



Crossing-Borders mobile app

Web Development 8.th semester Dissertation

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GitHuB repository : <https://github.com/kevinadeya/crossingbordersApp>

Abstract

Crossing Borders "CB" is an international organization based in Denmark. They advocate for peace, dialogue and sustainable development. Their projects are funded by the EU, national governments and other donors. Besides the staff of Crossing Borders, there are registered members, interns and volunteers. In summer 2017, I was an intern in Crossing Borders, where I was responsible for rebuilding crossing borders website. Most participants, volunteers and members in CB are youth from different countries and backgrounds. They are often travelling to events, seminars and educational programs organized by CB. CB is interested in attracting more young members and volunteers. Most of CB youth own mobile smartphones which they carry with them often as compared to laptop or desktop computers. Smartphones are more portable and less costly to youth with low income. Crossing Borders director has asked me during my internship if I can make a mobile application, so the CB web content can also be available in a mobile app as it is a modern way of utilizing web content among people with smartphones.

To begin this project, I have made a problem statement. In the conclusion I have made the answers to the problem statement.

I have structured the implementation part according to the software methodology I have chosen. I have used Git and GitHub¹, which is a version control tool for hosting software code and for collaboration among software teams or developers.

The reflection comes after the conclusion. Here I look back at the whole process and point out where I need to improve on and what impact it has made in my study

In the Appendix section I have added figures and images for illustration.

¹ <https://github.com/>

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1 Introduction

This is a final top up bachelor project in web development which comes after the completion of my internship at an international organisation called Crossing Borders “CB”.

CB is an international organization based in Denmark. They advocate for peace, dialogue and sustainable development. Besides the staff of Crossing Borders, there are paid memberships, volunteering in projects funded by EU and other donors. I was responsible for maintaining crossing borders website during my internship program. Most participants, volunteers and members in CB activities are youth from different countries and backgrounds. Most of CB youth own smartphones as compared to laptop or desktop because smartphones are less costly and more portable. Mobile phones internet is cheaper and faster, and you can save the information locally on your mobile phone and access it when you are travelling or far from home. This will be beneficial to the CB youth who are often travelling for seminars, projects and events.

I will be making a mobile application for CB. This is also an opportunity for me as the developer to exercise and improve on my skills in software development which I have acquired in my previous semesters.

2 Problem formulation

Most event participants, volunteers and members in Crossing Borders are youth from different countries and backgrounds. They are often travelling to events, seminars and educational programs organized by Crossing Borders. These young generation is what Crossing Borders is most interested in educating and passing information to in all available platforms. Crossing Borders has at present only a website. Most of Crossing Borders youth own mobile smartphones which they carry more often as compared to laptop or desktop computers. Other reasons are affordability, as smartphones are more portable and less costly to youth with low income. Mobile internet is also cheaper and more available as compared to broadband internet. Crossing Borders director has asked me during my internship if I can make a mobile application, so their web content can also be available in mobile applications which has gained much popularity with increased number of smartphone usage in the world.

3 Problem statement

Crossing Borders members, volunteers and staff owning smartphones would like me to develop a mobile application for their organization to make it easier for them to access Crossing Borders content from a smartphone.

1. Which development methodology can I use for developing this application as a single developer in Crossing Borders?
2. How can I make the user interface good for the users of Crossing Borders mobile application?

4 Methodology & Activities

There are a number of methods and activities that will contribute to solving the problem defined in the problem formulation.

Activities

- Study relevant software
- Study technologies
- Usability testing
- Programming

Methodology

There are several software development methodologies for developing software. I will make a short comparison of three common methodologies and give reason to why I will use one of them in this project.

Water Fall Method:

It emphasizes planning in early stages. Requirements must be known from the start. It is easy to understand and implement. The software is delivered at the end of the project delaying detection of software errors.

Unified Process

It has iterations or cycles during the development process.

Phase of Unified process

It has the following phases: **Inception , Elaboration, Construction and Transition**

Agile methodology

Extreme programming (XP) is a [software development methodology](#) which is intended to improve software quality and responsiveness to changing customer requirements.

The customer has changing requirements and is available for immediate feedback.

I want to point out that agile is for teams but since I am a single person I will not use all XP practices and only parts of Scrum that don't a team for example sprints and acceptance testing.²

² https://www.researchgate.net/publication/229046039_Personal_Extreme_Programming-An_Agile_Process_for_Autonomous_Developers

5 Interface Design

User Stories

I had a meeting with the product owner to discuss the user stories. The following was the result of the meeting. The user of the system will be the product owner, employees or anyone associated with Crossing Borders.

1. As a user, I would like to find About Us information from Crossing Borders.
2. As a user, I would like to find Projects and Events from Crossing Borders.
3. As a user, I would like to find School Services information from Crossing Borders.
4. As a user, I would like to send information to join Crossing Borders.
5. As a user, I would like to find Crossing Borders contacts.

Product backlog based on their Priority

I gave the product owner a set of 5 cards with the five user stories to give them a priority from the first to the last user story he wanted implemented.

Product Backlog	Sprints Backlog	In progress 0 / 2	Done
+ add task	+ add task	+ add task	+ add task
User can find About Us information from Crossing Borders	1. User can find About Us information from Crossing Borders		
User can find Projects and Events from Crossing Borders	2. User can find Projects and Events from Crossing Borders		
User can find School Services information from Crossing Borders	3. User can find School Services information from Crossing Borders		
User can send information to join Crossing Borders	4. User can send information to join Crossing Borders		
User can find Crossing Borders contacts	5. User can find Crossing Borders contacts		

Planning

I had approximately 5 weeks to dissertation deadline, so I made a plan to manage my tasks in the dissertation period.

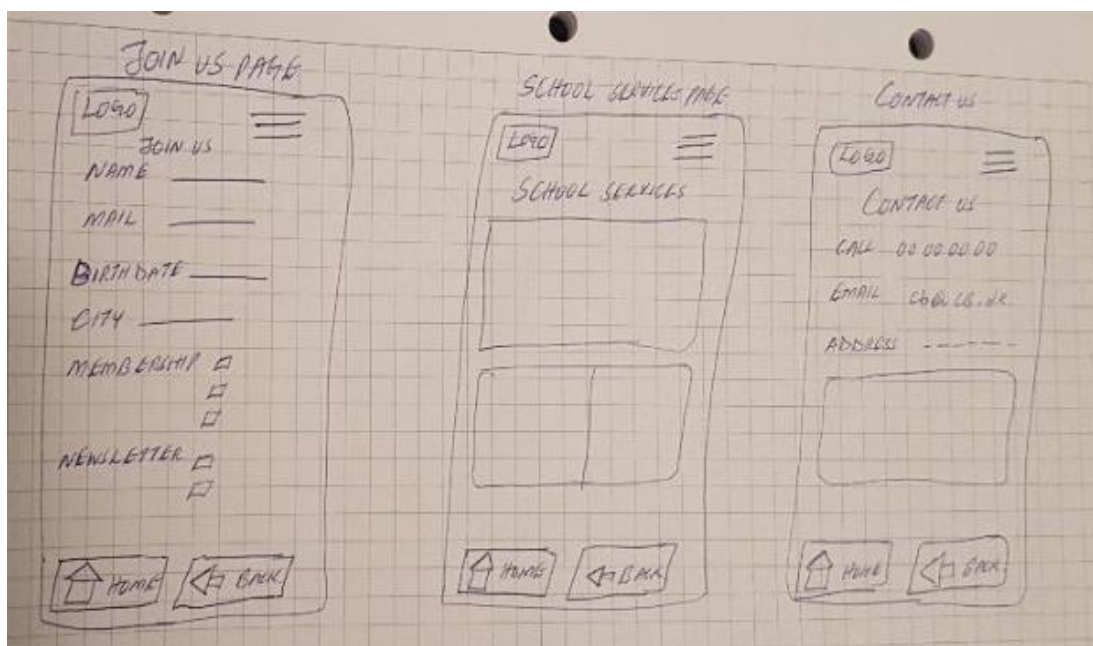
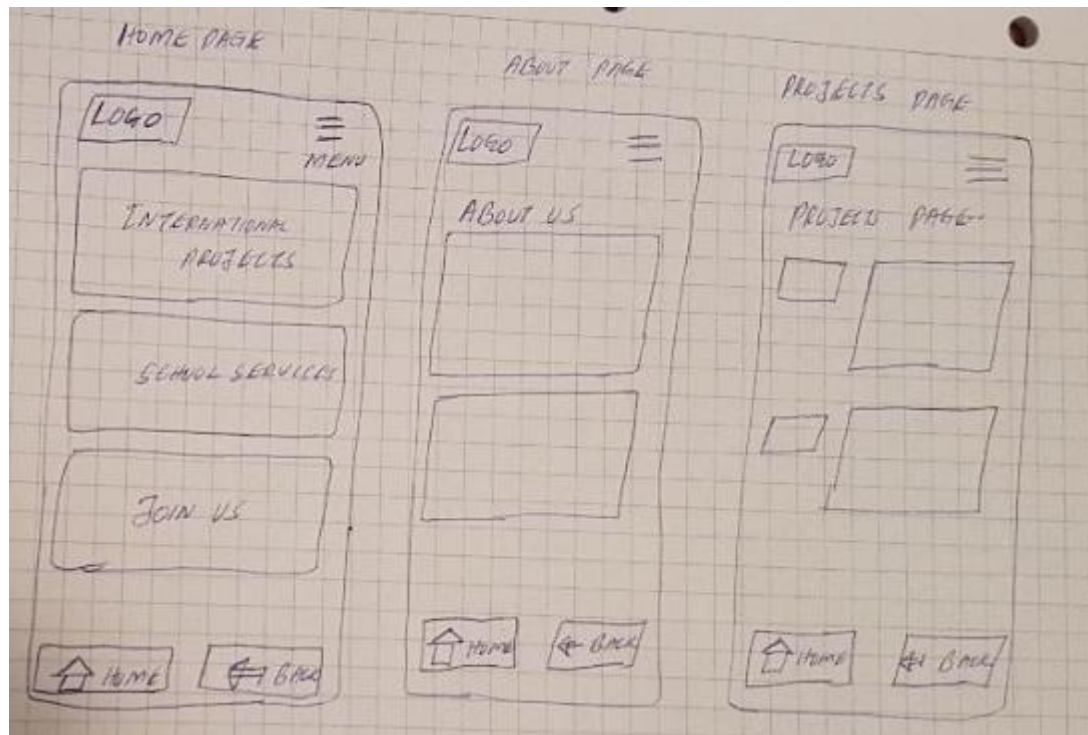
User can find About Us information from Crossing Borders	week 48
User can find Projects and Events from Crossing Borders	Week 49
User can find School Services information from Crossing Borders	Week 50
User can send information to join Crossing Borders	Week 51
User can find Crossing Borders contacts	Week 52

	WEEK 48	WEEK 49	WEEK 50	WEEK 51	WEEK 52
MON	SPRINT 1 PLANNING	SPRINT 2 PLANNING	SPRINT 3 PLANNING	SPRINT 4 PLANNING	SPRINT 5 PLANNING
TUES	IMPLEMENT ABOUT US PAGE	IMPLEMENT PROJECTS AND EVENT PAGE	IMPLEMENT SCHOOL SERVICES PAGE	IMPLEMENT JOIN US PAGE	IMPLEMENT CONTACTS PAGE
WED	ABOUT US PAGE	PROJECTS & EVENTS PAGE	SCHOOL SERVICES PAGE	JOIN US PAGE	CONTACTS PAGE
THURS	ABOUT US PAGE	PROJECTS & EVENTS PAGE	SCHOOL SERVICES PAGE	JOIN US PAGE	CONTACTS PAGE
FRIDAY	SPRINT 1 REVIEW & RETROSPECTIVE	SPRINT 2 REVIEW & RETROSPECTIVE	SPRINT 3 REVIEW & RETROSPECTIVE	SPRINT 4 REVIEW & RETROSPECTIVE	SPRINT 5 REVIEW AND RETROSPECTIVE
SATURDAY	REPORT WRITING	REPORT WRITING	REPORT WRITING	REPORT WRITING	REPORT WRITING
SUNDAY	RESEARCH AND REPORT WRITING	RESEARCH & REPORT WRITING	RESEARCH & REPORT WRITING	RESEARCH AND REPORT WRITING	RESEARCH AND REPORT WRITING

Prototyping

I started by making sketches on paper to make a draft of how the user interface would look like. I had regular meetings with product owner during the design phase to ensure that only the main design is agreed on, leaving room for minor changes before the coding or implementation starts.

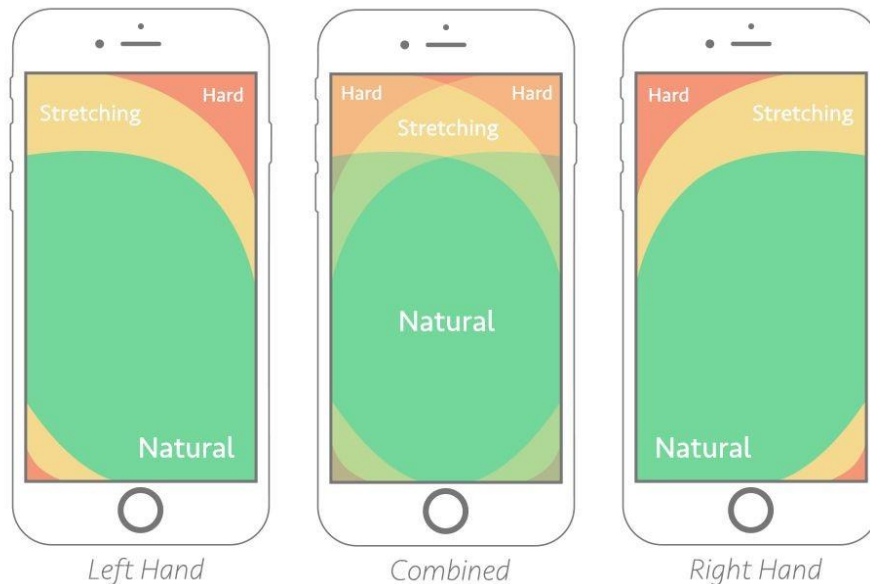
Paper prototype



The Thumb Zone

When designing a mobile phone, it is necessary to know how users interact with the devices on their hands using their fingers.

The image below from smashingmagazine.com³, demonstrates this principle:



It shows that most thumb placements is in the middle and the bottom of the mobile. This means that if we wish to make user interactions with our interface feel natural and less burdening, we will have to place functionality, such as buttons, within that green zone. Most users are right handed, according to the study done by UxMatters⁴⁵, so the most important buttons should be slightly to the left in the bottom, and slightly to the right in the middle.

Mock Up

3 <https://www.smashingmagazine.com/2016/09/the-thumb-zone-designing-for-mobile-users/>

Near line 35, in thumbs vs touchscreens section

4 http://www.uxmatters.com/mt/archives/2013/02/images/Device_Grasping.html, page 2,

line 112, section "One handed use"

5 <http://www.uxmatters.com/mt/archives/2013/02/how-do-users-really-hold-mobile-devices.php>

A prototype of the application with colour and text.

5.1 Crap principles applied to final design

Looking at our final design, we investigated it to see if it accommodated the CRAP principles, and then made changes to it.

Contrast: To better read the text, and separate the buttons from the background, we have made color contrasts of white and red, and black and white. These are calm contrasts that doesn't scream too much difference or blend too much in with each other.

On our login site, we have made contrast between the login button and the cancel button, to distinguish the more important action of logging in, against the lesser important cancel action.

Repetition: We have made a consistency of white text on red background, black text on white background, and white text on green background.

The fonts are the same. The headings are dynamically repeated. The pictures all follow the same rules of being responsive and centering towards the middle, while having the same border radius as the buttons.

The Scan button on the frontpage and the back button on the scan page have the same headings and sizes because they are the only buttons on their respective pages. All the buttons without text next to them have the same widths.

Alignment: All the pages have the same distance to and from the edges of the page border. Whenever there are repeating elements, such as the form our login page, or the comments on our art page, the distance between the elements are the same, and they have the same lengths and widths.

Bootstrap has functions to help alignment of elements.

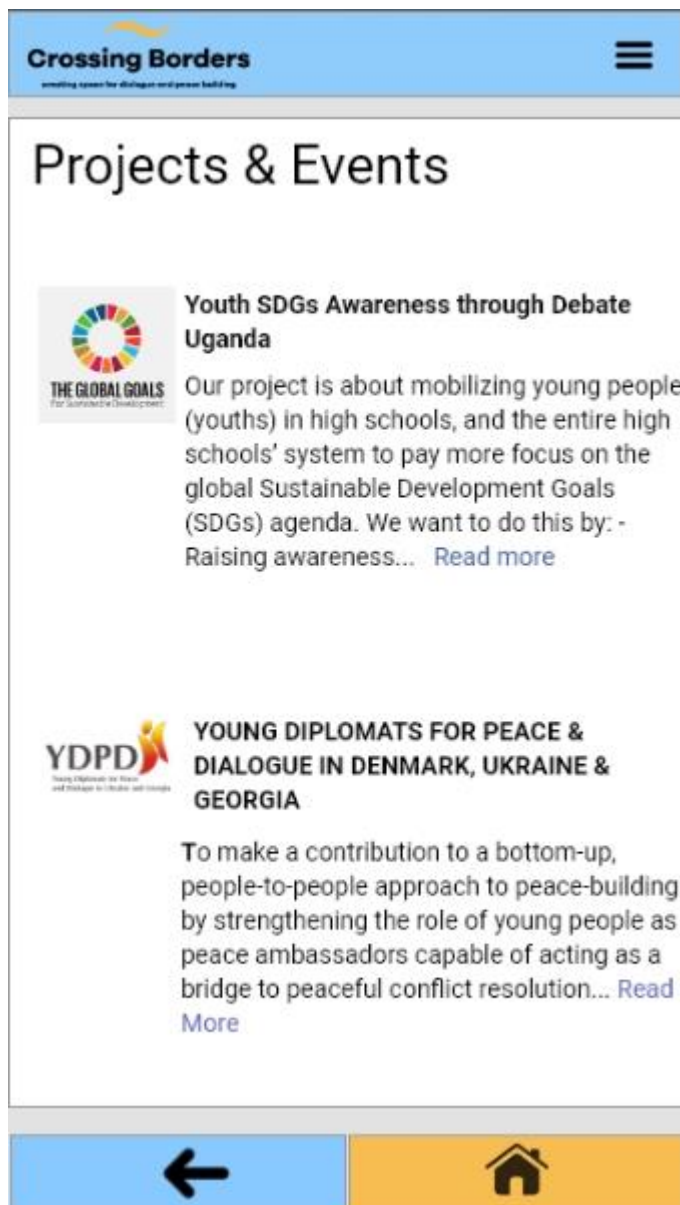
Proximity: Text and images, which are directly related to each other, are closer to each other to give the impression that they are grouped together. Like on our art page where the image art, the name of the art, and the artists are close together, centered on the page, to suggest they are grouped together.

The heading about the artist and descriptions they too are also in proximity with each other, with enough space between them and the image, title and author above to suggest they are in different groups. ⁶



⁶ Referred from our group project Ro's torv











Name

Mail

Date of birth

City of residence

Type of membership

☐ Individual (DKK 150 per year)

☐ Student (DKK 75 per year)

☐ Family (DKK 200 per year)


I want to receive the CB newsletter


☐ Yes

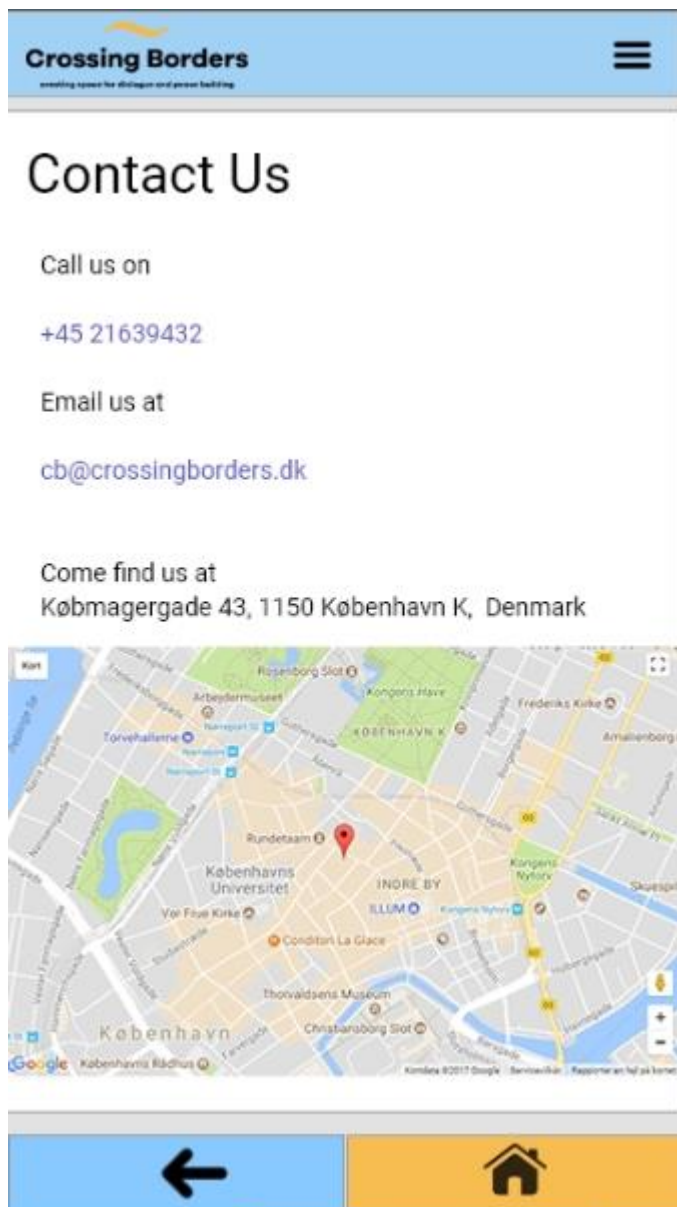
☐ No

Send

Cancel







Usability Testing

5.2 Planning usability test

The first step to conducting a usability test is planning. The purpose of our test plan is to document how we did our testing, what metrics we used, what participants we used for our testing, and which scenarios we wanted to test.⁷

⁷ <https://www.usability.gov/how-to-and-tools/methods/planning-usability-testing.html>

Scope:	Art Scanner application for Ro's torv. The test will be conducted on a prototype of the application as of 14/12-2016. This includes the main functions for a normal user as register, login, scanning, view art, and navigation.
Purpose:	<p>What test scenarios?</p> <ul style="list-style-type: none"> - Go and use the Scan option. - Login. - Comment on the scanned art, and give a rating. - Navigate back to the frontpage of the application.
Schedule & location:	We will conduct the testing in our classroom, at date 14-12-2016
Sessions:	The length of our sessions will be conducted in a timespan of 10-20mins pr. Participant.
Equipment:	<p>For the testing we will be using a iphone 4s as the testing device, the application will be running in the standard mobile browser.</p> <p>We will be using pen and paper to note the process.</p>
Participants:	4 participants in the age range of 20-25 years old web development students.
Scenarios:	<p>The 4 tasks is:</p> <p>Find art piece</p> <p>Login</p> <p>Comment</p> <p>Get back to frontpage</p>

Metrics:	The questions for the tester are written underneath the schema.
Quantitative metrics:	Task completed, time to complete a task, errors.
Roles:	Usability specialist: Mathias Madsen Note taker: Thor, Kevin. observer: Kim.

Thinking aloud: We used this method on the tester since it has a lot of advantages, most of all it serves as a tool to get in contact with our final users. By letting the users discover our web application, we can get direct feedback on the application structure and the different design choices we have made. By doing this kind of testing we can get rid of most of the misconceptions with the application.

After a task completion:

After each task completion, the participant was told to rate the task experience with points from 0-5. And give an argument for his choice of points.

After all task completion:

After all the tasks were completed we asked the participant in the test to give the application a rating from 0-5. Where the scale of 0 is disagree and 5 is agree. The question given after each task where.

- keeping the track of your location at all time.
- Ease of use.
- Designs, look and feel.
- Use of navigation.
- Finding the information.
- The content of the application.

And at last we asked the participants some overall in depth questions.

- What did you like most about the application?

- What you enjoyed least about the application?
- Do you have any recommendations on overall improvements to the application?

5.3 Result of usability testing

Task completion rates

Participant	1	2	3	4
Task 1	x	x	x	x
Task 2	x	x	x	x
Task 3	x	x	x	x
Task 4	x	x	x	x
Success rating, 0/30	20/30 points	20/30 points	27/30 points	26/30 points
Completion rate	100%	100%	100%	100%

Testing Task points from 0-5:

Participants:	1	2	3	Success
keeping the track of your location at all time.	3	4	5	80%
Ease of use	3	3	4	66%
Designs, look and feel.	4	3	5	80%
Use of navigation	3	3	5	72%
Finding the information	3	4	5	80%
The content of the application.	4	3	3	66%

5.4 Testing conclusion

Overall conclusion on the testing was good, the participants succeeded in completing the given tasks, and most of the feedback was very positive.

Pros:

The application was very fast, it was easy to use.

Cons:

It lagged some feedback on the login part, and the comment section. And the navigation was not placed in a logical way on the art page, and kept the users from finding the navigation in the first try since it was placed in the bottom and not in the top side.

5.5 Revised design based on user tests

The navigation was a little confusing, especially on the art piece page where the back button was hidden on the bottom of the page that you had to scroll down to. We plan to change that to have the navigation bar fixed to the bottom, to suit the thumb zone for mobile users.

The comment section didn't have confirmation or feedback whenever you posted a comment, so we plan on making a pop up notification that informs the user that their input was accepted. We could also make a faint sound cue to it. The comments, as we had coded it, also appears on the bottom instead of on the top side in the comment section, this confused some users since they were anticipating the comment to show first or in front of the older comments, this is something to add for the further development part.

5.6 Crap principles applied to final design

Looking at our final design, we investigated it to see if it accommodated the CRAP principles, and then made changes to it.

Figure 6 and figure 7. Revised final designs with CRAP Principles.

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The heading about the artist and descriptions they too are also in proximity with each other, with enough space between them and the image, title and author above to suggest they are in different groups.

6 Objectives and Delivery

The following objectives for the project can be considered as tasks to be solved to be able to provide a fully functional application.

Objectives of the project:

Make a mobile app for crossing borders.

minimum Requirements:

Functional requirements

- User can find projects and events
- User can find school services.
- User can find about Us information.
- User can find Contact information.
- User can find Join Us information.

Non-functional requirements

- Security
The information the user sends to the database should be secure.
- Scalability
The application will be open to future changes and improvements.
- Usability
The application interface should be easier to use.

Delivery & Evaluation:

- At the end of every sprint , a sprint review and evaluation is made.

7 Product Development

In this chapter I will begin the development of Crossing Borders mobile app.

7.1 Shared Vision

Shared vision document ⁸ has the goal of showing what the overall vision is for the customer and the developer.

⁸ Agile Software Engineering with Visual Studio, second edition

7.1.1 Product Position

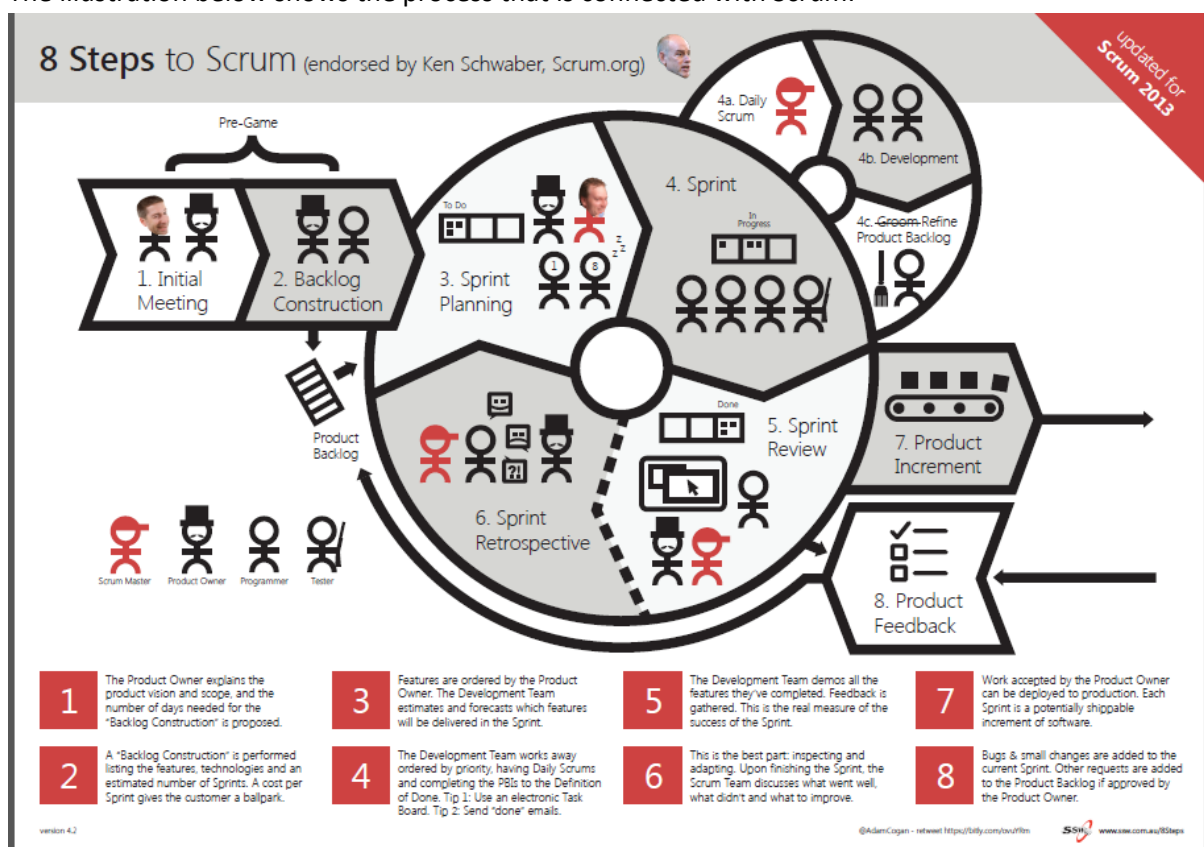
For	Crossing Borders
Who	Wants a mobile app developed for all platforms
The (product name)	CB mobile app
That	Gives the user the ability to read and write from CB mobile app
Our product	Gives the user the ability to get faster information from CB mobile app

7.1.2 Stakeholder Description (product owner?)

Name	Description	Responsibilities
Product Owner	Garba Diallo. The director of Crossing Borders.	Product Owner will follow product development process and give feedback.

7.2 Development process overview

The illustration below shows the process that is connected with Scrum.



7.3 Product Backlog

Contains all the user stories until the final release. User stories can be added or removed from the Product Backlog by the product owner.

Product Backlog	Sprints Backlog	In progress 0 / 2	Done
+ add task	+ add task	+ add task	+ add task
User can find About Us information from Crossing Borders			
User can find Projects and Events from Crossing Borders			
User can find School Services information from Crossing Borders			
User can send information to join Crossing Borders			
User can find Crossing Borders contacts			

Sprint Backlog

To make the Sprint Backlog, I have taken individual User stories from the product Backlog and arranged them according to the priority given the product owner.

Product Backlog	Sprints Backlog	In progress 0 / 2	Done
+ add task	+ add task	+ add task	+ add task
	<div>1. User can find About Us information from Crossing Borders</div> <div>2. User can find Projects and Events from Crossing Borders</div> <div>3. User can find School Services information from Crossing Borders</div> <div>4. User can send information to join Crossing Borders</div> <div>5. User can find Crossing Borders contacts</div>		

8 Sprint 1







8.1 User story 1 – User can find About Us information from Crossing Borders

When the user opens the home page , the user can navigate to about us page.

Product Backlog	Sprints Backlog	In progress 1 / 2	Done
+ add task	+ add task	+ add task	+ add task
	<div>2. User can find Projects and Events from Crossing Borders</div> <div>3. User can find School Services information from Crossing Borders</div> <div>4. User can send information to join Crossing Borders</div> <div>5. User can find Crossing Borders contacts</div>	<div>1. User can find About Us information from Crossing Borders</div>	

8.2 Implementation of User Story 1

There are several technologies for developing a mobile application as shown in the table below

	Swift	Programming language for iOS
	Java	programming language for android apps
	Ionic	open-source SDK for hybrid mobile app development.
	Cordova	Wraps HTML/JavaScript app into a native container which can access the device functions of several platforms.
	ReactNative	ReactNative app is a real mobile app. It uses the same fundamental UI building blocks as regular iOS and Android
	NativeScript	NativeScript apps are built using platform-agnostic programming languages such as JavaScript or TypeScript.

I will be using **Ionic** to build this application because I have used it before in a school assignment. I have only 5 weeks to complete this dissertation, and it will take me much time to learn a new language like swift which is platform specific to iOS, while Ionic + Cordova is multiplatform for Android, iOS and Windows mobile applications.

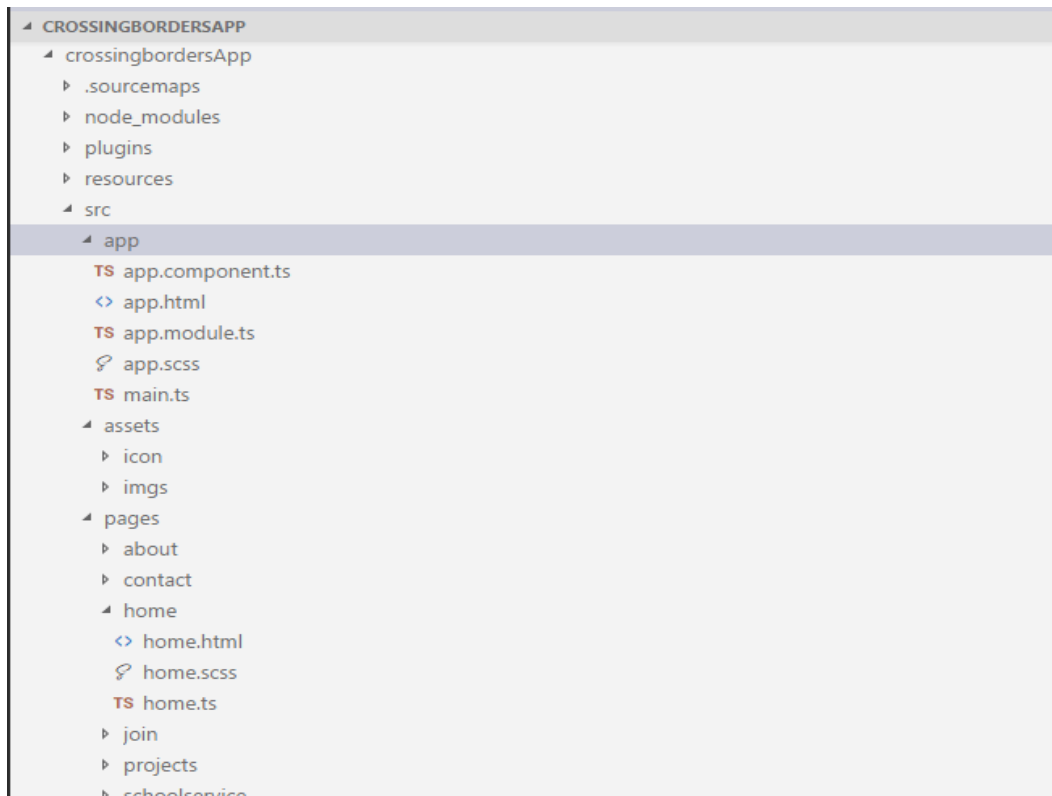
The App structure

To install and set-up ionic and get started, I followed the instructions and read the documentation on Ionic-Documentation⁹. Ionic uses AngularJS, a frontend Javascript framework.

Below is the App structure. The code can be accessed on my github repository¹⁰

⁹ <https://ionicframework.com/docs/>

¹⁰ <https://github.com/kevinadeya/crossingbordersApp>





```

13 <ion-content padding>
14   <ion-card>
15     <ion-card-content class="card-con" id="inter" type = "button" (click)="inter()">
16       
17       <h3>International Projects</h3>
18     </ion-card-content>
19
20     <ion-card-content class="card-con" id="school" type = "button" (click)="school()">
21       
22       <h3>School Services</h3>
23     </ion-card-content>
24
25     <ion-card-content class="card-con" id="join" type = "button" (click)="join()">
26       
27       <h3>Join Us</h3>
28     </ion-card-content>
29
30   </ion-card>
31 </ion-content>
32
33

```



```

9   <ion-content padding>
10   <ion-card>
11   |
12   <ion-card-header>
13   | ABOUT US
14   </ion-card-header>
15   <ion-card-content>
16   <div class="text">
17   | <h3>History</h3>
18   |
19   | <p>Crossing Borders (CB) started its activities for youth
20   |   and educators in the Middle East in October 1999. It
21   |   developed from the "Learning to Live Together in the
22   |   Middle East" Project. This project started in 1994 as a
23   |   summer seminar that was held in Helsingør, between
24   |   1994 and 1998, for Arab and Israeli educators,
25   |   teachers and journalists from Egypt, Israel, Jordan</p>
26   | </div>
27   | <div class="img">
28   |   
29   | </div>
30   | <div class="but">
31   |   <button ion-button class="center">More On The Website</button>
32   | </div>
33   </ion-card-content>
34   </ion-card>
35 </ion-content>

```

```

1  import { Component } from '@angular/core';
2  import { NavController } from 'ionic-angular';
3  import {ProjectsPage} from '../projects/projects';
4  import {SchoolservicePage} from '../schoolservice/schoolservice';
5  import {JoinPage} from '../join/join';
6
7  @Component({
8    selector: 'page-home',
9    templateUrl: 'home.html'
10  })
11  export class HomePage {
12
13    constructor(public navCtrl: NavController) {
14
15    }
16
17    inter() {
18      this.navCtrl.setRoot(ProjectsPage);
19    }
20
21    school() {
22      this.navCtrl.setRoot(SchoolservicePage);
23    }
24
25    join() {
26      this.navCtrl.setRoot(JoinPage);
27    }
28
29  }
30

```

8.3 Evaluation of Sprint 1

8.3.1 Acceptance Test

We conducted an acceptance test where the product owner was asked to open the app and navigate to about page. The acceptance test passed. The acceptance tests are in the appendix.

8.3.2 Sprint Review and Reprospective

This sprint was very busy as I had to set up the development tools. The communication with the project manager was good. I received good feedback and that I should add management profiles in about page in future releases. I felt motivated to continue to the next sprint

9 Sprint 2

9.1 User Story 2: User can find projects and events

When the user opens the home page , the user can navigate to projects and events page.

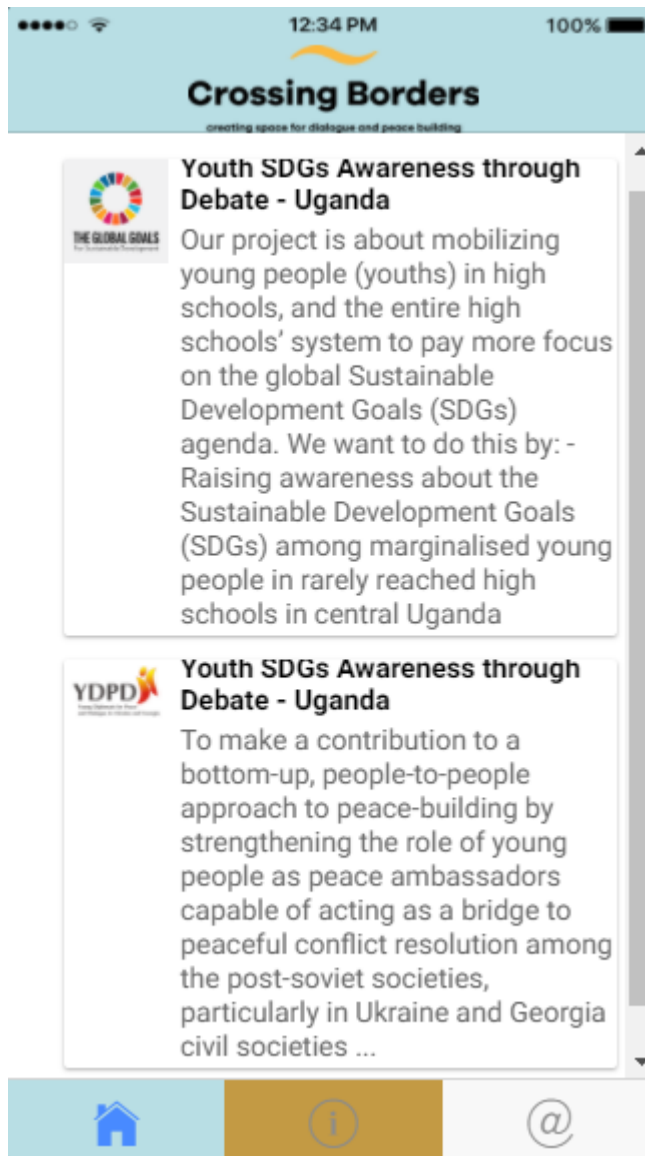
Product Backlog	Sprints Backlog	In progress 1 / 2	Done
+ add task	+ add task	+ add task	+ add task
	<div>3. User can find School Services information from Crossing Borders</div> <div>4. User can send information to join Crossing Borders</div> <div>5. User can find Crossing Borders contacts</div>	<div>2. User can find Projects and Events from Crossing Borders</div>	<div>1. User can find About Us information from Crossing Borders</div>

9.2 Implementing User Story 2: User can find projects and events

```

14 <ion-content padding>
15   <ion-card class="proj">
16     <div class="image">
17       
18     </div>
19     <div class="pro-text">
20       <h4>Youth SDGs Awareness through Debate - Uganda</h4>
21       <p>Our project is about mobilizing young people (youths) in high schools, and the e
22     </div>
23   </ion-card>
24
25   <ion-card class="proj">
26     <div class="image">
27       
28     </div>
29     <div class="pro-text">
30       <h4>Youth SDGs Awareness through Debate - Uganda</h4>
31       <p>To make a contribution to a bottom-up, people-to-people approach to peace-buil
32     </div>
33   </ion-card>
34 </ion-content>

```



9.3 Evaluation of Sprint 2

9.3.1 Acceptance Test

We conducted an acceptance test where the product owner was asked to open the app and navigate to projects and events page. The acceptance test passed.

9.3.2 Sprint Review and Retrospective

This sprint was less busy than sprint 1 as the fundamental tools to run the app had been set up, thus the process was simpler. The communication with the project manager was good as well. Feedback from the product owner was that no additions were necessary in the Projects page.

10 Sprint 3

10.1 User story 3: User can find school services information

When the user opens the home page , the user can navigate to school services page.

10.2 Implementation af User Story 3: User can find school services information

```

12     <ion-card-header>
13         SCHOOL SERVICES
14     </ion-card-header>
15     <ion-card-content>
16         <div class="full">
17             <p>Få verden ind i skolen og skolen ud i verden. Crossing Borders faciliterer workshops og temadage fi
18             </p>
19         </div>
20         <div class="half">
21             <a href="#">Download brochure</a>
23         </div>
24         <div class="half">
25             <ul>
26                 <li>Klimaet og vores jord </li>
27                 <li>Globale hotspots</li>
28                 <li>Flygtninge og migration </li>
29                 <li>Europa og demokrat </li>
30             </ul>
31         </div>
32     </ion-card-content>

```



10.3 Evaluation of Sprint 3

10.3.1 Acceptance Test

We conducted an acceptance test where the product owner was asked to open the app and navigate to school services page. The acceptance test passed.

10.3.2 Sprint Review and Retrospective

The communication with the project manager was less than last week due to travel. Feedback from the product owner was that I should improve the layout and make the pdf file downloadable. The development process is going well, no problems with the app.

11 Sprint 4

11.1 User Story 4: User can send information to join

Product Backlog	Sprints Backlog	In progress 1 / 2	Done
+ add task	+ add task	+ add task	+ add task
	5. User can find Crossing Borders contacts	4. User can send information to join Crossing Borders	1. User can find About Us information from Crossing Borders
			2. User can find Projects and Events from Crossing Borders
			3. User can find School Services information from Crossing Borders

11.2 Implementation of User Story 4: User can send information to join

```

19 <ion-card-header>
20 | JOIN US
21 </ion-card-header>
22 <ion-card-content>
23 | <ion-item>
24 |   <ion-label color="primary" stacked>Name</ion-label>
25 |   <ion-input type="text" placeholder="Name" [(ngModel)]="regInfo.name" name="name"></ion-input>
26 | </ion-item>
27 | <ion-item>
28 |   <ion-label color="primary" stacked>Mail</ion-label>
29 |   <ion-input type="email" placeholder="Mail" [(ngModel)]="regInfo.email" name="email"></ion-input>
30 | </ion-item>
31 | <ion-item>
32 |   <ion-label color="primary" stacked>Date of birth </ion-label>
33 |   <ion-input type="date" [(ngModel)]="regInfo.birth"></ion-input>
34 | </ion-item>
35 | <ion-item>
36 |   <ion-label color="primary" stacked>City of residence</ion-label>
37 |   <ion-input type="text" placeholder="City of residence" [(ngModel)]="regInfo.city"></ion-input>
38 | </ion-item>
39 |
40 | <ion-list radio-group [(ngModel)]="regInfo.type">
41 | |
42 | | <ion-list-header>
43 | | | Type of membership
44 | | </ion-list-header>
45 | |
46 | | <ion-item>
47 | | | <ion-label>Individual(DKK 150 kr per year)</ion-label>
48 | | | <ion-radio value="individual"></ion-radio>

```

More images is available in the appendix and the gitHub repository¹¹

¹¹ <https://github.com/kevinadeya/crossingbordersApp>

11.3 Evaluation of Sprint 4

11.3.1 Acceptance Test

We conducted an acceptance test where the product owner was asked to open the app and navigate to join us page, input information to join as a member and press the send button. The acceptance test passed.

11.3.2 Sprint Review and Reprospective

The communication with the project manager was very good this week. He liked that he could information to the database. Feedback from the product owner was very encouraging, the page could be developed further in future releases. I had challenge implementing the Api and database connection due to issues with cross-origin permissions.

12 Sprint 5

12.1 User Story 5: User can find contact information

When the user opens the home page , the user can navigate to projects and events page.

Product Backlog	Sprints Backlog	In progress 1 / 2	Done
+ add task	+ add task	+ add task	+ add task
		5. User can find Crossing Borders contacts	1. User can find About Us information from Crossing Borders
			2. User can find Projects and Events from Crossing Borders
			3. User can find School Services information from Crossing Borders
			4. User can send information to join Crossing Borders

12.2 Implementation af User Story 5: User can find contact information

```

11
12 <ion-card-header>
13 | CONTACT US
14 </ion-card-header>
15 <ion-card-content>
16 | <div class="contact">
17 |   <h3>Call Us On</h3>
18 |   <a href="tel:+4521639432">+45 21639432</a>
19 |   <br>
20 |   <br>
21 |   <h3>Email Us At</h3>
22 |   <a href="mailto:cb@crossingborders.dk">cb@crossingborders.dk</a>
23 |   <br>
24 |   <br>
25 |   <h3>Come Find Us At</h3>
26 |   <p>Købmagergade 43, 1150 København K, Denmark</p>
27 | </div>
28 | <div class="con-map">
29 |   
30 | </div>
31 </ion-card-content>
32
33

```

12.3 Evaluation af Sprint 5

12.3.1 Acceptance Test

I conducted an acceptance test where the product owner was asked to open the app and navigate to Contact us page and say if he can read the contact information. The acceptance test passed.

12.3.2 Sprint Review and Reprospective

The communication with the project manager was poor this week due to Christmas holidays. Feedback from the product owner was that I should add GPS navigation to the address section of contacts page. I had challenge implementing GPS navigation.

Product Backlog	Sprints Backlog	In progress 0 / 2	Done
+ add task	+ add task	+ add task	+ add task
			<div>1. User can find About Us information from Crossing Borders</div> <div>2. User can find Projects and Events from Crossing Borders</div> <div>3. User can find School Services information from Crossing Borders</div> <div>4. User can send information to join Crossing Borders</div> <div>5. User can find Crossing Borders contacts</div>

13 Conclusion

Through out the course of this report, I have worked on finding and giving answers to the problem definition.

13.1.1 Question 1

I have used extreme programming and scrum to the extend tha suits a single person group.

13.1.2 Question 2

I have used CRAP principles to guide in a good user interface.

14 Reflection

Although I completed the sprints for this dissertation, I look forward to integrating tests in the application as well as in the future releases. We have software to test Ionic apps, examples are Karma and Jasmine.

The mobile application is still open to further improvements in the design and quality. The 4 weeks period was short, and in the future sprints I will improve on the product. The application is still open to further improvements in the later releases after this report.

I have only had about 4 weeks to do the project, including travelling to and from Africa in the holiday period. I am still in working with Crossing Borders to the final version that can be hosted on Apple store, Google play, or Windows store. I will also look to the possibilities of building on different platforms with swift, java, native code or any other language.

I will improve on the user interface by carrying out more usability tests on the mobile app. Getting more people to test the app will be a great way of improving the future updates.

This dissertation has helped me learn on the importance of planning. It has been a challenging time for me to complete the requirements in the 5 weeks. I am open to more requirements from the product owner because of the agile methodology which gives room for refinement.

15 References

Websites

<https://ionicframework.com/docs/>

https://www.researchgate.net/publication/229046039_Personal_Extreme_Programming-An_Agile_Process_for_Autonomous_Developers

16 Appendix

```
1  var mongoose = require('mongoose');
2
3  mongoose.Promise = global.Promise;
4  mongoose.connect(process.env.MONGODB_URI);
5
6  module.exports = {mongoose};
```

```

1  var mongoose = require('mongoose');
2  var JoinCrossing = mongoose.model('JoinCrossing', {
3    name: {
4      type: String,
5      minlength: 1,
6      trim: true
7    },
8    email: {
9      type: String,
10     minlength: 1,
11     trim: true
12   },
13   birth: {
14     type: String,
15     minlength: 1,
16     trim: true
17   },
18   city: {
19     type: String,
20     minlength: 1,
21     trim: true
22   },
23   type: {
24     type: String,
25     minlength: 1,
26     trim: true
27   },
28   newsletter: {
29     type: Boolean,
30     default: false
31   }
32 });
33 module.exports = {JoinCrossing};

```

```

1  var env = process.env.NODE_ENV || 'development';
2
3  if (env === 'development') {
4    process.env.PORT = 3000;
5    process.env.MONGODB_URI = 'mongodb://localhost:27017/CrossingDB';
6  } else if (env === 'test') {
7    process.env.PORT = 3000;
8    process.env.MONGODB_URI = 'mongodb://localhost:27017/CrossingDB';
9  }

```

```

1  require('./server/config/config');
2
3  const _ = require('lodash');
4  const express = require('express');
5  const bodyParser = require('body-parser');
6  const {ObjectID} = require('mongodb');
7
8  var {mongoose} = require('./db/mongoose');
9  var {JoinCrossing} = require('./models/join');
10
11 var app = express();
12 const port = process.env.PORT;
13
14 app.use(bodyParser.json());
15
16 app.post('/join', (req, res) => {
17   var join = new JoinCrossing({
18     name: req.body.name,
19     email: req.body.email,
20     birth: req.body.birth,
21     city: req.body.city,
22     type: req.body.type,
23     newsletter: req.body.newsletter
24   });
25
26   join.save().then((doc) => {
27     res.send(doc);
28   }, (e) => {
29     res.status(400).send(e);
30   });
31 });
32
33 app.get('/join', (req, res) => {
34   JoinCrossing.find().then((join) => {
35     res.send({join});
36   }, (e) => {
37     res.status(400).send(e);
38   });
39 });

```

```

41 app.get('/join/:id', (req, res) => {
42   var id = req.params.id;
43
44   if (!ObjectID.isValid(id)) {
45     return res.status(404).send();
46   }
47
48   Todo.findById(id).then((join) => {
49     if (!join) {
50       return res.status(404).send();
51     }
52
53     res.send({join});
54   }).catch((e) => {
55     res.status(400).send();
56   });
57 });
58
59 app.delete('/join/:id', (req, res) => {
60   var id = req.params.id;
61
62   if (!ObjectID.isValid(id)) {
63     return res.status(404).send();
64   }
65
66   JoinCrossing.findByIdAndRemove(id).then((join) => {
67     if (!join) {
68       return res.status(404).send();
69     }
70
71     res.send({join});
72   }).catch((e) => {
73     res.status(400).send();
74   });
75 });
76

```

```

77 app.patch('/join/:id', (req, res) => {
78   var id = req.params.id;
79   var body = _.pick(req.body, ['name', 'mail', 'birth', 'city', 'type', 'newsletter']);
80
81   if (!ObjectID.isValid(id)) {
82     return res.status(404).send();
83   }
84
85   JoinCrossing.findByIdAndUpdate(id, {$set: body}, {new: true}).then((todo) => {
86     if (!join) {
87       return res.status(404).send();
88     }
89
90     res.send({join});
91   }).catch((e) => {
92     res.status(400).send();
93   })
94 });
95
96 app.listen(port, () => {
97   console.log(`Started up at port ${port}`);
98 });
99
100 module.exports = {app};

```

```

1 import { Component } from '@angular/core';
2 import { Platform } from 'ionic-angular';
3 import { StatusBar } from '@ionic-native/status-bar';
4 import { SplashScreen } from '@ionic-native/splash-screen';
5
6 import { TabsPage } from '../tabs/tabs';
7 import { HomePage } from '../pages/home/home';
8
9 @Component({
10   templateUrl: 'app.html'
11 })
12 export class MyApp {
13   rootPage:any = TabsPage;
14
15   constructor(platform: Platform, statusBar: StatusBar, splashScreen: SplashScreen) {
16     platform.ready().then(() => {
17       // Okay, so the platform is ready and our plugins are available.
18       // Here you can do any higher level native things you might need.
19       statusBar.styleDefault();
20       splashScreen.hide();
21     });
22   }
23 }
24

```


The screenshot shows an IDE with two tabs open: 'app.html' and 'app.module.ts'. The 'app.html' tab is active, showing the following code:

```

1 <ion-nav [root]="rootPage"></ion-nav>
2

```

The 'app.module.ts' tab is also visible, showing the following code:

```

1 import { NgModule, ErrorHandler } from '@angular/core';
2 import { BrowserModule } from '@angular/platform-browser';
3 import { IonicApp, IonicModule, IonicErrorHandler } from 'ionic-angular';
4 import { HttpModule } from '@angular/http';
5 import { MyApp } from './app.component';
6
7 import { AboutPage } from '../pages/about/about';
8 import { ContactPage } from '../pages/contact/contact';
9 import { HomePage } from '../pages/home/home';
10 import { ProjectsPage } from '../pages/projects/projects';
11 import { SchoolservicePage } from '../pages/schoolservice/schoolservice';
12 import { JoinPage } from '../pages/join/join';
13 import { TabsPage } from '../tabs/tabs';
14
15 import { StatusBar } from '@ionic-native/status-bar';
16 import { SplashScreen } from '@ionic-native/splash-screen';
17
18 @NgModule({
19   declarations: [
20     MyApp,
21     AboutPage,
22     ContactPage,
23     HomePage,
24     ProjectsPage,
25     SchoolservicePage,
26     JoinPage,
27     TabsPage

```

```

28   ],
29   imports: [
30     BrowserModule,
31     HttpClientModule,
32     IonicModule.forRoot(MyApp)
33   ],
34   bootstrap: [IonicApp],
35   entryComponents: [
36     MyApp,
37     AboutPage,
38     ContactPage,
39     HomePage,
40     ProjectsPage,
41     SchoolservicePage,
42     JoinPage,
43     TabsPage
44   ],
45   providers: [
46     StatusBar,
47     SplashScreen,
48     {provide: ErrorHandler, useClass: IonicErrorHandler}
49   ]
50 })
51 export class AppModule {}
--

```

```

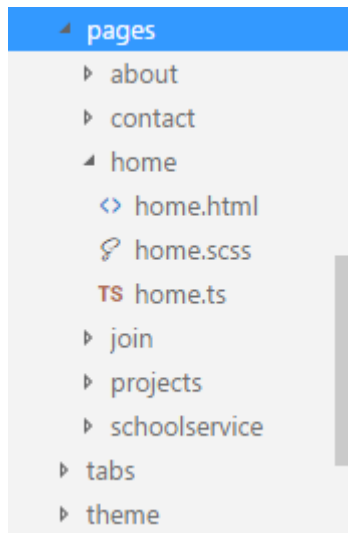
<> app.html  TS app.module.ts  app.scss  TS main.ts  x  Welcome  <> home.html
1  import { platformBrowserDynamic } from '@angular/platform-browser-dynamic';
2
3  import { AppModule } from './app.module';
4
5  platformBrowserDynamic().bootstrapModule(AppModule);
6

```

```

TS joinInfo.ts  x  <> app.html  TS app.module.ts  app.scss  TS main.ts
1  export class JoinInfo {
2    public name: string;
3    public email: string;
4    public birth: string;
5    public city: string;
6    public type: string;
7    public newsletter: boolean;
8
9  }

```



```

<> index.html x TS joinInfo.ts <> app.html TS app.module.ts app.scss TS main.ts Welcome
1  <!DOCTYPE html>
2  <html lang="en" dir="ltr">
3  <head>
4      <meta charset="UTF-8">
5      <title>Ionic App</title>
6      <meta name="viewport" content="viewport-fit=cover, width=device-width, initial-scale=1.0, minimum-
7      <meta name="format-detection" content="telephone=no">
8      <meta name="msapplication-tap-highlight" content="no">
9
10     <link rel="icon" type="image/x-icon" href="assets/icon/favicon.ico">
11     <link rel="manifest" href="manifest.json">
12     <meta name="theme-color" content="#4e8ef7">
13
14     <!-- add to homescreen for ios -->
15     <meta name="apple-mobile-web-app-capable" content="yes">
16     <meta name="apple-mobile-web-app-status-bar-style" content="black">
17
18     <!-- cordova.js required for cordova apps (remove if not needed) -->
19     <script src="cordova.js"></script>
20
21     <!-- un-comment this code to enable service worker
22     <script>
23         if ('serviceWorker' in navigator) {
24             navigator.serviceWorker.register('service-worker.js')
25                 .then(() => console.log('service worker installed'))
26                 .catch(err => console.error('Error', err));
27         }
28     </script>-->
29
30     <link href="build/main.css" rel="stylesheet">
31
32 </head>

```

```

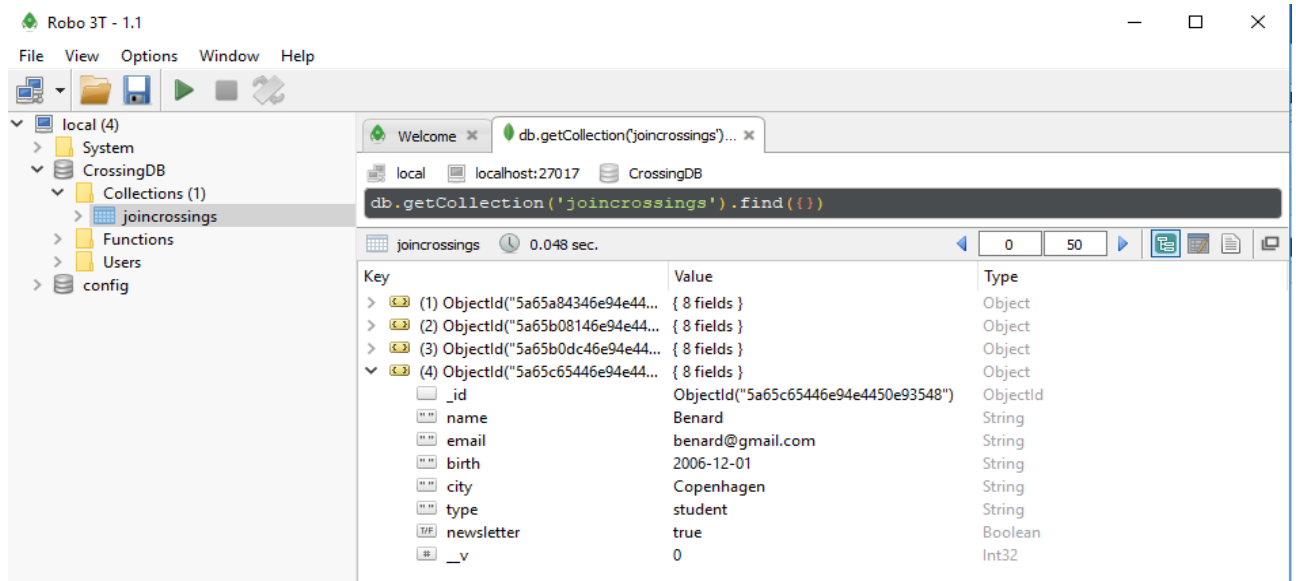
<> index.html x TS joinInfo.ts <> app.html TS app.module.ts app.scss TS main.ts
30 <link href="build/main.css" rel="stylesheet">
31
32 </head>
33 <body>
34
35 <!-- Ionic's root component and where the app will load -->
36 <ion-app></ion-app>
37
38 <!-- The polyfills js is generated during the build process -->
39 <script src="build/polyfills.js"></script>
40
41 <!-- The vendor js is generated during the build process
42 | It contains all of the dependencies in node_modules -->
43 <script src="build/vendor.js"></script>
44
45 <!-- The main bundle js is generated during the build process -->
46 <script src="build/main.js"></script>
47
48 </body>
49 </html>

```

```

ionic.config.json x TS joinInfo.ts <> app.html TS a
1 {
2   "name": "crossingbordersApp",
3   "app_id": "",
4   "type": "ionic-angular",
5   "integrations": {
6     "cordova": {}
7   }
8 }

```



ACCEPTANCE TESTS

Project Identification						
Project Name:			Sprint Start Date:			
CB Mobile App			27-11-2017			
Product Owner:						
Garba Diallo - Director						
ACCEPTANCE CRITERIA TESTS						
		Important Functions		Test Results		
User Story Number	Accept criteria Description	Yes	No	Accepted	Rejected	Comments
1	User can find About Us Information	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
APPROVED						
Product Owner		Signature			Date	
Yes	No	G.Diallo			01-12-17	
<input checked="" type="checkbox"/>	<input type="checkbox"/>					

Project Identification						
Project Name:			Sprint Start Date:			
CB Mobile App			04-12-2017			
Product Owner:						
Garba Diallo - Director						
ACCEPTANCE CRITERIA TESTS						
		Important Functions		Test Results		
User Story Number	Accept criteria Description	Yes	No	Accepted	Rejected	Comments
2	User can find Projects and Events from Crossing Borders	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
APPROVED						
Product Owner		Signature				Date
Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	G.Diallo				08-12-17

Project Identification						
Project Name:			Sprint Start Date:			
CB Mobile App			21-12-2017			
Product Owner:						
Garba Diallo - Director						
ACCEPTANCE CRITERIA TESTS						
		Important Functions		Test Results		
User Story Number	Accept criteria Description	Yes	No	Accepted	Rejected	Comments
3	User can find School Services information from Crossing Borders	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
APPROVED						
Product Owner		Signature				Date
Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	G.Diallo				15-12-17

Project Identification						
Project Name:			Sprint Start Date:			
CB Mobile App			18-12-2017			
Product Owner:						
Garba Diallo - Director						
ACCEPTANCE CRITERIA TESTS						
		Important Functions		Test Results		
User Story Number	Accept criteria Description	Yes	No	Accepted	Rejected	Comments
4	User can send information to join Crossing Borders	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
APPROVED						
Product Owner		Signature				Date
Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	G.Diallo				22-12-17

Project Identification						
Project Name:			Sprint Start Date:			
CB Mobile App			26-12-2017			
Product Owner:						
Garba Diallo - Director						
ACCEPTANCE CRITERIA TESTS						
		Important Functions		Test Results		
User Story Number	Accept criteria Description	Yes	No	Accepted	Rejected	Comments
5	User can find Crossing Borders contacts	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
APPROVED						
Product Owner		Signature				Date
Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	G.Diallo				29-12-17