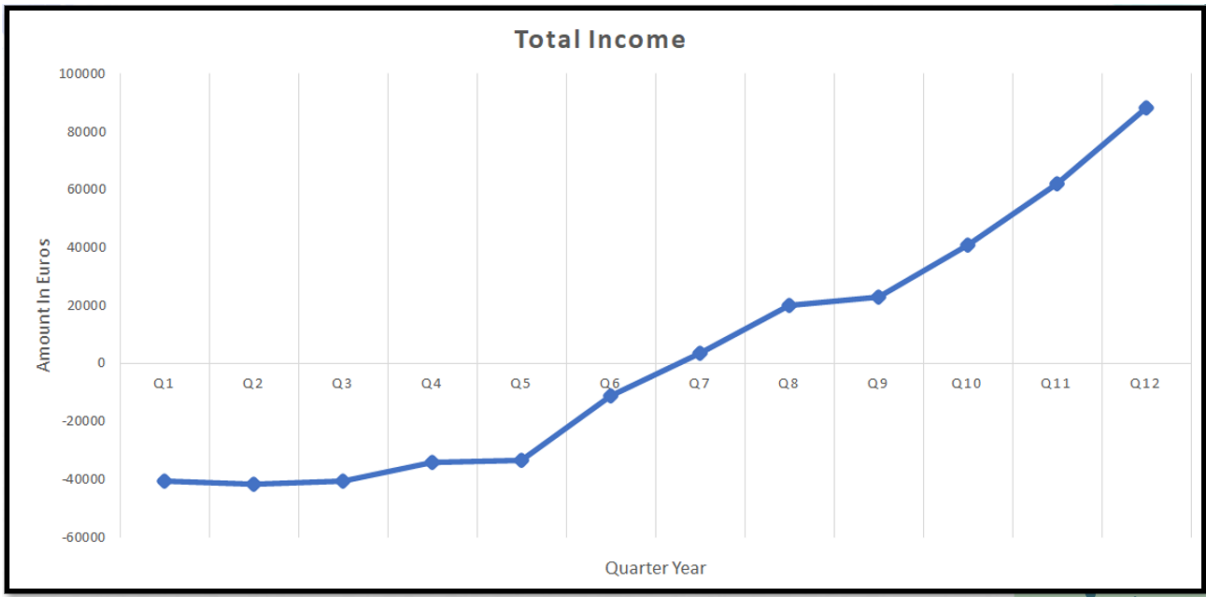
Financial year	First year	Second year	Third year
Jan	€ 1,200	€ 9,000	€ 21,000
Feb	€ 1,640	€ 11,000	€ 22,500
Mar	€ 2,000	€ 12,500	€ 24,000
Apr	€ 2,600	€ 13,700	€ 25,000
May	€ 2,900	€ 14,200	€ 27,000
Jun	€ 2,600	€ 15,000	€ 28,500

Jul	€ 2,800	€ 15,500	€ 29,000
Aug	€ 3,000	€ 16,000	€ 31,000
Sep	€ 3,400	€ 17,000	€ 33,000
Oct	€ 4,000	€ 18,000	€ 35,000
Nov	€ 6,060	€ 18,500	€ 37,000
Dec	€ 7,800	€ 19,600	€ 37,000

Income and Expenditure Projection

Income

The line graph below represents the income in quarterly basis for 3 years which is calculated by subtracting the total expenses from the total revenues. In the graph it is clearly seen that the quarters from Q1-Q6 are lagging whereas from the quarter Q7 there is steady rise in the income.



Expenditure

The below table explains about the overall expenses for the next three years. Most of these expenses are already discussed in the initial setup cost section.

Expenses	Year 1	Year 2	Year 3	Total
Application Cost	€ 38,700	€ 45,840	€ 60,000	€ 1,44,540
Hardware Cost	€ 2,500	€ 2,500	€ 5,000	€ 10,000
Licenses	€ 4,700	€ 4,800	€ 10,500	€ 20,000

Telecommunication	€ 1,800	€ 4,200	€ 7,800	€ 13,800
Insurance	€ 5,400	€ 6,600	€ 8,040	€ 20,040
Marketing	€ 18,000	€ 37,500	€ 36,000	€ 91,500
Cloud Storage	€ 0	€ 6,000	€ 14,400	€ 20,400
Rent	€ 0	€ 13,000	€ 18,000	€ 31,000
Salaries	€ 1,28,640	€ 2,31,120	€ 4,25,568	€ 7,85,328
Maintenance Costs	€ 6,000	€ 18,000	€ 26,400	€ 50,400
Legal and Accounting	€ 30,000	€ 43,500	€ 42,000	€ 1,15,500
Professional and Consultant fee	€ 6,000	€ 21,400	€ 24,000	€ 51,400
Miscellaneous	€ 42,000	€ 86,300	€ 1,02,000	€ 2,30,300
Total Expenses	**€ 2,83,740**	**€ 5,20,760**	**€ 7,79,708**	**€ 15,84,208**

The below mentioned graph explains about the quarterly split up of overall expenses for three consecutive years.

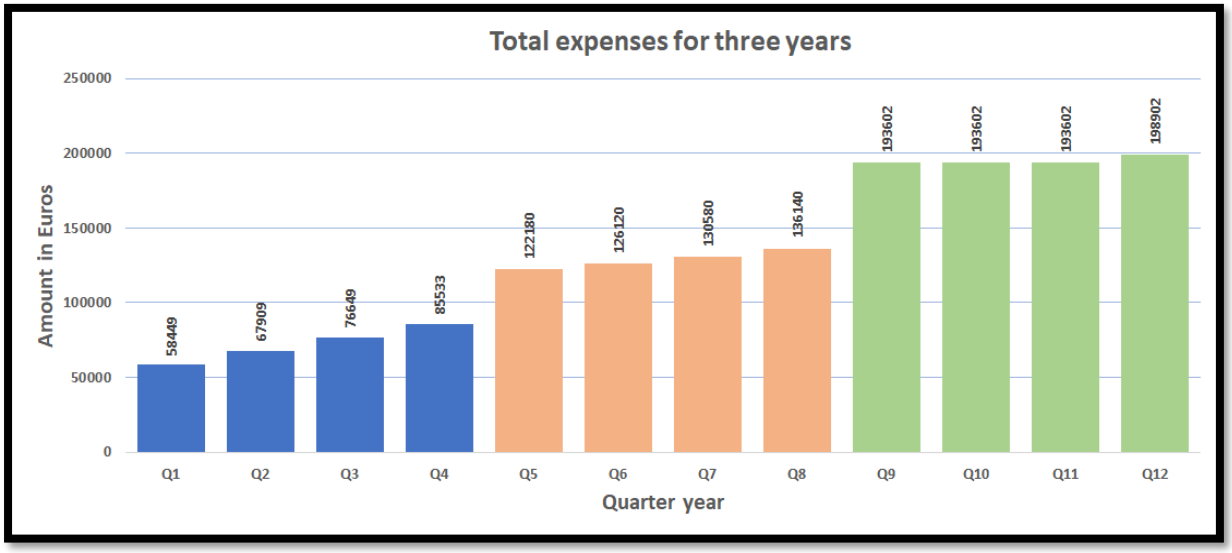


Image: Expense Projections

Cashflow Projections

Our starting balance will be € 2,00,000 in the first month which we will be getting from Enterprise Ireland as our initial price. Along with that we will be getting our fund from crowd

for every month. As shown in the diagram below, we will have enough financial reserves to keep our business viable until we achieve break-even, which will be described later.

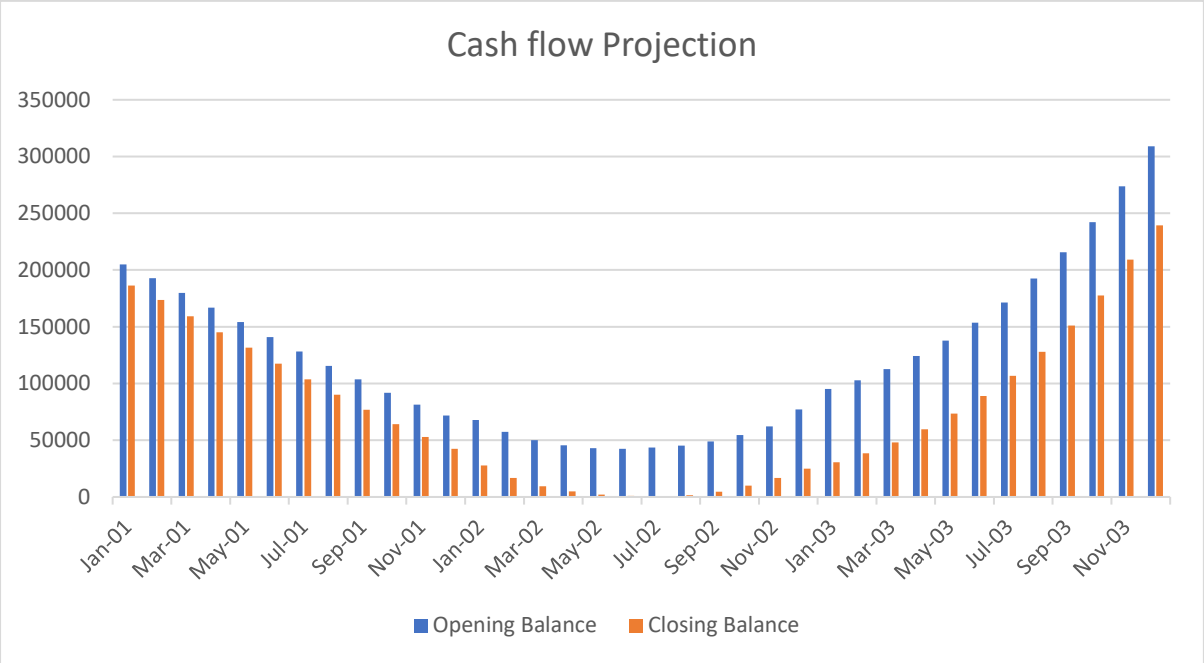


Image: Cashflow Projections

Breakeven Point and ROI

The graph below represents the Breakeven Point which is basically an analysis to determine at wat given point the product will be profitable. The blue line in the graph represents the total expenses and the orange line represents the total revenue. If everything goes as estimated, by August second year the product is expected to have the breakeven point as shown in the graph, the point where the two lines intersect. Since our profit margin growth steadily after our breakout point so by the end of the three years, we will be getting 119% ROI.

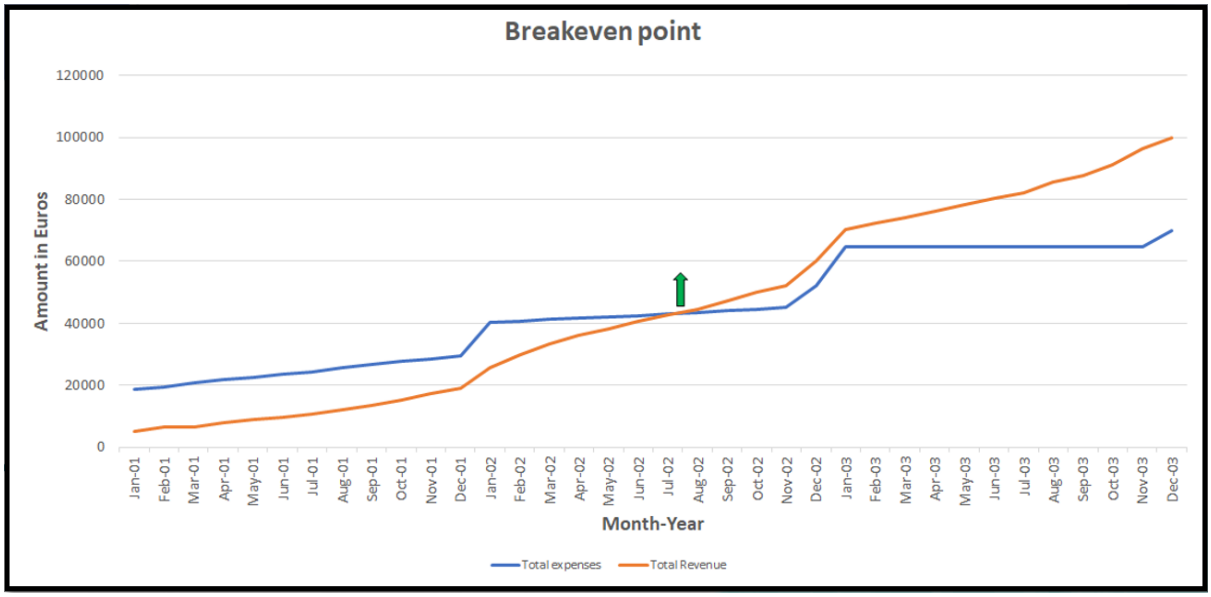


Image: Breakeven Point

Funding Requirements

We reached out to different venture capitalists and government agencies to support our initial setup cost and operations costs. Among those Enterprise Ireland support start-up idea that has the future scope of international services. Our company have the future scope of expanding it to all the European market. We approached Enterprise Ireland to provide €2,00,000 as an initial cost to run out business.

Moreover, considering the motive of people's welfare behind the entire project idea, we can expect some crowdfunding based on the marketing and awareness we created for our application. A support from the government authorities in the marketing and awareness campaign can be expected, considering the magnitude of the project.

References

Karagiannis, G. M., & Synolakis, C. (2017). Twenty challenges in incident planning. Journal of homeland security and emergency management, 14(2)

Ragini, J. R., Anand, P. R., & Bhaskar, V. (2018). Big data analytics for disaster response and recovery through sentiment analysis. International Journal of Information Management, 42, 13-24.

Qadir, J., Ali, A., ur Rasool, R., Zwitter, A., Sathiaseelan, A., & Crowcroft, J. (2016). Crisis analytics: big data-driven crisis response. Journal of International Humanitarian Action, 1(1), 1-21.

Andrea Thompson. (2020). A Running List of Record-Breaking Natural Disasters in 2020. (Online). Available at: <https://www.scientificamerican.com/article/a-running-list-of-record-breaking-natural-disasters-in-2020/> [Accessed on 10th June, 2021]

European Commission. (2021). Overview of natural and man-made disaster risks. (Online). Available at: <https://ec.europa.eu/echo/sites/default/files/overview_of_natural_and_man-made_disaster_risks_the_european_union_may_face.pdf> [Accessed on 16th June, 2021]

GlobeNewswire. (2019). The global incident and emergency management market. (Online). Available at: <https://www.globenewswire.com/en/news-release/2019/10/14/1928955/0/en/The-global-incident-and-emergency-management-market-size-is-expected-to-grow-from-an-estimated-value-of-USD-107-0-billion-in-2019-to-USD-148-5-billion-by-2024-at-a-CAGR-of-6-8.html > [Accessed on 27th June, 2021]

MarketsandMarkets. (2020). Incident and Emergency Management Market by Component, (Solutions (Emergency/Mass Notification System, Perimeter Intrusion Detection, and Fire and HAZMAT), Services, and Communication Systems), Simulation, Vertical, and Region - Global Forecast to 2025. (Online). Available at: <https://www.marketsandmarkets.com/Market-Reports/incident-emergency-management-market-1280.html> [Accessed on 27th June, 2021]

Allied Market Research. (2018). Incident and Emergency Management Market. Available at: <https://www.alliedmarketresearch.com/incident-and-emergency-management-market> [Accessed on 27th June, 2021]

Arun Goyal. (2019). Top reasons why mobile apps fail to make a mark in the market. Available at: <https://www.businessofapps.com/insights/top-reasons-why-mobile-apps-fail-to-make-a-mark-in-the-market/> [Accessed on 27th June, 2021]

Artyom Dogtiev. (2021). App Development Cost 2021. Available at: <https://www.businessofapps.com/app-developers/research/app-development-cost/> [Accessed on 25th June, 2021]

Tristan Louis. (2013). How Much Do Average Apps Make? Available at: <https://www.forbes.com/sites/tristanlouis/2013/08/10/how-much-do-average-apps-make/?sh=5e46686246c4> [Accessed on 28th June, 2021]

Mark Harris. (2020). SpaceX's Starlink satellites could make US Army navigation hard to jam. Available at: <https://www.technologyreview.com/2020/09/28/1008972/us-army-spacex-musk-starlink-satellites-gps-unjammable-navigation/> [Accessed on 28th June, 2021]

BRE Group. (2019). Over £1 billion lost every year due to false alarms. Available at: <https://www.bregroup.com/news/1bn-lost-false-fire-alarms/> [Accessed on 28th June, 2021]