Proposal

Proof-of-Concept, Geo-Fencing Application for **UVU Capitol Reef Field Station**

Prepared by:
Leandro Sanchez, Arthur Schoenfeld

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1.0 Client

CAPITOL REEF FIELD STATION
UTAH VALLEY UNIVERSITY

Pleasant Creek Rd, Torrey,
UT 84775

The Capitol Reef Field Station (CRFS) consists of four buildings on a bluff overlooking Pleasant Creek in Capitol Reef National Park. The station accommodates up to 40 day-use visitors and 24 overnight visitors. The CRFS is made possible through the partnership between UVU and Capitol Reef National Park. This unique partnership allows CRFS to provide its visitors with educational experiences that are as remarkable as the landscape in which they occur. CRFS is property of the National Park Service and is operated under the direction of UVU and the Park.

Mission:
Capitol Reef Field Station, in partnership with Capitol Reef National Park, promotes and supports engaged learning, research, scholarly, and creative activities, and environmental ethics through the exploration of the Colorado Plateau.

2.0 Statement of Need

UVU Capitol Reef Field Station would like to incorporate iBeacons to enhance visitor's experience throughout the national park. In the future they want to have iBeacons on every trail to ensure a convenient, relevant, and engaging experience. iBeacons will allow visitors to use their Bluetooth-enabled phones to explore the wilderness and learn more about nature automatically and seamlessly without needing to connect with the Internet.

3.0 Client Goals

- Inform visitors about the station and their mission statement
- Have a unique learning experience for visitor
- Encourage visitors to consider and care for their environment
- Teach visitors to employ responsible conservation practices
- Remove the need for a tour guide
- Show what can be done with iBeacon technology in the National Park

4.0 Proposed Solution

To meet the client's goals, the DGM Team will create a proof-of-concept application that will work with iBeacons. Using Estimote iBeacons throughout the station, the DGM team will create an application that will activate when the visitors are close to the beacons. These beacons will send a signal to the visitors' phones when they are near it with the application open, providing location-specific information about the CRFS and surrounding wilderness using battery-friendly Bluetooth technology that does not rely on an Internet connection.

5.0 Deliverables

- Proposal
- Design document
- Completed Application
- Copy of project documentation
- Repository of project source code
- Results from user testing

6.0 Success Metrics

With this proof-of-concept CRFS Application and iBeacon technology, the client hopes to see the following benefits:

An increase in visitor

- knowledge about the CRFS
- understanding of the local flora, fauna, and geological features
- understanding of conservation ethics
- desire to learn more about Capitol Reef National Park
- desire to conserve energy and recycle
- understanding of the environment and how to protect it

A decrease in visitor

- water consumption
- garbage production

An increase in CRFS administrator and park official

- understanding of the benefits of iBeacon technology
- desire to explore and extend the usage of this technology in other parts of the park

7.0 Audience & Stakeholders

Audience

- Students..... Students who want to come visit Capitol Field Station.
- Visitors..... People interested in exploring the wilderness.
- Tour guides staff..... Workers who want to have another way of guiding tours.
- Head of Capitol Reef National Park..... People interested in incorporating iBeacon tech to their park.

Stakeholders

- UVU Capitol Reef Field Station..... They provide the content and information about the station.

- Capitol Reef National Park Officials..... Benefit from applying technology in other areas of park.

8.0 Requirements

Application Content

- Map - Shows points of interest where beacons are placed
- Points of Interest - 6-10 Pages showing a different location or point of interest
- About Page - Information for the Field Station, staff contact information (phone numbers, email, roles, etc.)
- Media - images of area, audio of information for each point of interest

Functions & Scenarios

Use-case scenarios for each function listed, illustrating ways the users might use the application to fulfill their goals in different situations.

Function	Scenario
Contact	• A visitor has questions about Capital Reef Field Station. • A visitor needs to contact on-site staff to coordinate or schedule a visit.
Map Tour	• Visitors can use map to find hotspot locations where beacons are placed, as well as other points of interest.
About	• A visitor wants to learn about Capital Reef Field Station and their goals.

9.0 Development Process

9.1 Phases & Roles

Project Initiation	Pre-Development	Development	Post Development
Digital Media Team • Meet with client and discuss project • Conduct audience analysis • Prepare proposal • Meet with client for sign-off on the proposal	**Digital Media Team** • Design strategy, scope, structure, and surface treatment for application • Create wire-frames and working prototypes • Create prototype to test the Estimote beacons • Conduct usability test • Prepare design document • Meet with client to sign-off design	**Digital Media Team** • Code and style application • Pair application with beacons • Run alpha test on application and beacons • Record audio from script provided	**Digital Media Team** • Create post-development test plans • Conduct final usability tests/ make revisions • Collect product feedback from client and sample of potential users • Conduct quality assurance testing • Deliver final product/get sign-off • Submit final product documentation for DGM Department
CRFS Director • Provide useful content • Work on developing project goals, success metrics, and scenarios with DGM team • Review and sign-off proposal	**CRFS Director** • Review Design Document • Sign-off on Design Document	**CRFS Director** • Provide content (script for audio) • Review alpha release & provide feedback as needed	**CRFS Director** • Provide product feedback for DGM team • Sign-off on deliverables

9.2 Development Tools

Deliverables	Software
Application	PhoneGap/Cordova will be used to create native iOS and Android applications along with HTML/JavaScript/CSS, as well as publish them to respective stores. BitBucket will host source code repository until it is handed off to client.
Audio Files	Adobe Audition
Proposal	Adobe InDesign
Design doc	Adobe InDesign

9.3 Development Team

Team Members	Roles	Contact
Leandro Sanchez	UX Designer/Project Manager	Phone: 801-636-2668 Email: Leandrosanchez009@gmail.com
Arthur Schoenfeld	Developer	Phone: 801-759-0885 Email: arthur.schoenfeld@gmail.com

9.4 Quality Control Process

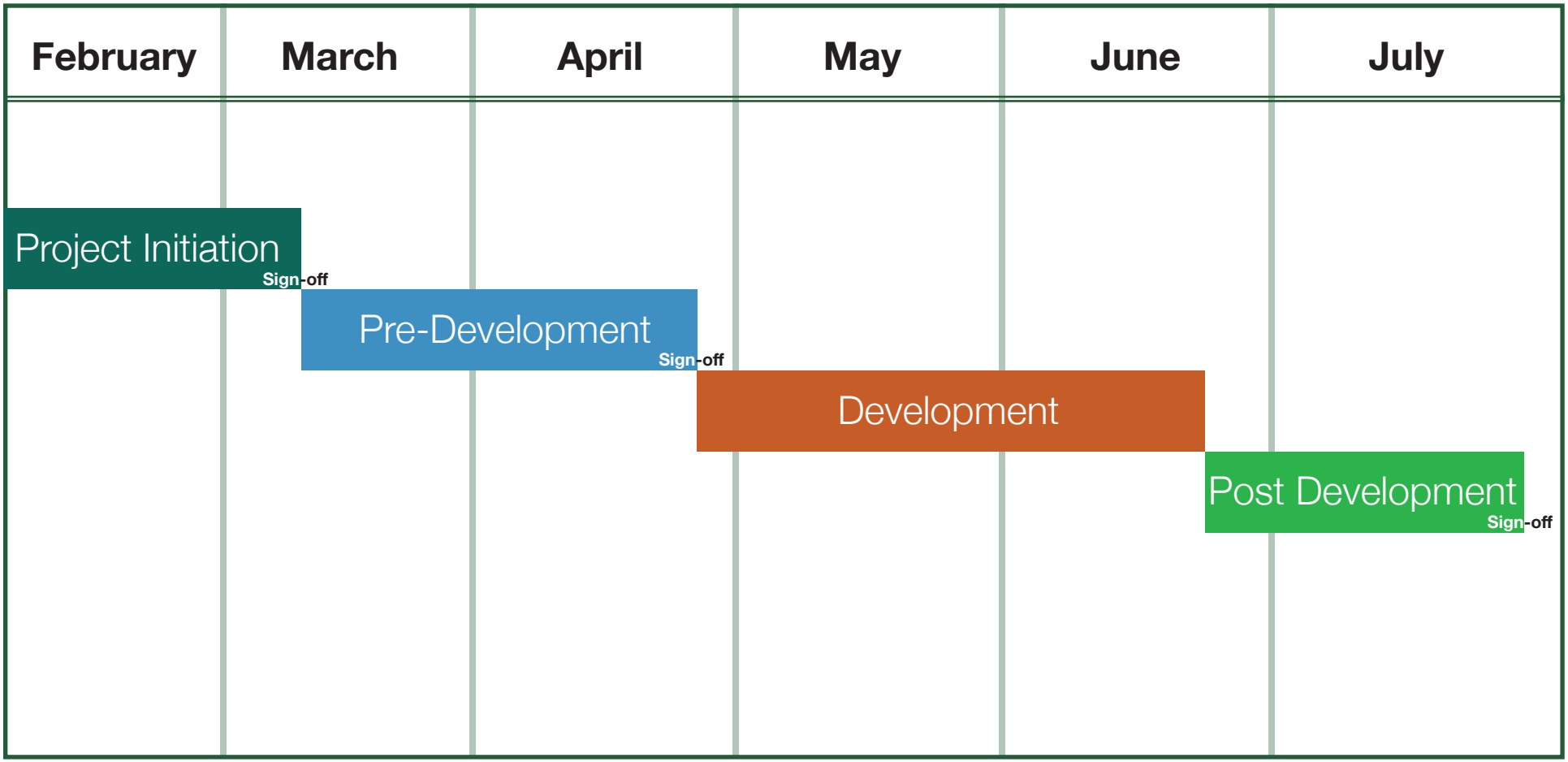
In order to ensure that the proof of concept app meets client expectations, several meetings will be arranged for client reviews.

- Proposal review/sign-off
- Design Document/sign-off
- Mock-up review/feedback/revisions
- Final product review/sign-off

After all final deliverables have been received the client will sign-off on the project and complete a user satisfaction survey for the Digital Media Department. The survey asks the client to rate their perceptions of the final product, quality of service, and performance of the project team.

10.0 Time-frame

The general time-frame for completion of each phase of this project is outlined below. A detailed schedule and project plan will follow in the Design Document.



11.0 Project Scope

This section briefly describes the scope of the project and includes factors that will influence the budget estimates. Cost estimates and time-frames are based on these assumptions. If the scope changes significantly, time and cost estimates will also change significantly.

Client	Client will provide content and images for the app
Application	Map Screen, About Screen, 6-10 Points of Interest Screens
Client Reviews & Revisions	Clients may request revisions at the previously designated review points Significant revisions after the alpha review may require cost and time adjustments
Testing	Conduct usability tests using 4-5 users at least once during the course of development Conduct a customer satisfaction survey with 4-8 representative users at the end of the project and provide results to the client

12.0 Cost Estimate

Although the labor required to produce this project is being donated, the DGM team wants to let the UVU Capitol Reef know the typical cost for a project of this scope. A project of this scope would usually cost between $5,000 to $15,000 assuming student rates of $20 an hour.

A more detailed final budget and cost estimate will be included with the Design Document.

Proposal Sign-Off

This document has been reviewed and the content and requirements described therein conform to an agreed-upon understanding of the design need.

DGM Team

Leandro Sanchez
Project Manager / UX Designer

Date

Arthur Schoenfeld
Developer

Date

UVU Capitol Reef Field Station (client)

Michael T. Stevens
Director / Client

Date

Instructor Approval

Trudy Christensen
Digital Media Professor

Date

Mike Harper
Mentor

Date

Proof-of-Concept Geo-Fencing App

DESIGN DOCUMENT

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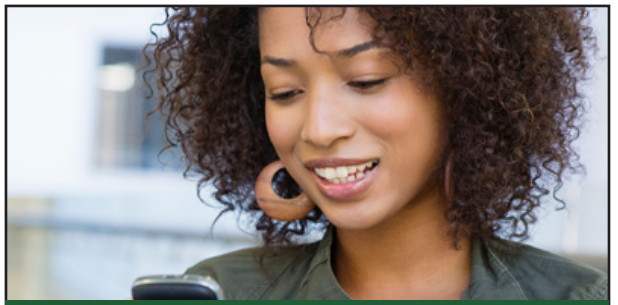
DESIGN

The purpose of this document is to more specifically address the design for the CRFS Proximity Beacon App and outline the plan for developing the final product. For more details about the project rationale, goals, requirements, and roles and responsibilities refer to the Project Proposal.

Sections:

1.0 Strategy

To help determine the strategy for developing a proximity beacon app for Capitol Reef Field Station, the DGM team came up with multiple personas to help understand the needs and goals of the audience. After analyzing what we needed from the target audiences, the team came up with detailed profiles for each persona to represent the goals of the audience.



College Student - Sasha

On-Site Personnel - Mark

Tourist - Sarah

Conclusion

Based on the analysis of the personas and meetings with our client, the DGM team has come to the conclusion that Sasha would be the best candidate for the primary persona as we focus on the design of the application. We chose Sasha because a grand majority of the visitors they get are Astronomy students and the students learn about the station and environment during their visit.

1.1 Primary Persona

College Student

“I love using technology and want to use it in new and interesting ways to help me learn.”

Name: Sasha
Age: 22
Location: Lehi, UT
Occupation: Student
Education: Bachelor’s (in progress)
Hobbies: Movies, travel, reading

Sasha is halfway through her degree at college and is taking a trip to the Capitol Reef Field Station for her last general education course, Astronomy 1040. Sasha is very technically experienced and picks up on new apps and technology quickly. The application at CRFS will mix her love of environment and knowledge of technology to create a great experience.

Key Characteristics

- Familiar with mobile apps
- Spends time with family and friends
- Main influencer for family and friends
- Environmentally aware and active
- Loves to visit museums
- Enjoys camping and hiking trails

User Goals

- Make memories from college years
- Learn more about environment
- Learn about Capitol Reef Field Station
- Experience a tour at her own pace
- Find info on staff to book a future family trip

Business Goals

- Add value to Sasha’s visit to CRFS
- Encourage Sasha’s environmental awareness
- Provide unique experience for Sasha that she will remember
- Provide a clean and easy to use app

1.2 Secondary Persona

On-site Personnel

“I want to provide a unique experience to visitors that sets us apart from other destinations.”

Name: Mark
Age: 34
Location: Capitol Reef National Park, UT
Occupation: On-site Management
Education: Bachelor’s in Natural History
Hobbies: Reading, hiking, animals, history

Mark has been working with the National Park for years now and still enjoys his day-to-day work. Being very passionate about his work, he enjoys facilitating and providing an area where students and visitors can share in his passion. The application can assist him in spreading knowledge to visitors by taking them on a self guided tour, which frees up more of his time.

Key Characteristics

- Passionate about history and the environment
- Uses technology but doesn’t spend much time with it
- Enjoys teaching visitors about history of area

User Goals

- Teach visitors and students more about the environment they are visiting
- Spread awareness of conservation
- Provide a unique experience for visitors
- Utilize app to teach more visitors in less time

Business Goals

- Reduce burden on personnel for guiding and teaching visitors
- Help visitors to learn about the Park more quickly and independently
- Obtain feedback about possible new locations for app

1.3 Secondary Persona

Tourist

“I love visiting new and beautiful places, and learning more about them.”

Name: Sarah

Age: 29

Location: Seattle, Washington

Occupation: UX/UI Designer

Education: Bachelor’s in Graphic Design

Hobbies: Movies, reading, travel, camping

Sarah is a UX/UI designer at a large technology company in Seattle. While she spends most of her weeks indoors on a computer, she prefers to be outside, hiking, camping, and exploring. Sarah is familiar with technology but doesn’t like confusing experiences. If the application isn’t simple to use she will ignore it, instead focusing on the outdoor experience.

Key Characteristics

- Familiar with technology but not an expert
- Experienced with outdoors and travel
- Prefers human interaction to an app but is not opposed to trying a unique tour

User Goals

- Pack new experiences into limited vacation time available
- Find answers to questions about the Park when no one else is available
- Investigate more about the geology of nearby formations

Business Goals

- Provide a simple application that is easy to use and not confusing
- Impress Sarah with app experience so she recommends to family/friends
- Provide unique experience unlike other outdoor destinations

1.4 Strategy Conclusion

Based on the needs and goals of our users, the DGM team concluded that the application needs to do the following:

- Provide instructions - The application should have clear instructions as to what the user needs to do in order to go through the experience. These instructions can be on the home page so the user learns what to do from the start and has easy access to them if needed.

- Provide an about page where users can learn about the CRFS goals/mission

- Provide a map for the user to find where the beacons are located

- Provide a contact page where the user can reach out to CRFS staff members.

- Provide organized and clear information of each location linked to the beacons.

2.0 Scope

This application will work with proximity beacons that will be placed all around Capitol Reef Field Station. The scope of the project is to build an app that students and visitors can use to learn about CRFS. The user will be able to use the “Map” feature on the app to look for the location of these beacons, once they approach them, a popup with information will come up on their screen. The entire experience will be used as proof of concept for future projects involving proximity beacons.

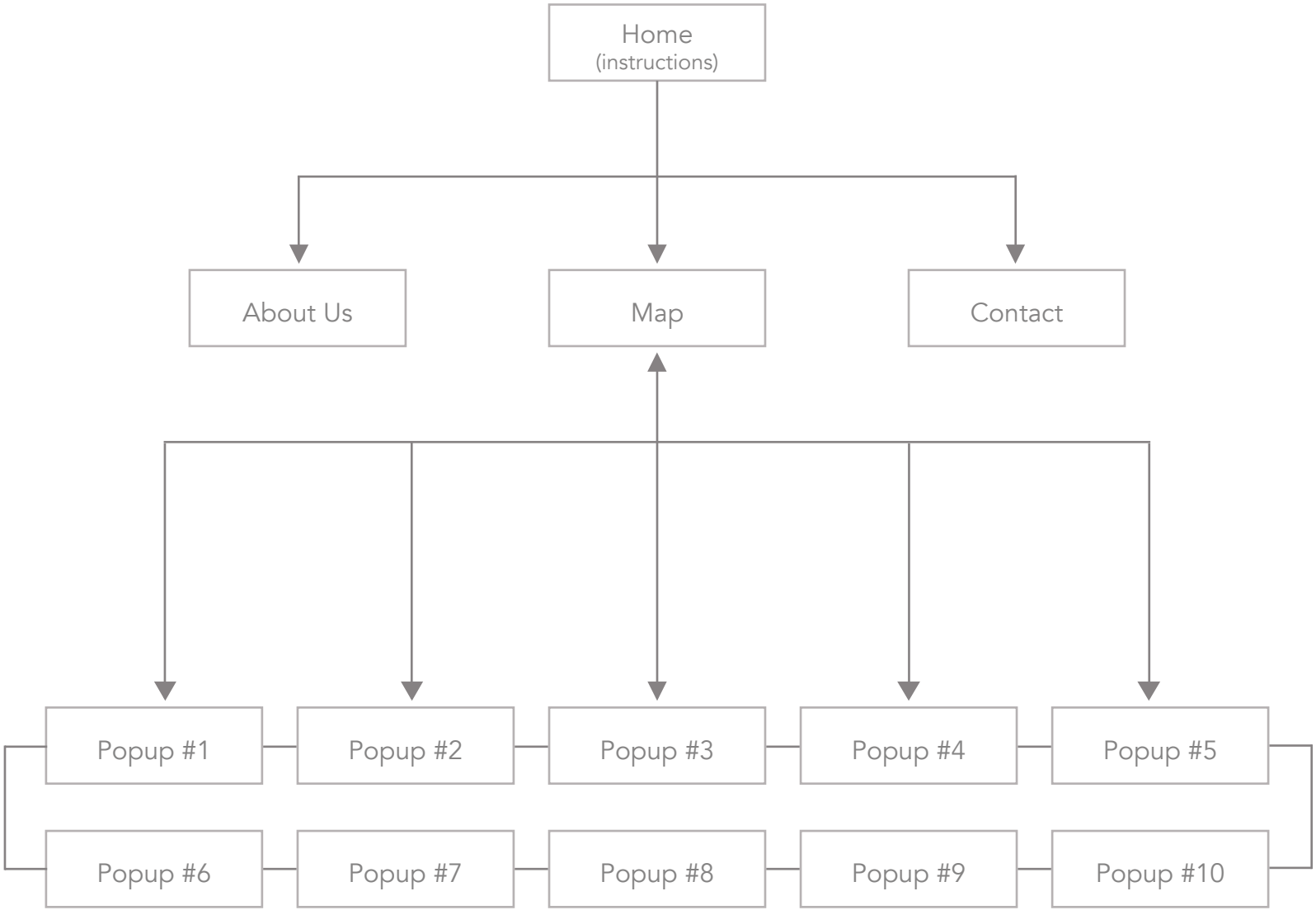
App Page	Page Purpose	Content
Home	Introduces CRFS with an image and logo	• Image and logo of CRFS • Links to About, Map and Contact page
About us	To inform people about CRFS and their goals	• Information about CRFS and their goals
Map	Shows the user the location of every beacon around CRFS. The user needs to have the map open in order for the popups to show up.	• A map with the location of every beacon around the station
Contact	If visitors have questions about CRFS or need to contact on-site staff to schedule a visit.	• Information of the CRFS staff members with image, name, titles and email.
Popup Page	Popup screens that will show up when the user is close to a beacon. Each beacon has its own popup screen.	• Image of place or object with its name and description • Link to Map page • Pause/Play/Replay button

2.1 User Stories

User Story ID	**As a** *<type of user>*	**I want to** *<perform some task>*	**so that I can** *<achieve some goal>*
1	Student	View a map of the area	Locate beacon hotspot areas
2	Student	See information appear from hotspot	Learn more about surrounding area
3	Student	See a list of contact information of staff	Contact them if needed
4	Student	View information about CRFS	Understand their mission and goals
5	Student	Report bugs and give feedback	Help improve the application
6	Student	Pause and play audio from hotspot screen	Control the tour at my own pace
7	Student	Learn more about CRFS features	Understand more how they operate
8	Student	Be introduced to the application features	Properly understand how to use the app
9	Staff	Add new content	Keep the application updated
10	Staff	Allow app to provide self guided tours	Free up time for other activities

3.0 Structure

The following diagram defines the structure of the application.

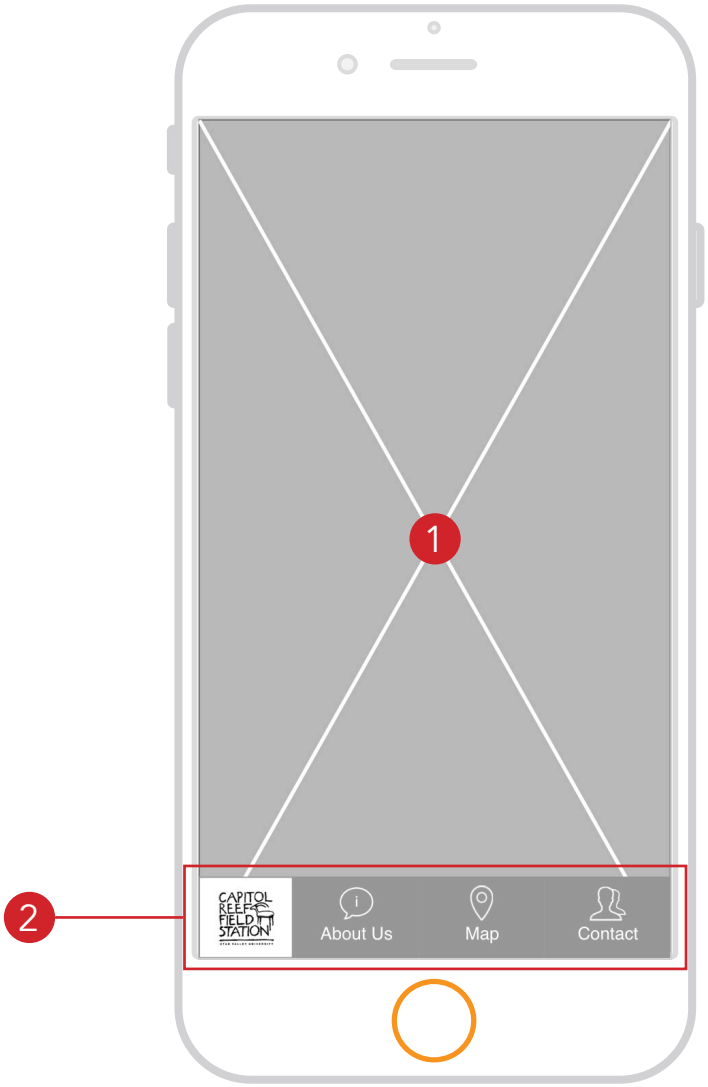


4.0 Skeleton - Home

1. Image representing Capitol Reef Field Station with their logo. Instructions also included in this screen
2. **About us:** Links to “About us” page where the user will find information about CRFS and their mission.

   Map: Links to “Beacon Map” page where the user will be able to see the location of each beacon around the station.

   Contact: Links to “Contact” page where the user will find information on the Capitol Reef Field Station staff.



4.0 Skeleton - About

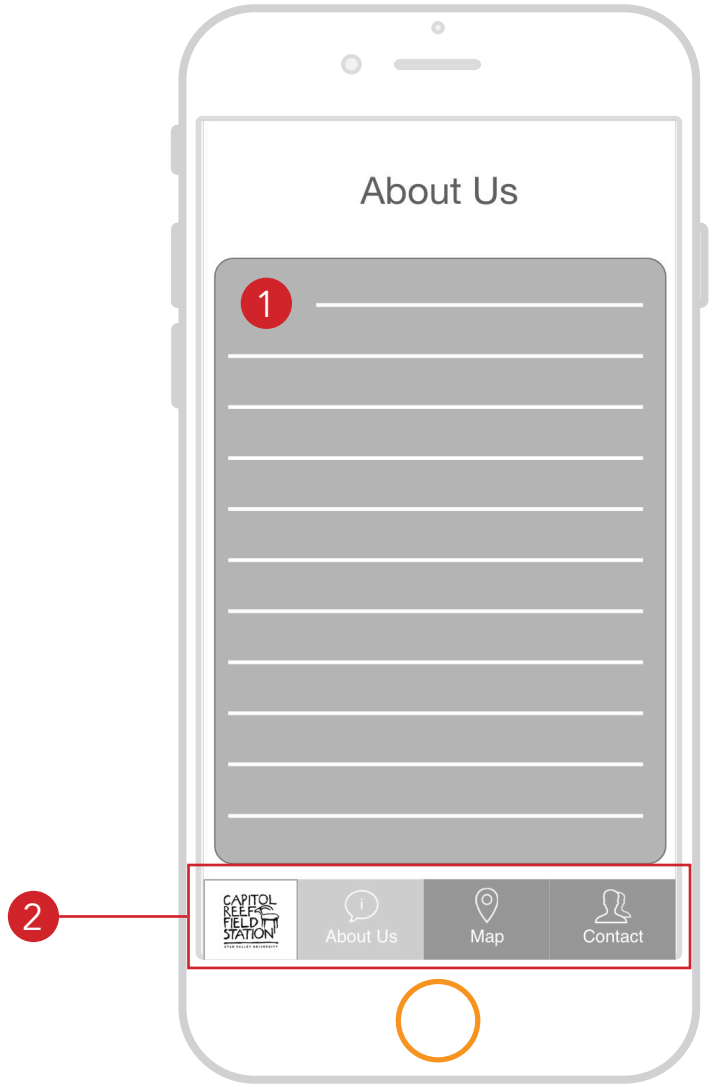
1. Information about CRFS and their mission statement.

2. **Logo:** The CRFS logo that links to “Home” page.

   About us: Links to “About us” page where the user will find information about CRFS and their mission statement.

   Map: Links to “Beacon Map” page where the user will be able to see the location of each beacon around the station.

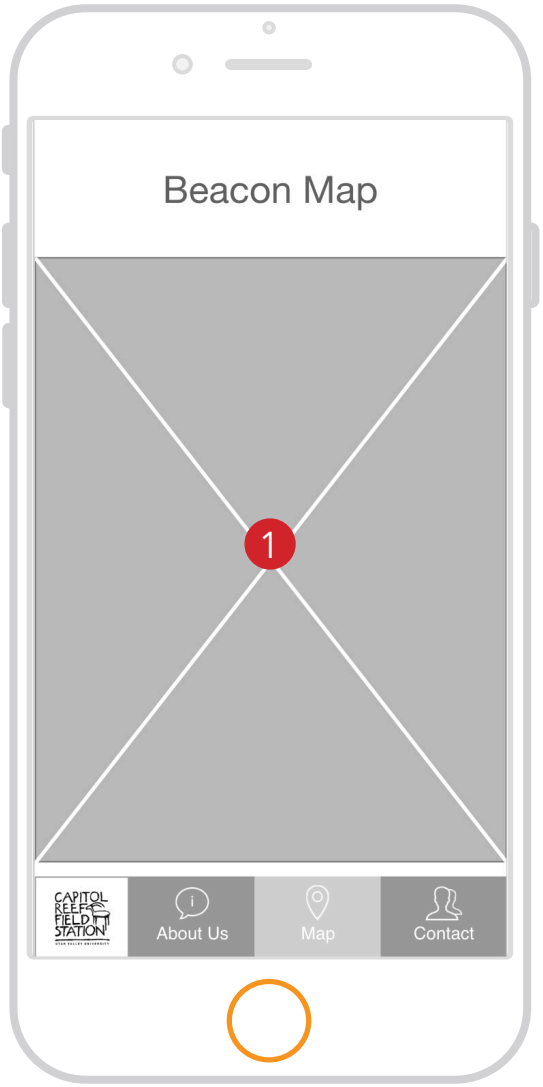
   Contact: Links to “Contact” page where the user will find information on the Capitol Reef Field Station staff.



4.0 Skeleton - Map

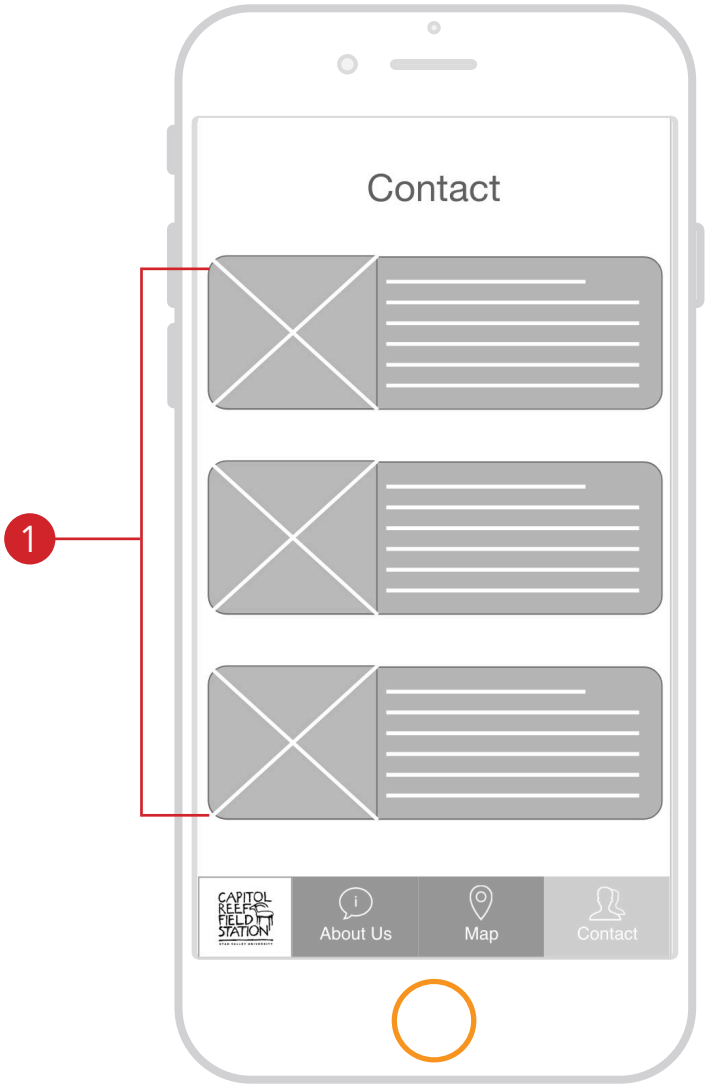
1. Map of CRFS with the locations of each beacon. When the user is close to a beacon, that beacon will pulse and the “Popup” page for that beacon will show up on the screen.

   The user will also be able to tap on the pulsing beacon to get back to the “Popup” page.



4.0 Skeleton - Contact

1. List of the CRFS staff members. Each will have his/her picture, name, title and Email for users to contact them if they want to know more about CRFS.



4.0 Skeleton - Popup Screens

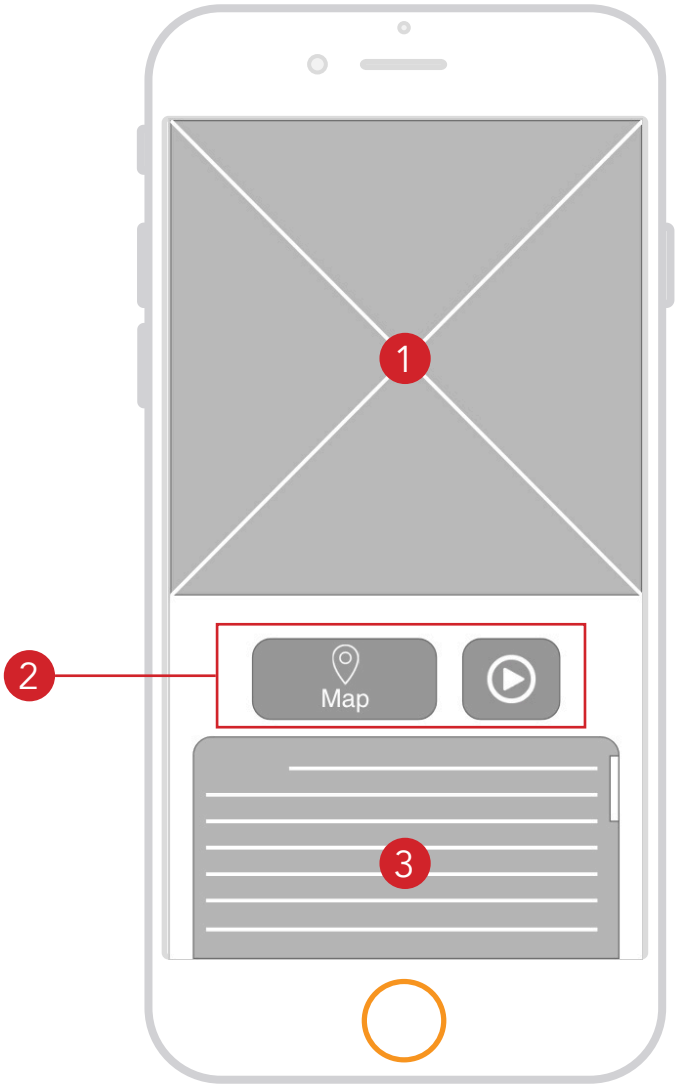
1. Image of the place or object including its name.

2. **Map:** When tapped it takes the user to the “Map” where they can see the location of every beacon on the station.

   Play/Pause: Audio plays only when the play button is tapped. The pause button becomes available to the user while the audio is playing.

   Replay: The option to replay becomes available once the audio is over.

3. Description/information of the place or object that is shown on the image. This information can be read to the user through the use of audio if the user choses to, by tapping on the play button.



5.0 Surface

Motif: The color and fonts used on the app were found on the UVU style guide.

Colors: To keep the app consistent with UVU Capitol Reef Field Station website, we picked colors that were used on the site.

Text: San Serif (Helvetica - Regular and Bold) is a clean font that was found as one of the options on the UVU's style guide.

#255C36
RGB: 38 92 55

#00843D
RGB: 3 132 66

#254B37
RGB: 37 75 55

#000000
RGB: 0 0 0

#FFFFFF
RGB: 255 255 255

Headings and section titles

Body text and other text throughout the app

5.0 Surface - Home

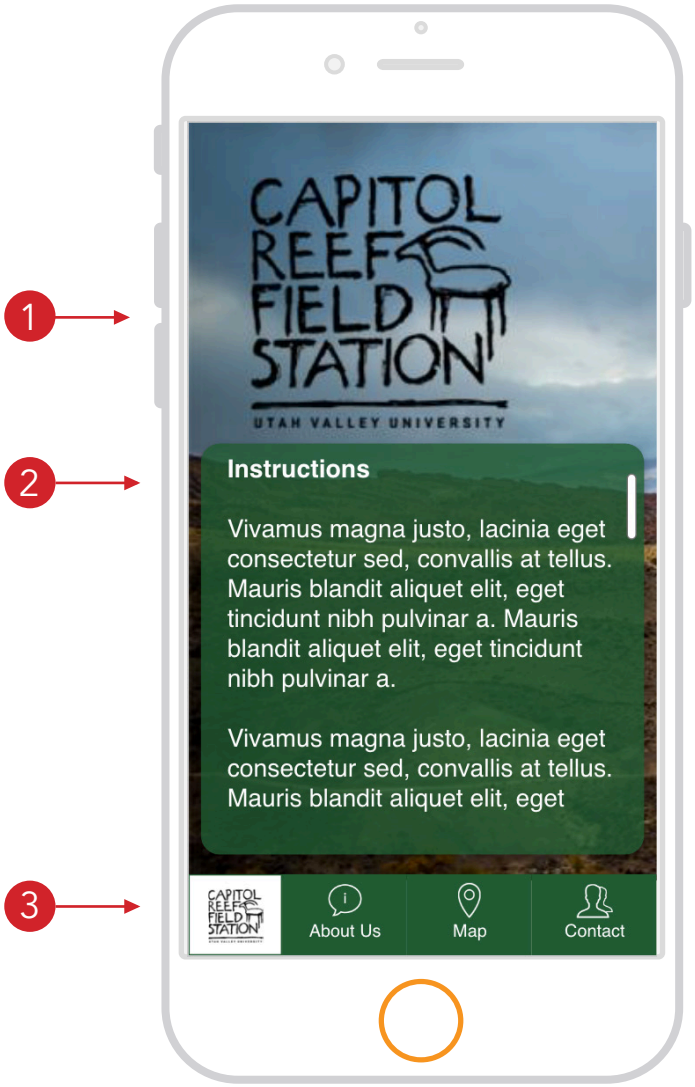
1. Image representing Capitol Reef Field Station with their logo.

2. Instructions on how to use the app with the proximity beacons.

3. **About us:** Links to “About us” page where the user will find information about CRFS and their mission.

   Map: Links to “Beacon Map” page where the user will be able to see the location of each beacon around the station.

   Contact: Links to “Contact” page where the user will find information on the Capitol Reef Field Station staff.



5.0 Surface - About

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   Map: Links to “Beacon Map” page where the user will be able to see the location of each beacon around the station.

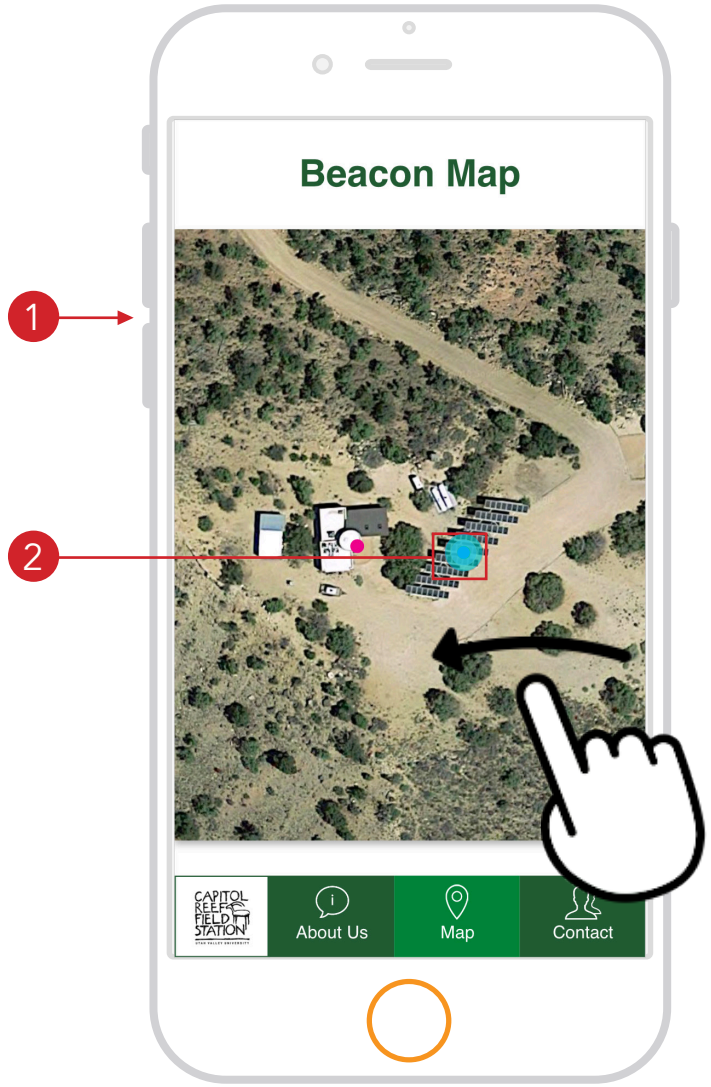
   Contact: Links to “Contact” page where the user will find information on the Capitol Reef Field Station staff.

5.0 Surface - Map

1. Map of CRFS with the locations of each beacon. The user will be able to swipe to reveal more of the map.

   When the user is close to a beacon, that beacon will pulse and the “Popup” page for that beacon will show up on the screen.

2. The user will also be able to tap on the pulsing beacon (green dot on map) to get back to the “Popup” page.



5.0 Surface - Contact

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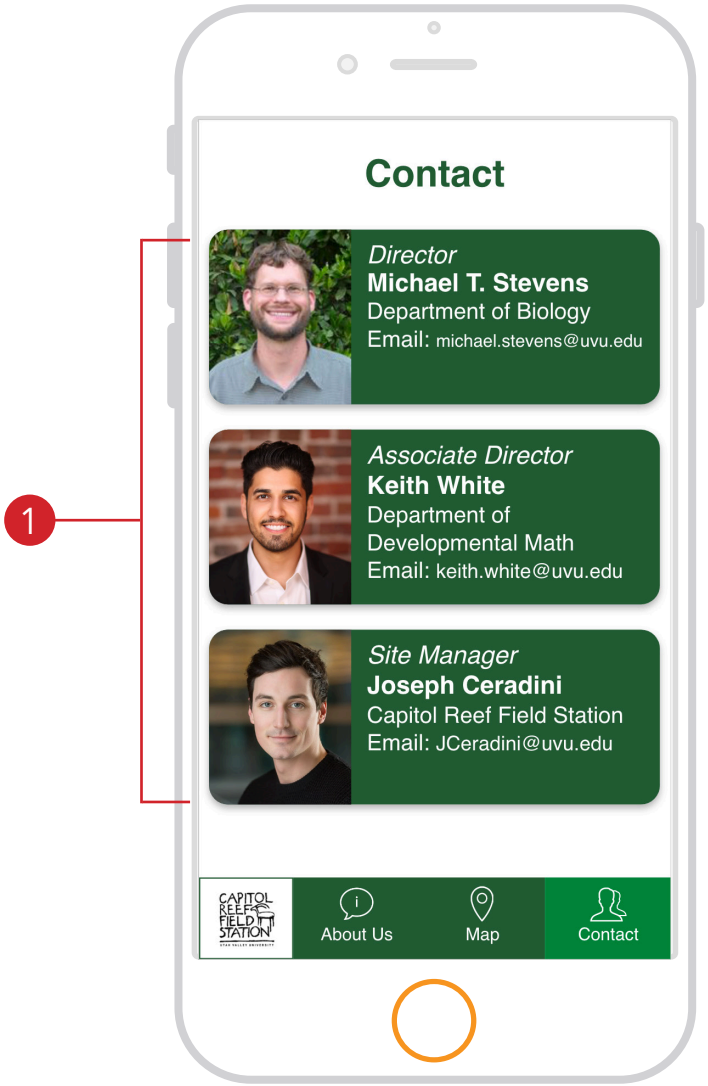


5.0 Surface - Popup Screens

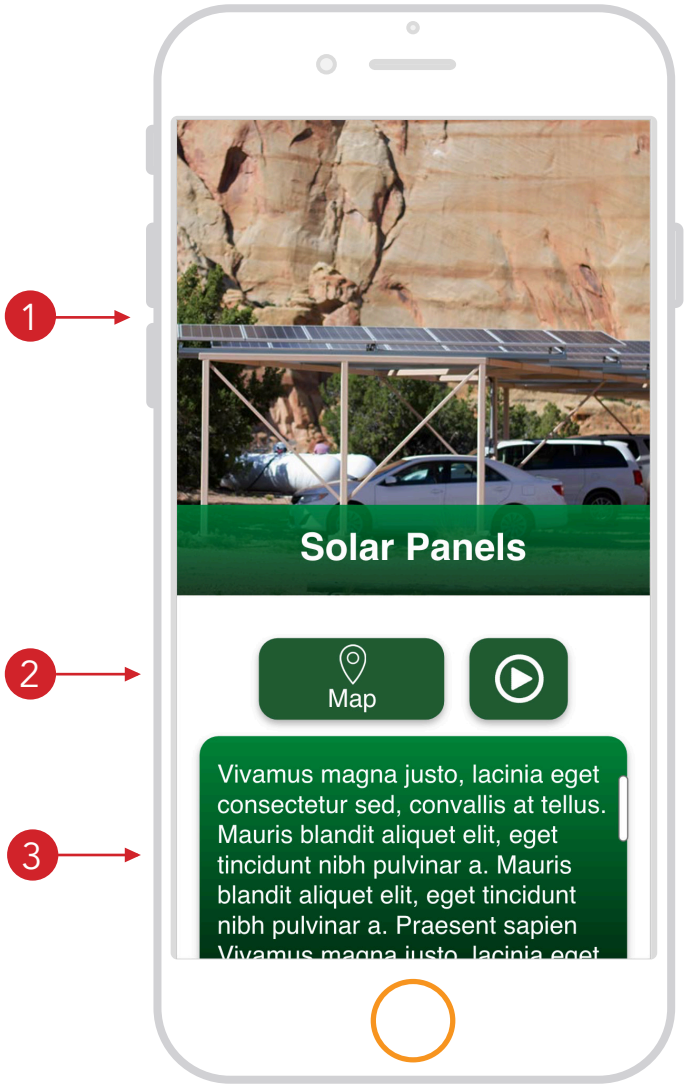
1. Image of the place or object including its name.

2. **Map:** When tapped it takes the user to the “Map” where they can see the location of every beacon on the station.

   Play/Pause: Audio plays only when the play button is tapped. The pause button becomes available to the user while the audio is playing.

   Replay: The option to replay becomes available once the audio is over.

3. Description/information of the place or object that is shown on the image. This information can be read to the user through the use of audio if the user choses to, by tapping on the play button.



Project Plan

The project plan describes how the DGM team plans to implement the design

Sections:

6.0 - Work Breakdown
7.0 - Budget
8.0 - Risk Assessment

6.0 Work Breakdown Structure & Schedule

Sprint	Task	Status	Release Date	Goal
1	Initiate Project	Complete	2/1/18	Complete Kick-off meetings
2	Project Proposal	Complete	3/23/18	Complete Project Proposal
2	Grant Proposal	Complete	3/23/18	Submit grant proposal
2	Technology Research	Complete		Research Estimote Beacons / PhoneGap
3	Wireframes	Complete	3/28/18	Low and High fidelity wireframes
3	Design Meeting	Complete	3/28/18	Initial design meeting sign-off
4	Base application	Ongoing		Base application setup (jQuery/Phonegap)
4	Design Iteration	Ongoing		Continuing application design
5	Contact Page	Planned	5/15/18	Contact page added
5	About Page	Planned	5/15/18	About page added
5	Map Page	Planned	5/15/18	Map page added
5	Home Page	Planned	5/15/18	Home page added
6	Location Pages	Planned	6/1/18	Location pages added
7	Beacon Code Added	Planned	6/15/18	Beacons connected to specific location pages
8	Audio Scripts	Planned	7/1/18	Audio scripts recorded and added to locations
9	Beacons Installed	Planned	7/15/18	Beacons installed on site and tested

7.0 Budget

Task / Item	Cost	Details	Total
Student Hours	$20/hour	~300 Hours x 2 students	$6,000.00
Trip Miles	$423.36	Miles for 2 round trips. 784 miles x $0.54	$423.36
Trip Food	$90.00	3 days at $15 / student (2) / day	$90.00
Location Beacons	$99.00	3 Location Beacons	$99.00
Proximity Beacons	$295.00	15 Proximity Beacons	$295.00
Beacon Shipping	$17.00	Shipping for all beacons	$17.00
Adobe Creative Cloud	$40/month	$20/month/student (2) for 7 months	$280.00
Total	Total	Total	$7,204.36

8.0 Risk Assessment

Successful completion of the project according to the previous estimated schedule and budget can be affected by the following sections.

8.1 Dependencies

The following items are dependencies for the project and are required for success:

- High quality photos of beacon locations
- Scripts for each beacon location that will be recorded
- Approval of grant proposal for funding trips
- Successful acceptance of application to app stores

8.2 Technical Risks

Technical risks that could delay schedule and increase budget:

- Rejection from app stores on application submission
- Bugs in application that break features
- Issues/delays in recording scripts to audio
- Hardware failure in development equipment

8.3 Contingencies

Accounting for potential risks helps mitigate delays and budget increases and include:

- Using version control software (Git) to protect code
- Testing application regularly to catch bugs
- Testing application on multiple device types
- Adhering to app store submission guidelines

8.4 Change Control Process

It is also possible that the project schedule and budget may be affected by change requests from the client that come too late in the development process or that are so significant that they change the scope and costs of the project. To help us manage changes, we will follow a simple change control process, which uses the Change Request Form included in the Appendix. Here is the process that should be followed:

1. If the client wishes to request a change during the development process, they should fill out and submit the attached form to the project manager.
2. The project manager will review the impact of the request and possible solutions on the project scope, schedule, and cost.
3. The project manager will make a recommendation and discuss it with the client
4. Finally, the project manager and client will decide on the course of action that is mutually agreeable and either authorize the change, put the change on hold or discard it altogether.

Appendix

The Appendix includes all detailed documents that support the design and project plan.

Sections:

I. Technical Specifications
II. Change Request Form
Design Doc Sign Off

I. Technical Specifications

Deliverables	Software
Application	PhoneGap/Cordova will be used to create native iOS and Android applications along with HTML/JavaScript/CSS, as well as publish them to respective stores. BitBucket will host source code repository until it is handed off to client.
Audio Files	Adobe Audition
Proposal	Adobe InDesign
Design doc	Adobe InDesign

II. Change Request Form

Submission Info (Completed by Client)

Project:

Priority:

Request Date: ☐ High ☐ Medium ☐ Low

Request Number:

Request Description:

Justification:

Authorization (Completed by Project Manager & Client)

Scope: ☐ Approved ☐ Rejected ☐ Saved for later version

Client Signature *Date*

Response Information (Completed by Project Manager)

Responder's Name: Response Date:

Possible Solution:

Impact Analysis

Scope: Resources:

Cost: Schedule:

Recommendation:

Project Manager Signature *Date*

Design Doc Sign Off

This document has been reviewed and the content and requirements described therein conform to an agreed-upon understanding of the design need.

DGM Team

Leandro Sanchez
Project Manager / UX Designer

Date

Arthur Schoenfeld
Developer

Date

UVU Capitol Reef Field Station (client)

Michael T. Stevens
Director / Client

Date

Instructor Approval

Trudy Christensen
Digital Media Professor

Date

Mike Harper
Mentor

Date

FINAL DOCUMENT

Proof-of-Concept Geo-Fencing App

Usability Test

Our testing plan consisted on having a working prototype coded by the developer using PhoneGap and testing it ourselves as well as with a group of people down at Capitol Reef Field Station including staff (app was also tested outside of CRFS). At this stage we had the beacons working properly with the app so we placed them all in the selected locations around CRFS. The idea was for us to go through the entire experience first and make sure the beacons worked properly in the new environment and then have volunteer visitors download the app and allow them to use it as intended.

Observations

We found that the instructions were clear to some users but not all. People didn't have a hard time finding the places on the map (this could be because the test subjects were familiar with CRFS). They were patient and waited until the beacon showed up on their map but there was confusion as to why some beacons would take longer than others to show up on the map (this was due to either signal from beacon being blocked, device being used or power saving mode active on the device).

Our Findings & Solutions

1. Beacons only work if the user is in line of sight. Anything blocking the signal will cause the device being used to not receive the signal sent from the beacon. Placing the beacons somewhere high (when possible) reduces the chances of signal interruption.

    - **Solution:** When possible, place the beacons somewhere high where there is less chance of something blocking the signal.

2. Power saving mode increases the time it takes for the device to recognize the beacon in range. When this mode is turned on, the time for the beacon to be recognized by the device would increase by 5 to 10 seconds depending on the device being used.

    - **Solution:** On the instructions located on the main page of the app, we let the user know that for the best experience the power saving mode needs to be turned off on their device.

3. Android devices have a delay when detecting the beacon in range. When using Android we noticed a 10 to 15 second delay when in range of a beacon.

    - **Solution:** After the initial tour given by the staff, letting visitors know about the delay when using Android devices will help the them understand that they need to wait a little longer for the device to receive the signal.

4. Instructions on the app were causing confusion. On the instructions it is specified that when in range of a beacon, the user can tap on the map in order to receive information about that location. We were told that when that part was read, the user would assume it meant tap on the map button, not on the map itself.

    - **Solution:** Word the instructions differently to create less confusion between the map button and the actual map.

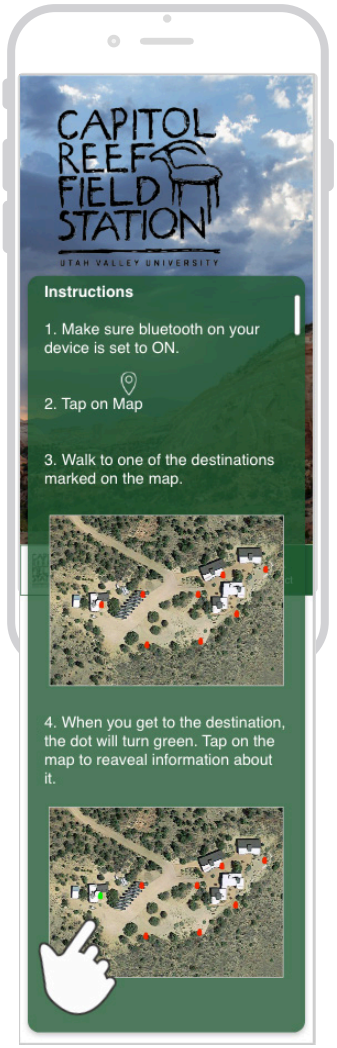
Changes to Instructions

After user testing the DGM team made some changes to the instructions on the app that would fix some of the issues found by test subjects.

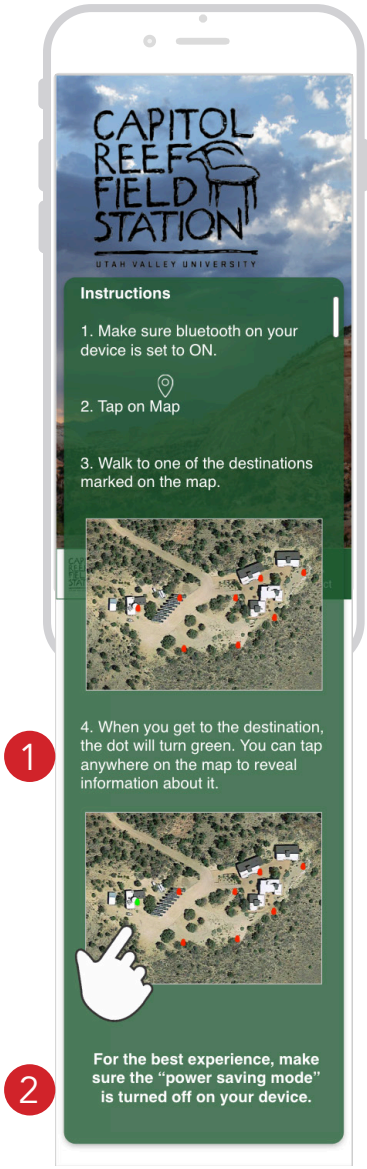
1. Step number four was worded differently to create less confusion between the “Map button” and the map.

2. At the end of the instructions we advise people to turn off their power saving mode for a better experience. The reason for this was because during testing we found that power saving mode would cause a delay at the time of detecting the beacon in range.

Before



After



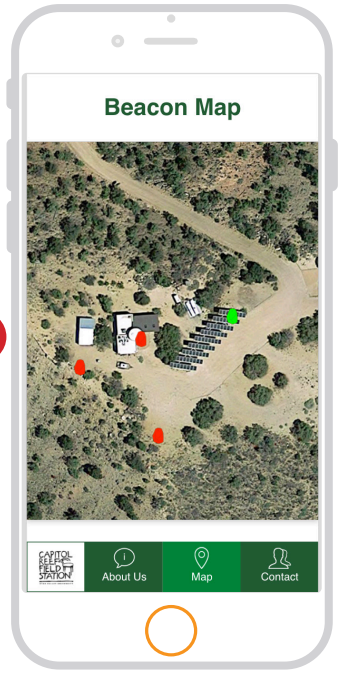
Changes to Map

Finding the right color to show the locations was an issue because of the colors already on the map. The DGM team decided to take a different approach and add icons of the beacons to represent the locations on the map.

1. The colors were changed to have a better visual of where the locations are, and the dots were replaced by icons of the actual beacons.

Before

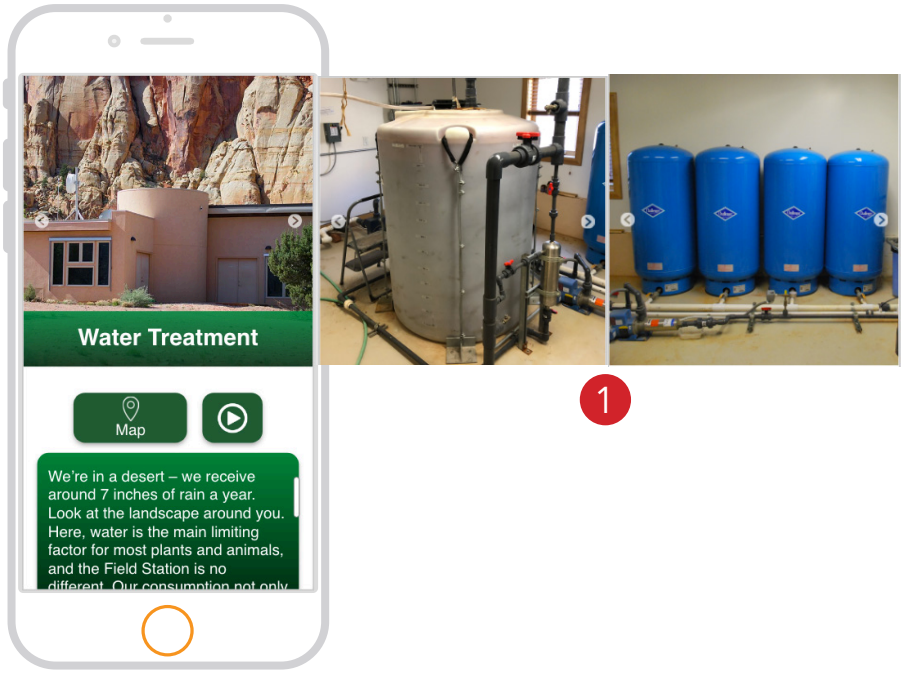
After



Changes to Pop-ups

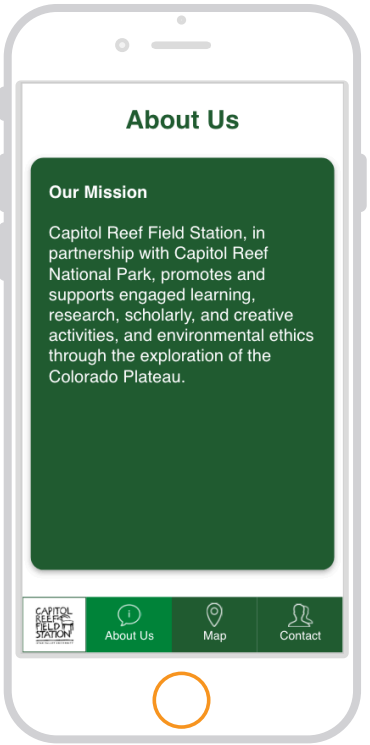
The pop-ups were changed to have multiple pictures rotating instead of just one, this allows the user to get more insight on locations like the “Water Treatment Facility” where visitors don’t have access to but can still appreciate it with the images.

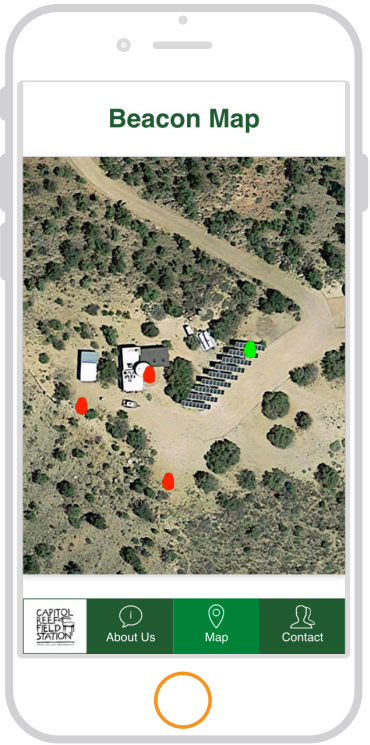
1. Multiple images rotating every few seconds to allow the user to experience places they don’t have access to and for a better visual representation of what is being said on the descriptions.

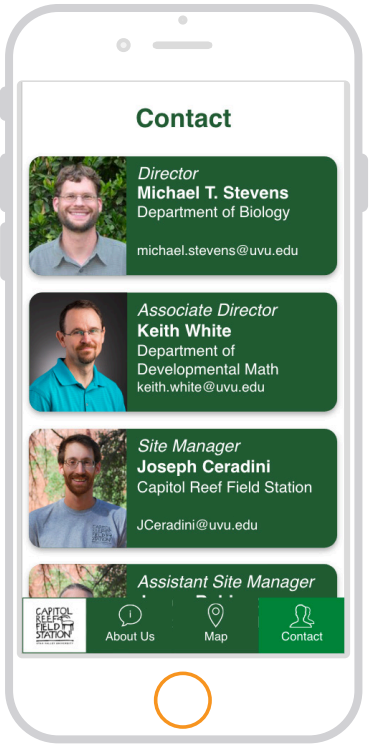


Final Version of the app

The final version of the app went through the changes necessary to better help the user through the experience. The look of the app stayed as planned with the instructions on the main page that can be accessed at all times, an about page with CRFS mission statement, a map for locating the beacons and contact page for the purpose of contacting staff.

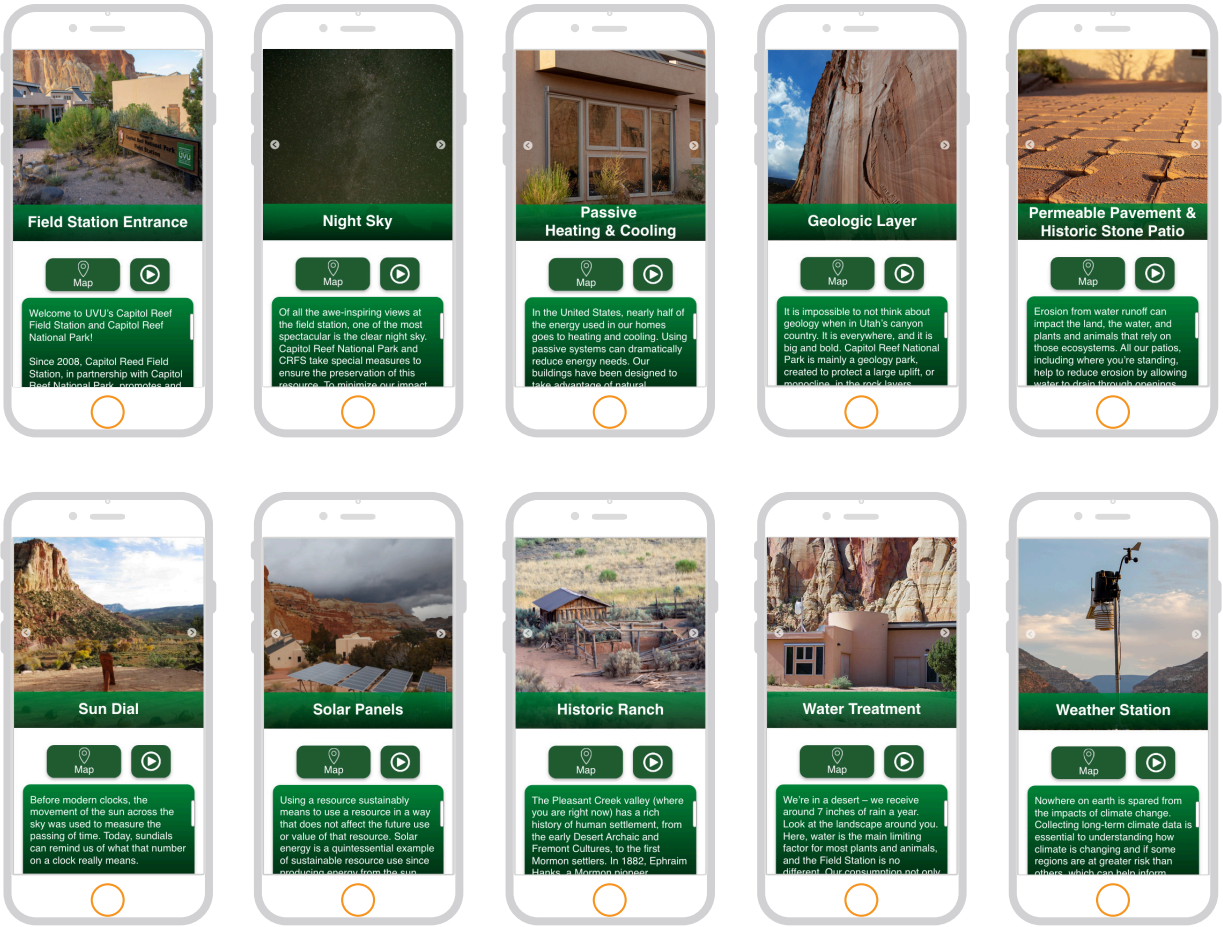






The Pop-up Screens

There were a total of 43 pictures used on the pop-up screens to capture the necessary essence and practices of CRFS. These images were taken by DGM team and also provided by CRFS staff.



Ideas for Future Changes

During the time we took designing and developing the app, we had other ideas that didn't make it to the final product due to time and/or software limitations. These ideas could be implemented in the future by another group that wants to take on this project.

They are the following:

1. Visited areas on the map could have a name above the beacon to let the person know they have already visited that location.

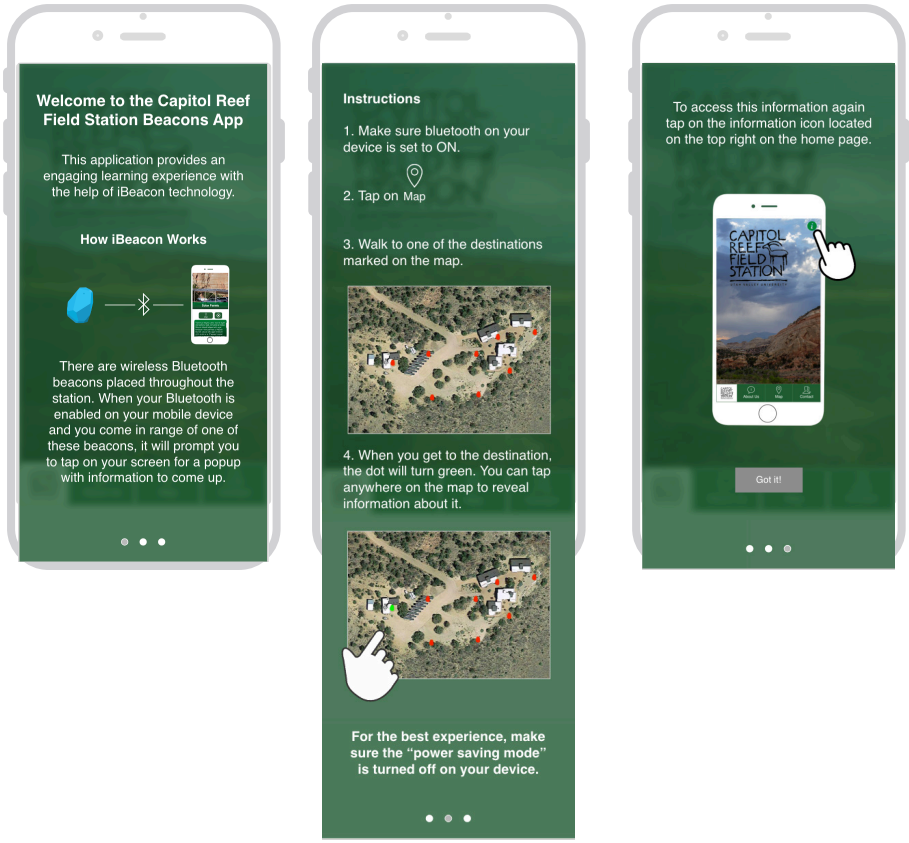
2. A page with a list of places the person has discovered or been to.
   - Images and description of those places can be accessed on this page.
   - This is also a way for them to take what they have discovered home and share it with friends and family.

Future instructions changes

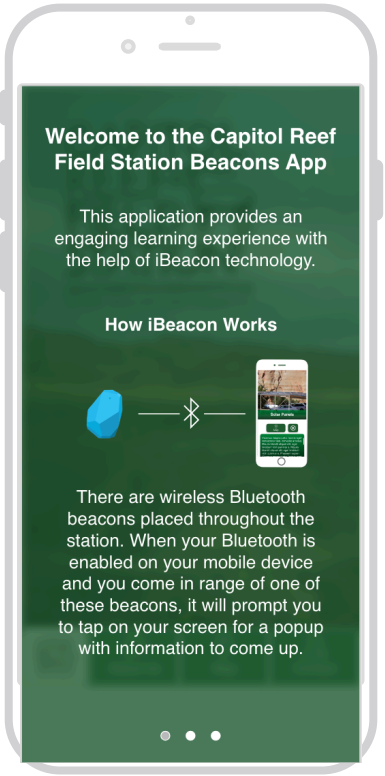
When we got done with user testing, we came up with a different way of doing the instructions but because of time and the tech being used to develop the app, we were not able to implement these changes, so it was decided to improve the instructions we already had in place.

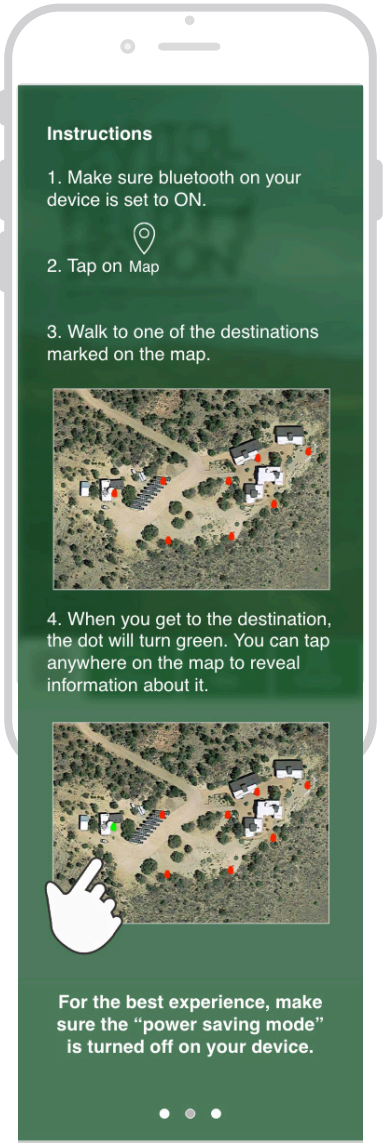
The idea was that these screens would only come up the first time the user opened the app and would be able to access them again by tapping on a button located on the home page.

The first screen would welcome the user and give information about the technology, second screen would have the instructions on how to use the application and the last screen would inform the user on how to access this information again.



Future instructions changes

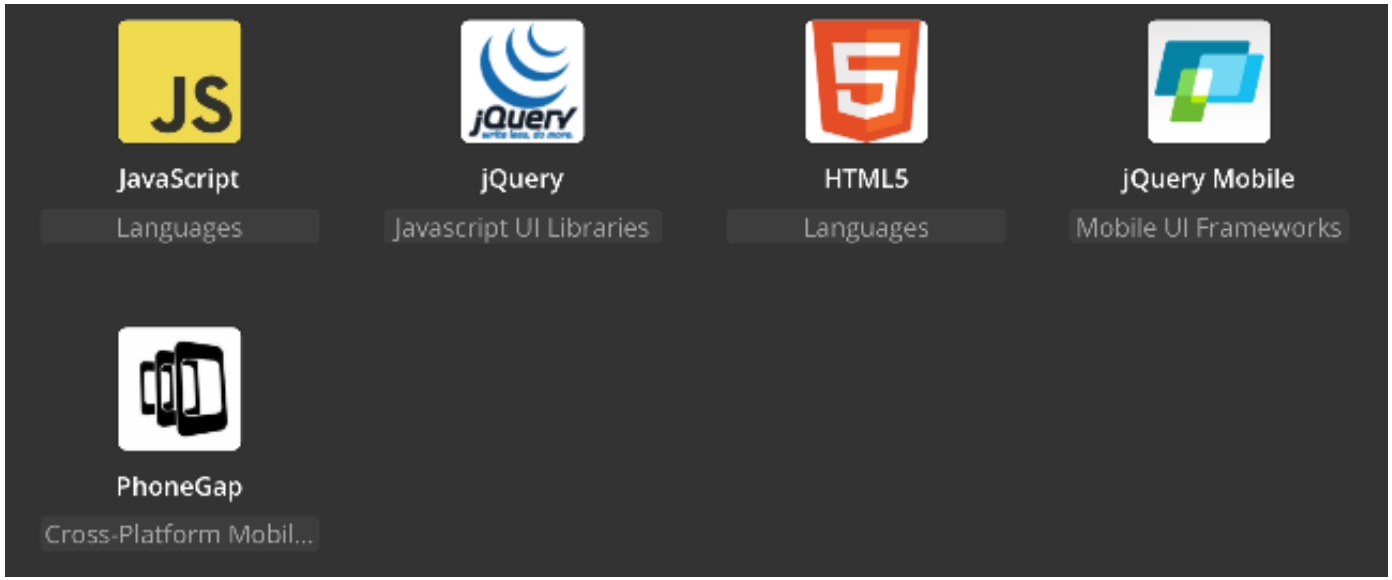




Technical Specifications

Since the project is a proof-of-concept, rapid development was key to testing feasibility of idea while keeping costs low. jQuery Mobile framework using Adobe PhoneGap was chosen to create application quickly and easily export to multiple platforms (iOS and Android).

The increased speed of development comes at a trade off of performance and features that a more modern framework would provide. More modern frameworks may want to be considered in future iterations of project for more features (e.g. React Native).



Work Breakdown

Sprint	Task	Status	Release Date	Goal
1	Initiate Project	Complete	2/1/18	Complete Kick-off meetings
2	Project Proposal	Complete	3/23/18	Complete Project Proposal
2	Grant Proposal	Complete	3/23/18	Submit grant proposal
2	Technology Research	Complete	6/15/18	Research Estimote Beacons / PhoneGap
3	Wireframes	Complete	3/28/18	Low and High fidelity wireframes
3	Design Meeting	Complete	3/28/18	Initial design meeting sign-off
3	First Trip	Complete	4/8/18	Initial discovery / research trip
4	Base application	Complete	5/1/18	Base application setup (jQuery/Phonegap)
4	Design Iteration	Complete	5/1/18	Continuing application design
5	Contact Page	Complete	5/15/18	Contact page added
5	About Page	Complete	5/15/18	About page added
5	Map Page	Complete	5/15/18	Map page added
5	Home Page	Complete	5/15/18	Home page added
6	Location Pages	Complete	6/1/18	Location pages added
7	Beacon Code Added	Complete	6/15/18	Beacons connected to specific location pages
8	Second Trip	Complete	8/7/18	Audio scripts recorded and added to locations
9	Beacons Installed	Complete	7/27/18	Beacons installed on site and tested
10	Project Finalization	Planned	8/15/18	Final / demo meeting with client
10	Deliver Assets	Planned	8/15/18	Provide project assets (repo and files)
10	Publish App	Planned	9/1/18	Publish app to Apple and Google App stores

Budget

Task / Item	Cost	Details	Total
Student Hours	$20/hour	~400 Hours x 2 students	$8,000.00
Trip Miles	$423.36	Miles for 2 round trips. 784 miles x $0.54	$423.36
Trip Food	$90.00	3 days at $15 / student (2) / day	$90.00
Location Beacons	$99.00	3 Location Beacons	$99.00
Proximity Beacons	$295.00	15 Proximity Beacons	$295.00
Beacon Shipping	$17.00	Shipping for all beacons	$17.00
Adobe Creative Cloud	$40/month	$20/month/student (2) for 7 months	$280.00
Voice Acting	$600.00	Flat rate for voice acting	$600.00
Audio Recording	$600.00	Flat rate for audio engineer	$600.00
Total	Total	Total	$10,404.36

Final Overview

This app will help the client succeed by allowing visitors and students the opportunity to learn more about Capitol Reef Field Station and their practices. It will help encourage visitors and students to take some of those practices home and share what they learned from their visit to Capitol Reef Field Station, to their friends and family.

This proof of concept project will also help future students who would like to work with CRFS on a similar project. Our findings, testing and experience with ibeacons were documented as a mean to help any other group in the future that would like to take on the challenge of working with ibeacon technology.

Credit for involvement

App creation

Design by:	Leandro Sanchez
Development by:	Arthur Schoenfeld

Special thanks

Voiced by:	Clarissa Lavon
Audio recording by:	Christopher Chun