
IBM Call for Code

2019 Global Challenge

Team

The Hummingbirds
Cognizant Interactive Spain

00/

Table of content

01/ Motivation	3
02/ About Voluntree	5
03/ Case of use	6
04/ Technology choice: Flutter	9
05/ Efficiency	10
06/ Design & Usability	11
07/ Novelty	12
08/ Machine Learning & AI	13
09/ IBM Cloud Services	14
10/ Next steps	21

01/

Motivation

Floods, Earthquakes, wildfires... All these natural disasters happen without warning causing chaos and destruction.

Emergency response teams do their best to face these disasters but sometimes their efforts are not enough.

People is willing to help people and we cannot ignore the potential of this. We know we are stronger if we work together.

Every time a catastrophic situation occurs we can see hundreds of messages in social networks of individual peers trying to do their bit to help victims offering whatever they have. All that altruism wave is practically lose without a proper organization.

Have you ever wonder how much of a difference volunteer help can make?

We have.

That's why we introduce...

A close-up photograph of several hands of different skin tones and ages, all clasped together in a tight握拳. This imagery represents unity, support, and collective effort. In the background, there are faint, out-of-focus signs that appear to say "VOLUNTEER".

voluntree

02/

About Voluntee

Voluntee is a way of managing volunteers to help the most vulnerable people after a disaster.

We are implementing a mobile application oriented to both groups, so volunteers & people affected by any disaster can connect without the intervention of a third party.

As a user of Voluntee you will receive notifications if something happens close to your location and your help may be needed. In this way, people could quickly be aware of the affected zones and the centralized shelters fitted up to receive and manage their solidarity.

You could give or ask for help in four categories: Transportation, food & supplies, medical assistance and housing/sheltering.

03/

Case of use

We made up a scenario to exemplify how Voluntee can make a difference. For the sake of simplicity we will focus just on one category: transportation.

Imagine there has been a flood.

Emergency response teams have evacuated people from the affected area and they are waiting to be taken somewhere safe.

You, as a Voluntee user, get a notification on your device to let you know something has happened close to your location.

Once you access the app you can go through two paths :

- 1) You need help
- 2) You want to help

You need help

John's path

As John you need help. You are in a safe zone with your wife and kid but you need to go to the closest shelter so you can rest after the disaster.

You open the application, choose "You need help". Then, you select "transportation" because that's the type of help you need. App will redirect you to a map where you can see different shelters and their routes. You select the closest shelter and a form pops up.

You fill up the form with relevant information that is required (contact details, number of people you travel with and some additional data to prioritise & optimise the request). You press the request button and a new screen tells you to wait for someone to help you.

After a few seconds you receive a notification. Someone called Lisa is coming to help you and your family. You can see on the app how much time is going to take Lisa to arrive.

Lisa calls you to let you know she is there. You and your family get into Lisa's car and you confirm on the app she has picked you up. On the way to the shelter Lisa stops and pick up someone else: Luis. You are all set.

You arrive to the shelter and thank Lisa for her help.

She looks happy. You go inside the shelter to rest.

You want to help

Lisa's path

As Lisa you want to help. You are at home seeing the news of the awful floods. You open the app, choose "You want to help". Then, you select "transportation" because that's the type of help you are able to provide. A form will pop up on your screen requesting relevant information (Contact details & capacity of your vehicle) You fill up the form and the app matches you with two people called John & Luis. You accept to help them.

On a map you can see where John is and a route to get there. The route avoids the area affected by the flood.

You start your car and start navigation mode in your phone. Your first destination is John's location. App notifies John & Luis that you are helping them.

You arrive to destination and call John to let them know you are there. You see him and their family. They look tired. They get into your car. John confirms on his phone you have picked them up. Now your phone shows Luis location.

On your phone you can see you are able to start the navigation mode to go to pick up Luis. When you get to his location, you call him. He is in your car in seconds.

Luis confirms you have picked him up. Finally, you arrive to the shelter and John, his family and Luis thank you again.

They are safe.

04/

Technology choice:



We are using Flutter for crafting a natively compiled mobile application on iOS and Android from a single codebase. Flutter is Google's mobile UI framework which provides a modern, reactive framework, and a rich set of platform, layout and foundation widgets for building cross-platform apps with high-quality interfaces in record time. Flutter apps are written in Dart, a modern, expressive language with a declarative approach.

The main reasons for this choice are listed below:

- Open source: It allows a massive contribution to improve the project
- One development for both platforms: Same user experience even in older devices
- Highly productive: Do more with less code, even on a single OS
- Prototype and iterate easily using hot reload.

05/

Efficiency

The ideal case: people would have it installed previously (so they can receive alerts). It should be light to allow a quick download and installation. The main calculation would be made on the server side, and the resources and screens will be kept at the minimum. Forms are quite simple and straightforward. They are designed to only require the indispensable data for the algorithm to be efficiently processed.

06/

Design & Usability

Voluntree is designed putting the user first.

Understanding user needs in the event of a natural disaster we designed the application taking into account two main aspects:

- 1) Simplicity: We designed simple and straight forward user flows so user goal could be achieved as soon as possible.
- 2) Ease of use: We based our app on interfaces that are recognizable for the user. UI elements are not elaborate so user can perform the different tasks with ease and these tasks are reduced to minimum in order to make the process fast.

In addition, the user interface provides different confirmation messages in different stages of the flow so users know exactly what's going on.

07/

Novelty

In these scenario the app leverage Artificial Intelligence & Machine Learning in order to:

- Automatise processes such as matching volunteers with people in need of assistance.
- Optimise routes, resources and seats available in vehicles in order to help as much people as possible.
- Create safe routes for volunteers that avoid most affected areas by the disaster and traffic jams.
- Prioritise transportation for people with restricted mobility or for those who require special assistance, such as disabled, elderly or children.

08/

Machine Learning & AI

In order to optimize matching requests and proposals for help it's necessary to implement a robust algorithm to calculate the optimum route in a quick and accurate way.

One of the techniques considered to implement this algorithm is the generation of a trained decision tree as a predictive model to classify the possible solutions and make decisions.

The training method would consist on a selection sort algorithm that, receiving as an input all the possible matches generated through recursive mechanisms, should always keep certain factors (distance, vehicle capacity, dangerous zones) into a limited range.

Having therefore, several options available, we will proceed to prioritize the choice based on weighted parameters such as the presence of elderly, kids or injured people, or maximize the number of travelers.



09/

IBM Cloud Services



IBM Cloudant

The NoSQL DB service from IBM offers us a way to store all the registrations (whether they are victims or helpers) and all the relevant information related with the catastrophe.

WHY?

Lightweigh database, easy quering, scalable, directly in JSON format.



IBM Push notifications

Essential for a mobile application. It will allows us to notify the users with the events and relevant information about the catastrophe.

WHY?

Easy compatibility with IBM cloud system.



IBM Cloud Functions

We want to react to the changes in IBM Cloudant and send push notifications if needed, so we connect this both services using IBM Cloud functions. This function detect when some data is updated in Cloudant and checks if any notifications should be sent and do it using the IBM push notification service.

WHY?

Easy to compose using JS, control over all IBM data flow, handle IBM services events.

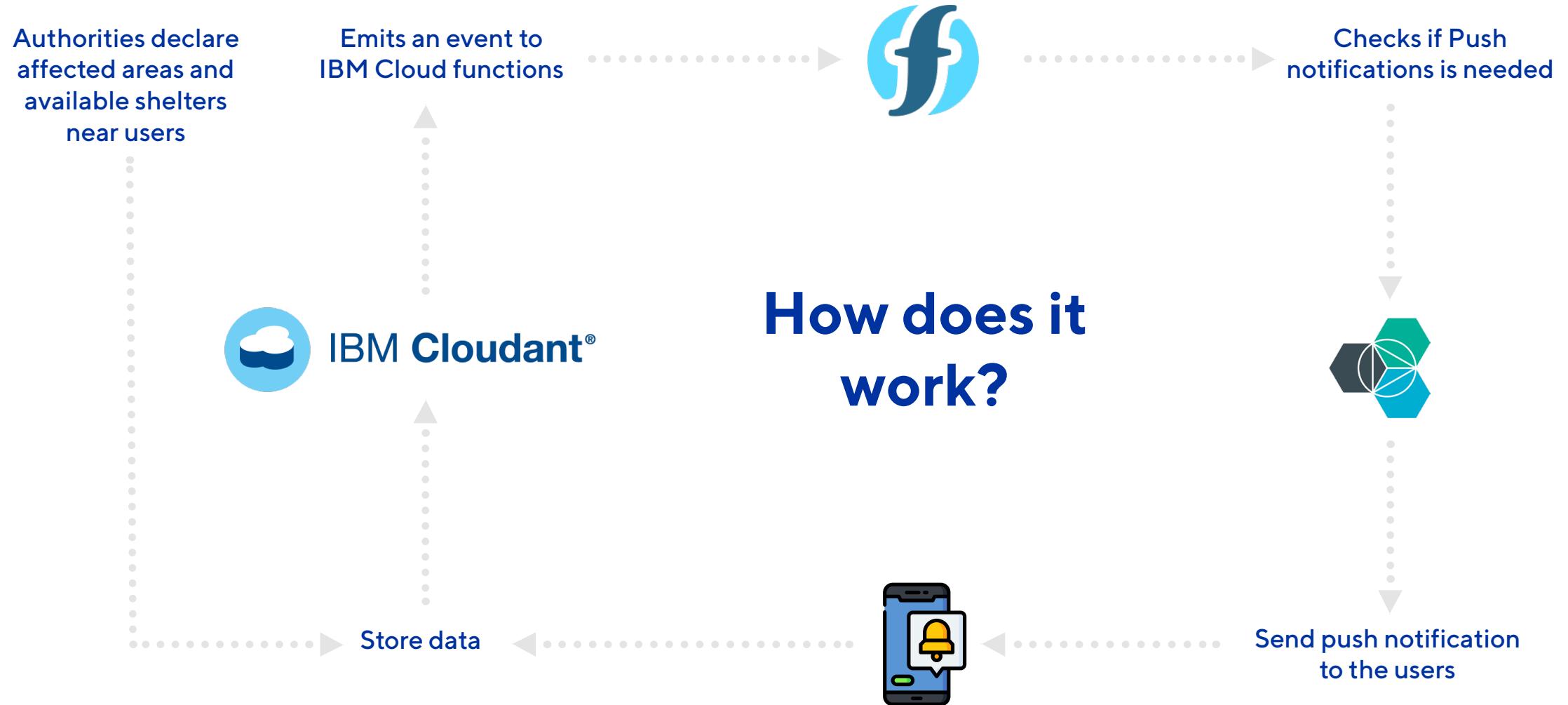


Watson Bot assistant

In this kind of situations you may need to express what you want instead of filling forms. Therefore we work with Watson Assistant building a natural conversation offering those who are affected with this situation a feeling of calm and serenity.

WHY?

Advanced conversational skills, natural language, Compatible with another IBM speech services.





IBM Cloudant®

Store data from
conversation feed



Feed data through
a conversation



IBM Cloudant implementation

We have developed a use case implementation of IBM Cloudant to Voluntree.

How did we do that?

We have created a service in our app that is synchronized with an instance of IBM Cloudant database, so that authorities can inform users about areas affected by natural disasters and available shelters near them.

How does it work?

When authorities declare a catastrophic area and official refuges, they will be able to upload the relevant information directly to and instance of IBM Cloudant database in JSON format. This way, data will be shared in a quick, reliable way. An event will be emitted to IBM Cloud functions, and a push notification will be sent to nearby users. When users check the Voluntree app, they will have the information available to them, and they will be able to easily locate the affected areas and available shelters in a map.

Authorities can enable and facilitate citizen collaboration by delivering accurate and fast guidance during humanitarian crisis.

This is an IBM Cloudant database where general information about events/catastrophes will be uploaded by authorities.

These are IBM Cloudant documents where JSONs containing details about affected areas and available shelters will be stored.

id	key	value
<input type="checkbox"/> areas	areas	{ "rev": "8-72f7d0a60a" }
<input type="checkbox"/> shelters	shelters	{ "rev": "5-72fe68db56" }

A photograph showing a person's lower legs and feet as they walk up a set of blue metal stairs. The person is wearing dark trousers and bright red low-top sneakers with white soles. The stairs have a textured blue surface and metal railings. The background is slightly blurred.

10/

Next steps

More kinds of helping

In our first approach we only be able to implement a way of helping with transportation, but there are a few more we want to include in our final solution:



Medical assistance

We want to connect people who need medicine with the nearest specialists to speed up the aid and reach more people.



Food & supplies

In this kind of situations the access to food and necessary items is often so difficult, so we offer a way to make easier to share food and supplies between people.



Housing

In a catastrophe your house may be damaged or you cannot reach your home due to the weather, so we want to give the possibility to offer shelter to this people.

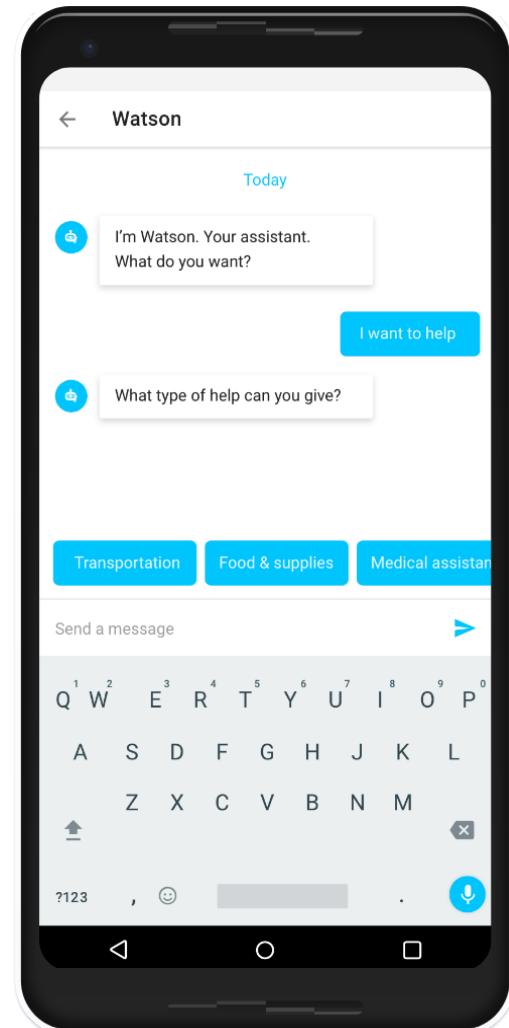


Chatbot

In this kind of situation you may be shocked, so navigate through an app and fill forms can be difficult and confusing.

So we want to use the last technology on conversational assistants to help you with the process of asking for help.

Using google assistant and Siri shortcuts we are able to launch our Watson assistant in order to start talking to him just saying: "I want to talk to Voluntree" or simply "I need help".



Resilient flow

We want to improve the flow of the app through a psychological study in order to avoid users blocking and the feeling of not knowing what to do or how to continue.

We take this term “Resilient” because is the way we want the flow to behave, adapting to the users and taking them to the point they wanted to reach.

Newsletter feed

In a catastrophe situation you are maybe in the middle of a “chaos” and it’s a little bit difficult to find out what is happening, so we want to find a way to keep you tuned with the world.

This is where “Watson Discovery” comes into play. This awesome technology, developed by IBM, allows us to analyse social networks, newsletters and filter the news on what we want to focus, in this case, all new information about the catastrophe.

In this way we want to feed our app with all the information available and bring it to you!

Cognizant