Final Project Report: Redland Museum

Display Information and Guidance System

IFB399 Capstone Project (Phase 2)

REDLAND MUSEUM

Green Tigers

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GitHubs Used:
https://github.com/ProPablo/rm_dashboard

| Queensland University of Technology |
|Client: Russel Dinte |Tutor: Fatima Kamali|

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1. Introduction

1.1 Project, Context & Goals

Redland Museum is a museum situated in the south east area of Queensland specifically in the Cleveland suburb of Brisbane. The museum which was founded in 1968 and opened to the public in 1972 aims to both preserve and exhibit artifacts which were prominent throughout the history and culture of the Redland area. The Redland Museum specifically represents a part of the tourism sector within Brisbane. Throughout the years of operation of the Redland Museum only until recent years has the museum made plans to branch more into a technological way of interacting with visitors and enhancing their experience at the museum.

The client of this project, Russel Dinte, is the technology manager at Redland Museum, had the business goal of creating an interactive mobile application that would utilise bluetooth beacons to tour and guide visitors around the museum. This project requested by the client has been worked on in the previous two years with the project being an estimated total four year plan. The client wanted to have this project working in surprise for the museum's 50 year anniversary which is happening in 2022. The project's main objective is to positively impact visitor's experience with a more modern and fun approach to exploring the museum.

The end of the project would include the successful creation of the mobile application which is connected to a backend database that should allow admins to easily configure and edit information displayed. Along with this, the bluetooth beacons should be set up correctly so that the application can track an approximate location of where the visitor is in the museum and therefore display the relevant information or video when they are in a certain area.

1.2 Project Outcome

At the beginning of phase 2 of the capstone project, it was important to revise the work done in the previous semester. By doing so the team was able to determine what point the project timeline had been reached. Furthermore, this was the determining factor in which the phase 2 of the project's outcome could be sourced from. As phase 2 of the project began, the project's outcomes were devised from determining the current state of the project and the feasible outcomes that could be reached. In doing so the following project outcomes could be met within the phase 2 project using two releases.

Release 1 Admin Portal Improvements -

The first release planned by the team centered around the admin portal improvements that needed to be done. By analysing and determining the point in which we left off, it was deemed necessary as a starting point of the project's phase two. Here in this stage the improvements included resolving bugs within the portal, refactoring entity attributes within the codebase and removing excess tabs that were not necessary. From there the remaining outcomes that were met included presenting what artifacts and beacons belong to a zone and adding those tabs respectively. Additionally, the codebases' connectivity was established so that codebase 1 could send data to codebase 2.

Release 2 Admin Portal Finalisation And Basic Mobile Application Deployment -

By having frequent client meetings, the basis of the release 2 was officially formalised as having a deployed product with the client requirements. In this release a number of different requirements were met with the clients agreed approval. Firstly, the release saw the media upload requirement be filled through the use of being able to upload both video and images. Furthermore, those media types were able to be used within different tabs successfully. Additionally, when called within the mobile application the media types were shown with success. Secondly, the artifacts were enabled to be shown based on the admins order that had been set. This technology enabled the admin to show the order in which artifacts are shown in a certain area. Lastly, at the end stages of development the beacon technology was able to pull media successfully when detected. All outcomes of the project detailed in the artifact agreement were successfully implemented.

As seen here the result of the semesters two's work has been summarised using the two release plans that were completed. By completing these release plans, a number of user stories were finalised and completed within the time frame of semester two. These user stories can be seen within the sprint plans used in the project (Appendix 5.1). By completing required sprints within the time frame given, the projected outcome of the project was executed efficiently and effectively. These Project outcomes also served as the basis of the artifacts agreement with the client nearing the end of semester.

2. Project Setup (Phase 2)

2.1 Project Management Approach

It was important that the right method be used in relation to how the project should be managed. Furthermore, it was also important that the team's understanding of the project's management methodology be clear and understandable in its use. Firstly, the project was analysed and a number of different project management methods were considered when finalising the resulting approach. In doing so, it enabled the team to be able to choose the appropriate approach for the project's progression. Furthermore, the resulting approach selected was the scrum project management methodology. The scrum methodology was chosen for a number of reasons to do with project traits. Firstly, as the team was required to develop interfaces with the requirements of the product owner, it was important that changes to the product could be met with reiteration. Weekly and Bi weekly meetings were scheduled to enough the team to showcase, take suggestions and change requirements of the product owner. By doing so, the project's requirements were not set in stone, allowing change within the project and adapting to the project owners requirements when requested.

To allow the change of requirements and the iteration of said requirements, the Trello and sprint plans allowed for agile change. These can be seen in appendix 5.3 and 5.1 respectively. Firstly, the sprint plans used were the releases of small parts of the project's requirements. Unlike other project management methodologies like waterfall methods where requirements and sets and releases contain large amounts of different requirements, scrum doesn't do this. This was used as a way to show the product owner progress of the project and discuss the type of work to be done within the next sprint. The sprints also enabled the tasks to be delegated to certain team members in which they were comfortable with. These roles and responsibilities enabled the team to work fluidly in areas that were most suited to them. Breaking tasks down into smaller steps also allowed the opportunity of shared responsibility. Having two team members work on tasks together eased pressure on the required tasks' difficulty.

As a means to keep track of progression and also show uncompleted and completed work done a Trello board was constituted as a means to do this. In regards to the scrum methodology, the trello board was able to show the tasks needed to be done, tasks that are currently being done and that were done. This can be seen in appendix 5.3.

2.2 Client Expectations

The client's expectations shaped the project's progression throughout the whole semester. Although the client's overall vision for the end goal of the high level release maintained the same, smaller details in the project's progression would be constantly changing to meet the client's new expectations. Zoom meetings with the client occurred each week with the team showcasing the progress made according to the client's expectations since the previous meeting. After this, as the role of product owner, it was the client's responsibility to provide feedback and to set new expectations. If the client had new ideas and expectations after the meeting, an email would be sent to the team so the artefact could be worked on to meet this new expectation. An artefact agreement was created by the team and shown to the client to see if the releases and deliverables specified in the agreement were acceptable. Meeting notes are also shown in Appendix 5.4.

2.3 Team Collaborations

Team meetings were held at minimum twice a week, one after the client meeting and one after tutor meetings. Outside this time, whenever team members were available, through the use of a group chat, meetings would be organised to continue development and planning. Screen sharing was a tool that was essential for team collaboration when planning or developing. Team decisions for the direction that the project should be headed occurred directly after each client meeting. If any members of the team did not agree with the decisions of the direction of the project for the current week then another solution was created until there was a unanimous agreement. Roles and responsibilities of each team member stayed consistent from Phase 1 of the project. The roles of each individual members are as stated:

1. ***Anhad Ahuja - Lead developer***

Anhad's role was to lead the development of the artefact and to do research on the best practices of what tools should be used for the project to head in the right direction. Anhad was to share the findings of his research and to provide solutions for the team to decide on.

2. ***Liam McKay - Documentation***

Liam's role was to modify the existing user stories and release plans of previous teams to match the current direction that the project was headed. If new user stories needed to be created as additional features were added then Liam was to create the new stories and to communicate this with the team. Along with this, diagrams necessary for planning were created by Liam. Additionally, the sprint plans were formulated along with the burndown charts done by Liam.

3. ***Peter Nguyen - Documentation***

Peter's role was to have an up to date understanding of the development process by being there while Anhad and Tyrone were developing. This understanding would be used to create detailed documentations required such as the artefact agreement, handover guide and the final report.

4. ***Tyrone Nolasco - Developer and main communicator with the client***

Tyrone's role was to assist with the development process and to also set up meeting dates and times with the client, providing Zoom meeting links to all team members and the client just before the meeting time. Tyrone was also responsible for creating easy to understand flow charts of how every component of the artefact were to connect to each other.

2.4 Communication Plan

ID	What	Who	How	When	Why	Responsible
1	Client Meetings	Client and all team members	Zoom Meeting	Every Monday 12pm	Discuss project progress with the client and to receive feedback. Also provides a chance for both parties to ask and answer questions.	Tyrone Nolasco
2	Tutor Meetings	Tutor (Fatima Kamali) and all team members	Zoom Meeting	Every Fortnight at Tuesday 7pm	Discuss progress of the project and to ask questions relating to the final project. To also sort out any team or client difficulties.	Tutor and all team members
3	Group Meetings	All team members	Group Voice Chat	At least once a week	Finalise and delegate project tasks to be added to the Trello board based on information gathered from tutor and client meetings.	All team members
4	Development Meetings	Available team members	Group Voice Chat (with screen sharing)	At least twice a week	Implement all weekly tasks and note down any other tasks that arise during development. Test implemented features to be ready for demonstration, seeing if they match what the client envisioned	Anhad Ahuja & Tyrone Nolasco
5	Digital Text Communications	Client and Tyrone	Emails	At least once a week	Send Zoom meeting links and preface these meetings with what information was to be discussed as well as bring up anything urgent that came up during the week.	Tyrone Nolasco

Table 1: Communication plan

3. Project Plan & Risk (Phase 2)

3.1 Project Planning & Progress

At the commencement of phase 2 of the project, a meeting was planned in week 1 to discuss the current status of the project's progression. During the meeting, planning was done that included the revision of the phase 1 project plan as well as the team weekly schedule of task work (refer to Appendix 5.5) The project plan outlined a number of different requirements to be met throughout the progression of phase 2.

As the scrum agile project planning method was used, it was most effective in managing the changing requirements of the project. Through the progression of phase 2, the major cause of restructuring requirements came in the change of the project plan. It was planned that the project would deliver the beacon navigation technology as its main artifact. However, this was changed early in the project's progression because of difficulties with codebase technology. At the risk of continuing the project in unfamiliar/ difficult code to work it was important to re prioritize user stories and current direction. As sprint plans were used as the main form of tracking and completed priorities work, these could easily be altered to change the work to be done. An example of this being that the work completed in the first sprint plan was done using the old codebase technology and had no effect on the project's progression. However, as the sprint was two weeks, subsequent time spent was relatively short and became the basis of the main reason for change.

The sprints plan was a great tool in breaking down the user stories (Appendix 5.2) into sprints that were completed in two weeks sprints (appendix 5.1). User stories are prioritised using prioritization with the addition of user story points indicating the estimation of difficulty. These user stories could be used as the high level point of reference for requirements to be done for the semester. The sprints were able to break down the high level user story into smaller completable tasks that were easier to understand. Through the use of these sprint plans, the repriotisation could be used as an example of this being done in sprint two. After the agreement with the client about the codebase refactoring, the sprint two was able to be changed to enable the team to start the refactoring of the codebase easily. The admin portal cleanup was quickly prioritised and the sprint began. User stories have been picked out and prioritised based on the client requirements and sorted from must haves, should haves and could haves. These are also reiterated in the artifact agreement where the requirements from the client were approved. All of the user stories that were prioritised were completed within the time frame.

As a way to track the progression of sprint plans, burndown charts were very useful in testing the effort of the work being done (appendix 5.9). A burndown chart was created for each of the respective sprints, measuring the expected effort to be done through the sprints two week velocity of tasks. Furthermore, each Burndown chart measured the expected effort to be done in comparison to the effort being made by the team. For sprint ones burndown, it can be analysed the expected work being done was being done in respect to the expected effort that was set.

However, due to the difficulty of the previous codebase, it's evident that this did not happen in the other burndowns. In each sprint from there on out, the expected effort was high for the days in which followed the sprints initial creation. The creation of the sprint was met with high effort from the team, completing each sprint before the sprints deadline, Where there are dips in actual effort near the sprints end, it was due to the completion of the sprints tasks.

3.2 Risk Management

At the commencement of the second stage of the capstone project, a number of risks were identified that may be faced through the progression of the project. Furthermore, a number of these risks were faced in relation to covid-19 outbreaks and the decision to refactor the codebases of the product.

At an early stage of phase 2 of the capstone project, the team were facing difficulties with the inherited project's previous code. The codebase that was inherited used a coding language that the team had not worked with previously, resulting in slow progression. A number of risks were raised due to the lack of information regarding the functionality and completeness of the codebase. As a result of this, the team's progression became more stagnated, slowing down the progression of the project. It became apparent that continuing to work on a codebase without the means to consult the previous team to clarify what needs to be done would leave the project in a state where the client’s requirements could only just be met with satisfactory results.

This is when a risk assessment was done (refer to appendix 5.10) in order to justify changing the architecture of the project as well as use a coding language that the team was comfortable with. The new development technologies used were more in line with modern industry standards than the previous codebase.After completing the risk assessment of the current situation, the proposal of offering the client a standard deadline of one week for refactoring was established. This was met with great success and the risk of going forth with the previous teams codebase was mitigated

For the entirety of the project, the risk matrix table(*table 2*) mapped out the potential risks that could occur during phase 2. The risks displayed in the table explains the likelihood, impact, severity, owner and the action taken if a risk occurs. An example of a risk occurring and its mitigating action include the Covid-19 outbreak that occurred during phase 2. As the outbreaks are more than likely unavoidable, the mitigation plan was paramount in the action taken in response to the risk occurrence. Additionally, the codebase refactoring errors are included as a way to deal with volatile errors that may disrupt the progress of the team's work.

ID	Risk description	LIkelihood of the risk occurring	Impact if the risk occurs	Severity Rating based on impact and likelihood	Owner (Person who will manage the risk)	Mitigating Action
1	Covid-19 outbreak occurrence in the southeast region	High	Low	Low	Project manager / queensland government protocols	Refer to the state mandated covid-19 protocols. Evaluate the current client commitments and adjust to the situation through appropriate means of communication
2	Scheduled sprint plans not being completed	Low	High	Medium	Project manager	Analyse the burndown chart and refer to the project's backlog. Consolidate the current situations tickets and re-evaluate the requirement backlog of task priorities. Assess whether the task hierarchy can be adjusted to suit current project progression.
3	Codebase refactoring errors	Medium	High	High	Project manager / development team	Refer to risk mitigation strategies if errors are intimate and unavoidable. Judge severity and compose a risk assessment for the project's progression.
4	Handover documentation errors	Medium	Medium	Medium	Project manager / development	Discuss handling errors with tutor and client. Use correct communication methods to establish actions for fixing errors.
5	Project scope out of reach	Low	High	Medium	Project team	Communicate to the project owner the current situation. Analyse the current directory of the project through a burndown chart. Set up a meeting with client to discuss the trajectory of the current project's progression. Establish new requirements if needed.
6	Lack of	Medium	Medium	Medium	Project	Communicate to the tutor of the

	communication between project team and client				team/tutor	lack of communication between the project team and client. Establish the current lines of communication and also the frequency in which it happens. Refer to the tutors recommendations and move on.

Table 2: Risk Matrix Table

3.3 Project Experience

3.3.1 Previous Codebases

Situation: The codebase from the previous team was becoming more difficult to work with because of lack of documentation and unfamiliarity with codebase technology

Task: Refactoring the existing codebase to enable seamless progression throughout the projects phase 2

Action: A meeting with the client was set up to propose the idea of refactoring. The team explained the potential risks and benefits of the change, and proposed an idea. The idea was that with the clients permission, the team be given a week or so to try to progress the refactoring process to a satisfactory standard. Additionally, if the proposed change did not work, the team would resume work on the current codebases as is. The developers worked within the time restraints to achieve this goal.

Result: The permitted time was enough for the team to be able to convince the client that committing to the transition would be more efficient than slowly continuing development with the existing codebases. In addition, the transition as a whole enabled the team to continue work in a more comfortable development environment thus speeding up progression immensely.

Learning: Ultimately, transitioning technologies taught valuable lessons in critical decision-making and time management.

3.3.2 New Codebase Transition

Situation: Adjustments were made to the project plan to fit the development transition after multiple consultations with the client.

Task: Planning and structuring the development process so that developers would be able to deliver key features according to a schedule.

Action: Development meetings twice a week alongside thorough usage of Trello to keep track of weekly tasks allowed the artefact to receive its envisioned features on time. Weekly leaps in the development of the artefact allowed demonstrations to occur during client meetings. These demos were essential to ensuring that the artefact fit the client's expectations whilst also being a good opportunity to adjust the scope and weekly set of tasks to be implemented.

Result: This process of adjusting the project plan and development process entirely, allowed the project to move forward at a much faster rate than last semester thus leading to an artefact that reflects the artefact agreement. As a result, the client was able to be more involved in developing this product and the experience was much more dynamic.

Learning: Starting from scratch and adjusting the project plan allowed the team to learn more about rapid prototyping as a result of this semester being a lot more fast paced in terms of progression. The design decisions that were discussed in the previous semester were able to be applied to the current iteration of the artefact, allowing everything from both semesters to come together nicely. If the team were to have done anything differently, it would have been to start from scratch to begin with rather than hesitating and holding onto the previous and unfamiliar codebases which ultimately would have saved a lot of time.

4. Artefact Description

4.1 Functionality

Functionality for the museum's guidance and touring system is split to cater to two core sets of users: the client themselves who will be interacting with the administration portal (codebase 1), and the customers of the museum who will be using the museum guidance application (codebase 2). All of the features outlined in the artefact agreement are present in the artefact itself in both codebases.

The client will have access to a website that allows them to add appropriate information to be displayed in the application. This is done by creating an object, whether it be a zone, museum artefact or exhibition, filling out the appropriate information and saving it to the website. The client will also have the ability to map out the relationships between these museum objects so that the appropriate information is displayed when consumers are using codebase 2. The core relationship is between the museum artefacts' attached media (image or video) which the client will be able to add themselves via image / video upload and the area or zone that it belongs to. This relationship will define what will be displayed when consumers physically enter a specific area in the museum whilst using codebase 2. Appendix 5.6.1 is a good reference for the functionality of the administration portal.

The consumer on the other hand can interact with a multitude of screens accessible to them via a bottom bar navigation system. The home screen displays points of interest such as events and the primary touring functionality of the app so that the entry point for the user of this app is very clearly signposted. The tour itself takes inspiration from the design cues of Google Maps where you can pan and zoom the map itself as well as show a pull up menu when the user goes near a point of interest. The tour feature is still incomplete as a result of it not originally being a part of the scope of this artefact, however the application is still able to show videos based on its detection of nearby beacons which acts as the foundation for the touring feature. The other screens list out the museum's zones, artefacts, merchandise and exhibitions in detail, each of which contains additional information. All screens directly reflect what has been added to the administration portal as objects, showing thumbnails, descriptions, names and attached media. Refer to Appendix 5.6.2 for screenshots of the application's functionality.

These two codebases working in tandem will allow the client to enhance the consumer's experience by providing them with content related to what they will be seeing in front of them. This will satisfy the clients needs to enhance the experience of his customers whilst also assuring that they have a worthwhile visit to the museum.

4.2 Architecture

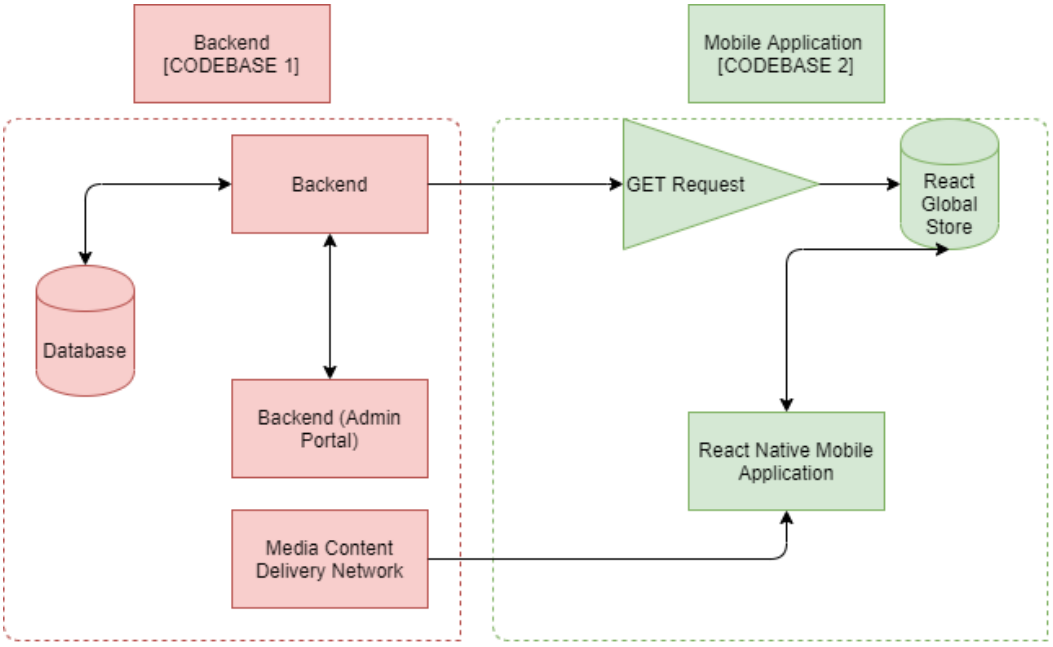


FIGURE 1 - Codebases Architecture Overview

The constituent codebases that make up the museum are both written in Typescript using React, codebase 1 using the React Admin framework and codebase 2 using React Native. The data and relationships established by the client in codebase 1 will directly reflect what and how information is presented to customers in codebase 2, this can be seen in figure 1. The images and videos attached to artefacts in codebase 1 are served to codebase 2 through an NGINX proxy, a web server responsible for content delivery. The NGINX proxy also serves static files from the React client in codebase 1.

The connection between codebases can be seen through how object relationships play a role in the retrieval of data within codebase 2. This process is illustrated in the flowchart below.

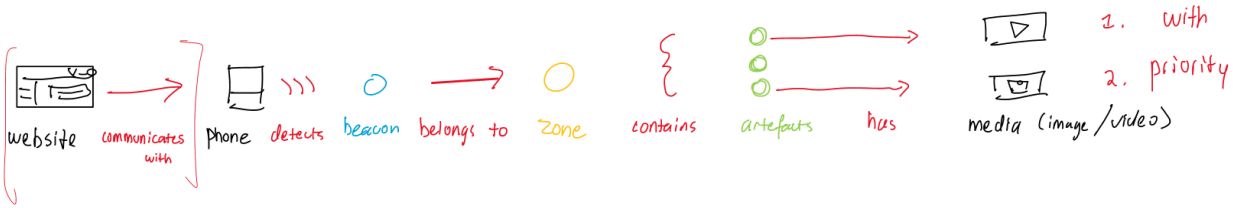


FIGURE 2 - Codebases Flowchart

Through the phone detecting a beacon in range, it is signified which zone the customer is in. This relationship is important to the tour feature because the application is able to display the corresponding artefacts and attached media. This process is outlined in figure 2.

4.3 Technical Description

4.3.1 Description Evaluation

Codebase 1 is a functioning administration portal backend with a web UI that has working authentication and content delivery for images and video. The React Admin framework was the crux of this codebase, giving the development team the ability to quickly implement the relevant screens and allowing them to focus on more specific functionality and styling. The following code block represents the overarching structure the team used in React Admin to define all of the tabs, with the list, edit and create attributes linking to the appropriate forms that the client will be interacting with. These forms reflect the information that will be stored in the database for the respective object.

```
function App()
  {return (
    <div className="App">
      <Admin customRoutes={customRoutes} layout={AppLayout} theme={redlandTheme}
dataProvider={builtDataProvider} authProvider={authProvider} loginPage={LoginPage} >
        <Resource name="artefacts" options={{label: "Artefacts"}} list={ArtefactList}
edit={ArtefactEdit} create={ArtefactCreate} icon={ArtefactIcon} />
        <Resource name="artefactmedia" ... />
        <Resource name="zones" ... />
        <Resource name="beacons" ... />
        <Resource name="exhibitions" ... />
        <Resource name="storeItems" ... />
      </Admin>
    </div>
  );}
```

The backend API supports this React Admin frontend by handling all requests that aim to create, edit or delete data. All endpoints are also documented in the form of an API documentation Swagger page allowing developers to see and test the functionality of each request that could possibly be made from the administration portal. The below code block is an example of how the endpoints are structured in the code, with this structure differing depending on the data sent.

```
exhibitionRouter.get('/:id', async (req, res) => {
  const { id } = req.params;
  const exhibition = await Exhibition.findOneOrFail({ id: Number.parseInt(id) },);
  exhibition.thumbnail = exhibition.thumbnail?.toString() as any;
  res.json(exhibition);
})

exhibitionRouter.post('/', async (req, res) => {
  const value: Object = await createSchema.validateAsync(req.body);
  res.json(await Exhibition.create(value).save());
})

exhibitionRouter.put('/:id', async (req, res) => {
  const { id } = req.params;
  const value = await editSchema.validateAsync(req.body);
  res.json(await Exhibition.save({ id: Number.parseInt(id), ...value }));
})

exhibitionRouter.delete('/:id', async (req, res) => {
  res.json(await Exhibition.delete({ id: Number.parseInt(req.params.id) }));
});
```

Get, post, put and delete requests comprise the structure of the endpoints or routes which correspond with the create, edit and list forms contained within the React Admin framework.

The database layer is defined and interacted with an ORM library called TypeORM which allows us to specify the database schema for tables through type based structure, enabling quick manifestations of both typing and managed sql tables with one description. This library also handled migrations to make the development process very streamlined.

The data that is sent through these requests is run through a library based validator schema from JOI to ensure that the input data is correct.

```
export const editSchema = Joi.object({
  id: Joi.number().strip(),
  name: Joi.string().min(3).max(30),
  ...
})

@Entity()
export class Exhibition extends BaseEntity {

  @PrimaryGeneratedColumn()
  id: number;

  @Column()
  name: string;
  ...
}
```

The endpoint structure that most deviates from these examples is artefact media because of the image handling component where media is served using an NGINX static file server, stored on a public in project itself. This is as opposed to delivering the media through base64 and serving media through a conversion which is what the previous codebase had done.

Codebase 2 fundamentally works as a GUI for whatever information the backend has to offer. Therefore, on boot and on refresh, all the data is retrieved from the backend, of which the state is set for all relevant entities and stored globally. The codebase was structured this way so as not to overload the client's network by making a request for every page load.

```
export const GlobalStore: React.FC = ({ children }) => {
  const [artefacts, setArtefacts] = useState<Artefact[]>([]);
  const [storeItems, setStoreItems] = useState<StoreItem[]>([]);
  const [exhibitions, setExhibitions] = useState<Exhibition[]>([]);
  const [zones, setZones] = useState<ZoneConsumable[]>([]);
  const [beacons, setBeacons] = useState<Beacon[]>([]);
  const [isLoading, setisLoading] = useState(false);

  const globalValue: ActionContextValue = useMemo(() => ({
    reload: async () => {
      setisLoading(true);
      try {
        console.log("Getting payloads");
        const artefactResults = await request<Artefact[]>(`${baseURL}/artefacts`);
        const storeItemResults = await request<StoreItem[]>(`${baseURL}/storeItems`);
        const exhibitionResults = await request<Exhibition[]>(`${baseURL}/exhibitions`);
        const zoneResults = await request<ZoneConsumable[]>(`${baseURL}/zones/app`);
        const beaconResults = await request<Beacon[]>(`${baseURL}/beacons`);
```

Once the user has confirmed their bluetooth and location permissions, the code will essentially look through the global store in a way similar to Figure 2. After obtaining the MAC address of the beacon closest to the user, the program will find the zone that it belongs to, the artefacts contained within the zones and, in the order of priority, the artefacts that have attached media. Based on the priority, the media will cycle through all available content.

The media sent to the global store is then accessed by the mobile app from a source URL.

```
`${MEDIA_URL}/${props.artefactMedia.src}`
```

4.3.2 Design Contentions & Challenges

The main challenge of the previous semester was whether to discard the progress made with the previous mobile application codebase whilst still working with the administration portal from previous teams. This semester, a similar challenge was presented to the team as a result of the slow development progress of the artefact where it was called into question as to whether keeping the previous codebase would limit progression or not.

Ultimately the team decided on giving the client a proposal that if the developer team could showcase enough progression within the week, the previous codebase 1 would be scrapped. Once it was demonstrated that progress was in fact much faster, similar to the results of this decision in the previous semester, although the development team decided to focus heavily on reworking the administration portal aspect of the project rather than the reworks that occurred last year with codebase 2.

The refactoring discussion carried on from the last semester concerning the design of the project was able to be fully realised, directly as a result of the codebase 1 restart. Initially, the project had beacon triangulation in mind as well as a database structure that was not ideal for image handling or establishing the appropriate relationships required for beacon navigation. However, starting from scratch made it so that the team could structure the database to support and deliver to the client a project that more matched their expectations.

Another challenge is the platform of codebase 2. This codebase is written in React Native which has cross-platform support, however the team does not have access to an Apple development machine or the means of purchasing a developers licence to have this artefact on the Apple Store. Initially, we are developing a use case presented by the client where museum patrons will use an Android tablet given to them upon entering the museum. However, upon expansion of this project's scope the client may want the capability to allow customers to use their own devices. This is fine enough for Android, but Apple iPhone users could possibly comprise a large portion of the user-base which makes it difficult for this artefact to then be widely accessible on people's phones upon entering the Redland Museum. This is more of a consideration when a wide-scale deployment occurs rather than during development and so it is definitely outside of the scope of the semester.

Resolving these contentions and challenges became the focus of client meetings and through open communication most of these issues were able to at least factor into the design considerations.

4.3.3 Future Functionalities

Despite the incompleteness of the artefact, this project has been evaluated to have only one major step away from completion in terms of features. The map tab to be displayed in codebase 1 is the largest feature left outside of the scope of this project as a result of its complexity. The map tab would essentially be visualising an aggregation of all of the data structures by allowing the user to drag and drop objects in (artefacts, zones, beacons etc.) and place them physically on a map of the museum as opposed to manually filling out forms. Despite this feature's importance for usability, the design of it was only able to be considered once every other aspect of the codebase was completed and stable. Technically, the user would still be able to use the project in its current state but it becomes difficult because of the inability to visualise relationships between data, only having the option to view those relationships through forms and lists. A mockup of the map tab has been included in Appendix 5.7 for reference.

The touring feature was also left out of the scope because it required so many prerequisites in order for development to occur. But now that beacon detection is up and running in the current iteration of the artefact, the touring feature could be developed in the next phases of the project only requiring the capability for the code to consider both the switching the media when you switch to a different beacon and the linking up of various points of interest so that the application is able to guide customers through a set path.

The project also requires more polishing with regards to the general styling of certain elements. These design considerations would be the focus of future client meetings where it is defined exactly what the client wants the application to look like, allowing for discussions about the previously trivial decisions. Priorities can now be shifted to polish the artefact rather than laying the foundations of it and as such the framing of future iterations of the project differs heavily from what was required during the team's time working on the project.

4.4 Quality and Metrics

Quality of the project's progression was measured by weekly client meetings where the team would discuss their ideas and demonstrate any changes to the project. The project's goals were guided based on these meetings and the team utilised a Trello board to keep track of that. The communication plan outlines the general schedule kept up throughout the semester that allowed the team to deliver approximately one major feature each week. With this level of progress, the client was able to express their input and any wanted changes could be noted down and implemented in the following week. GitHub was used for collaborative development, where simultaneous development allowed multiple features to be developed on different branches of code, merging them when necessary.

The team set up the repository so that every time a commit was pushed to the master branch, GitHub would run an action to first check tests and deploy to the production server so that the client could access it on the open internet. This presented the client with a live feed of the project's progress, allowing them to test the artefact's current iteration at any time and essentially covered the user testing for codebase 1 as the client is the main user. To ensure quality however, the team performed some user tests on the administration portal, which can be seen in Appendix 5.8.1. Codebase 2 went through similar user tests (refer to Appendix 5.8.2).

Implementation of user recommendations is incomplete as a result of most of these suggestions being design-related thus leaving them out of the scope of this semester's work. During development, major features were prioritised to align with the client's priorities being functionality rather than aesthetics.

The team has written extensive documentation contained in four separate README's, covering the server, frontend, app, and the overall project in the linked GitHub repository. In compliance with industry standards, this is the user guide for the coming team. It is a suggested first visit for new teams to get an overall understanding on how to run the project during development.

5. Appendix

5.1 Sprint Plan

Sprint 1

Total Story Points: 9 **Total Hours: 16.5 hours**

Current Velocity: two weeks (roughly) **Completed: 21/3/21**

Story 3: Uploading media to codebase with “lazy loading”

Task ID	Assigned too	Task Description	Estimate	Taken
T1	Peter	Upload relevant media to codebase server	30 mins	20 mins
T2	Peter	Connect media with filestream	30 mins	10 mins
T3	Anahad	Create request media protocol from file stream	2 hours	2 hours
T4	Tyrone	Set media parameters and syntax	2 hours	1 hour
T5	Tyrone	Configure media output with API	1 hour	1 hour
T6	Peter	Test media output with API	3 hours	2 hours
		Story Points: 5 Total Hours: 9	9 hours	6.5 hours

Story 29: Evaluate and fix bugs related to the dropdown boxes (irrelevant)

Task ID	Assigned to	Task Description	Estimate	Taken
T7	Peter	Evaluate existing dropdown beacon function	30 minutes	15 minutes
T8	Tyrone	Consolidate with user requirements and plan to add dropdown requirements	30 hours	15 minutes
T9	Anhad	Develop the beacon function if dropdown where to be considered NULL	2 hours	1 hour
110	Peter	deploy the beacon function into the application tab	2 hours	1 hours
T11	Peter	Test the dropdown function allows beacon to be NULL inside application	2 hours	1 hour
T12	Anhad	Consolidate and document the requirements met	30 minutes	30 minutes
		Story Points: 4 Total Hours: 7. 5 hours	7.5 hours	4 hours

Sprint 2

Total Story Points: 8 **Total Hours: 36.5**

Current Velocity: two weeks (roughly) **Completed: 13/4**

Story 32/33/34/35: Admin portal clean up

Task ID	Assigned to	Task Description	Estimate	Taken
T1	Anhad	Create the artifacts tab within the application	2 hour	1 hour
T2	Anhad	Implement an artifact create and export function	2 hour	2 hour
T3	Anhad	Create and configure the artifact parametres including artifact ID, Name, Description, X and Y coordinates, Zone location and dates relating to creation	1 hour	1 hour
T4	Anhad	Test implementation entering information into the fields	2 hour	1 hour
T5	Tyrone	Create zones tab in the application	1 hour	45 mins
T6	Tyrone	Implement create and export zones function	30 mins	30 mins
T7	Tyrone	Create and configure the zone parametres including Zone ID, Name, Description, dates relating to creation and updation	1 hour	1 hour
T8	Tyrone	Test implementation by entering into the fields and viewing the new input on website	2 hour	1 hour
T9	Peter	Create the Beacons tab within the application	1 hour	30 min
T10	Peter	Implement the create and export function	1 hour	45 min

T11	Peter	Create and configure the Beacon parametres including BeaconID, Name, Visits,MAC address , activation, Coordinates x and y and zone	1 hour	1 hour
T12	Peter	Create activation on/off function	2 hour	1.35 hour
T13	Peter	Test implementation by entering into the fields and test the activation functionality	2 hour	1 hour
T14	Anhad	Create the zone media tab within the application	1 hour	30 min
T15	Peter	Implement the export and create feature	1 hour	45 min
T16	Tyrone	Create and configure the Zone Media parametres including media ID, Media source link, title, media type and zone	1 hour	45 minutes
T17	Tyrone	Test implementation by entering and the field and check it updates the fields in the application	1 hour	1 hour
		Story Points: 4 Total Hours: 21.5 hours	21.5 hours	15 hours

Story 36: Media upload through admin portal

Task ID	Assigned to	Task Description	Estimate	Taken
T1	Anhad	Define parameters for media upload file type	2 hours	3 hours
T2	Tyrone	Create Media upload function using drag and drop	2 hours	2 hours
T3	Anhad	Connect and create Zone media router functions	2 hours	1 hour
T4	Anhad	Connect backend to react Native	1 hour	1 hour
T5	Anhad	Create media parameters for rendering	2 hours	1 hour
T5	Peter	Define media display dimensions	1 hour	1 hour
T8	Tyrone, Peter, Anhad	Test media upload function/ fix necessary bugs	3 hours	2 hours
		Story Points: 4 Total Hours: 12 hours	13 hours	11 hours

Sprint 3

Total Story Points: 7 **Total Hours: 19.35 hours**

Current Velocity: two weeks (roughly) **Completed: 26/4/21**

Story 36: Media content organisation

Task ID	Assigned to	Task Description	Estimate	Taken
T1	Anhad	Create upload thumbnail function in artifacts	2 hours	1.5 hours
T2	Anhad	Define parameters for thumbnail function using ID, Name, Descriptio, Coordinates and acquisition date	1 hours	30 minutes
T3	Tyrone	Create Thumbnail Drag and Drop feature using media upload functionality from Zone media tab	3 hours	2 hour
T4	Peter	Define thumbnail gateway to ngnix server	1 hour	1 hour
T5	Peter	Test and implement the Thumbnail media upload/ drag and drop feature	2 hours	2 hour
T6	Anhad	Add two new tabs with exhibitions and Store items respectively, into the application frontend	1 hour	1 hour
T7	Tyrone	Review zone media tab functionality and test bugs	2 hours	1 hours
T8	Tyrone	Include where necessary media zone re sizing parameters in upload function	2 hours	2 hours
		Story Points: 4 Total Hours: 13 hours	13 hours	11 hours

Story 44: User guide with swagger documentation

Task ID	Assigned to	Task Description	Estimate	Taken
T1	Anhad, Peter, Tyrone, Liam	Review Artifact agreement for handover	1 hours	30 Minutes
T2	Tyrone	Use Swagger docs and connect to the API defining server, url and description	2 hours	2 hours
T3	Anhad	Using swagger define pathway to function and its Get response using description	5 minutes	5 minutes
T4	Tyrone	Define parameters for function using the correct terminology	30 hour	30 hour
T5	Peter	Using the Schema object define what the parameters are	30 hours	30 hour
T5	Tyrone	Using define the response in line with the parameters line, define the content of a successful response	30 hour	30 hour
T8	Anhad, Tyrone, Peter	Using required documentation in Swagger, define each of function of the Codebase	8 hours	7 hours
		Story Points: 3 Total Hours: 9.35	9.35 hours	8.35 hours

Sprint 4

Total Story Points: 8 **Total Hours: 15.5 hours**

Current Velocity: two weeks (roughly) **Completed: 9/5/21**

Story 42: Exhibitions and store items tabs

Task ID	Assigned to	Task Description	Estimate	Taken
T1	Anhad	Implement a create store items functions	1 hours	1 hour
T2	Tyrone	Add appropriate parameters including name, description, Item cost and in stock on/off function	1 hours	1 hour
T3	Peter	Add upload media function inside add store item	1 hours	1 hour
T4	Anhad, tyrone and Peter	Test and review Store items tab	2 hours	1.5 hours
T5	Tyrone	Implement a create exhibition function	1 hour	1 hour
T6	Anhad	Add appropriate parameters including thumbnail, name, description, organiser, start and finish date, price of adult, price of concession and price of child	1 hour	1 hour
T7	Tyrone	Add upload an media function and link to thumbnail parameter	1 hour	1 hour
T8	Tyrone/Anhad	Test and review the exhibitions tab	2 hours	2 hours

		Story Points: 2 Hours: 9 Total	9 hours	7.5 hours

Story 31: Codebase 2 connectivity

Task ID	Assigned to	Task Description	Estimate	Taken
T1	Anhad	Assess server connectivity with database	1 hour	1 hour
T2	Tyrone	Establish server connection with codebase 2	1.5 hours	1 hour
T3	Anhad	Complete feature parity with codebase2_GT	2 hour	2 hour
T4	Tyrone	Complete Swagger basepath dynamic change between production and local	1 hour	1 hour
T5	Anhadr	Server link with appropriate protocol using local gateway	1 hour	1 hour
T5	Anhad	Assess server status with functionality	1 hour	1 hour
T8	Tyrone/Anhad	Test and review server setup with connect tests	2 hours	1 hour
		Story Points: 6 Hours: 9.5 hours Total	9.5 hours	8 hours

Sprint 5

Total Story Points: 10 **Total Hours: 17.2 hours**

Current Velocity: two weeks (roughly) **Completed: 22/5/21**

Story 40: Artefact media tab

Task ID	Assigned to	Task Description	Estimate	Taken
T1	Anhad	Change Zone medias tab name to artifact media tab	1 hours	20 mins
T2	Tyrone	Create artifact add option to artifact media tab	2 hours	1 hour
T3	Peter	Implement function to to be able to select artifacts from artifact tab	1 hour	1 hour
T4	Anhad, Tyrone and Peter	Create function to associate artifact Id to the artifact media and display artifact ID when saved	1 hour	1 hour
T5	Tyrone	Test the Artifact media creation function	2 hours	1 hours
T6	Anhad	Test with connectivity to codebase mobile application, review media requirement and confirm usability	1 hours	1 hours
		Story Points: 3 Total Hours: 8 hours	8 hours	5.2 hours

Story 38/39: Artefact hierarchy

Task ID	Assigned to	Task Description	Estimate	Taken
T1	Anhad	Create the relations tab within the zone media tab, do this within the zone creation	1 hour	1 hour
T2	Tyrone	Implement an input box for artifact and beacon options	1 hour	1 hour
T3	Anhad	Implement artifact information display to read description, name and media	1 hour	1 hour
T4	Tyrone	Implement beacon information display to read beacon name and MAC address	1 hour	1 hour
T5	Peter	Review client requirements, research implementation methods for artifact sorting ranking technology	2 hours	1 hour
T6	Anhad	Create artifact sorting method into the tab, use the sorting method to display artifact ranking based on input	2 hours	2 hours
T7	Peter	Implement artifact hierarchy technology into the tab	1 hours	1 hour
T8	Anhad / Peter	Test and review the beacon hierarchy technology to confirm the client requirement	2 hours	1 hour
		Story Points: 7 Total Hours: 11	11 hours	9 hours

Sprint 6

Total Story Points: 10 **Total Hours: 13.5 hours**

Current Velocity: two weeks (roughly) **Completed: 1/6/21**

Story 37/43: Beacon functionality with media grab

Task ID	Assigned to	Task Description	Estimate	Taken
T1	Anhad	Test beacon server connection	1 hour	30 mins
T2	Tyrone	Test and review functionality with mobile application through APK	3 hours	2 hours
T3	Anhad	Using real time data analyse the connection strength and usability	1 hour	1 hour
T4	Anhad / Tyrone	Once beacon strength is fully tested, Test the application to see if if beacons discoverability is fully working	1 hour	1 hour
T5	Anhad / Tyrone	Create functions for grabbing artifact and artifact media when detected by beacon	3 hours	3 hours
T6	Tyrone	Test if the associated zone, artifact and artifact media data are all pulled if detected	2 hours	2 hours
T7	Tyrone / Anhad	Add map tab within the codebase admin portal, with resizable capabilities	2 hours	2 hours
T8	Anhad / Tyrone	Test and implement the relevant functions to size and fit map within mobile application	2 hours	2 hours
		Story Points: 8 Total Hours: 13.5 hours	15 hours	13.5 hours

5.2 User Stories

5.2.1 Prioritised User Stories

Must Haves

ID	Requirement/Story	Priority	Points
31	As the project owner, I want to have the mobile application communicate to the backend database, so that the information is displayed in real time.	Must	6
32	As the project owner, I want the backend to store all necessary information, so that it can all be accessed easily.	Must	6
33	As the project owner, i want to be able to assign a zone to a artifact, so that it shows the which zone a artifact belongs to in the zone tab	Must	5
34	As the project owner, i want to be able to login into the admin interface, so that i can view/add/edit and delete different features	Must	3
35	As the project owner, i want to be able to insert new artifacts with descriptions, coordinates, and creation dates, so that i can add artifacts to the museums beacons	Must	4
36	As the project owner, i want a zone media tab, so that i can upload media that fits the beacon zone so the video matches the beacon zone	Must	4
38	As the project owner, I want after a person has viewed the main video of a zone, for it to autoplay a video about another artifact, so that the person can learn more about the area's artifact.	Must	3

40	As the project owner, i want to have artefact media tab to have the ability to upload videos, so that the artifacts can have a video associated with them	Must	4
43	As the project owner, i want the map of the redlands museum to be uploaded, so that visitors can view the layout of the museum.	Must	2
44	As the project leader, i want a accurate user guide, so that the future of the project can be progress through another team	Must	4

Should Haves

45	As the project owner, i want the everything that has a image associated with it to have a thumbnail attached, so i can see without clicking what it is	Should have	3
22	As a product owner, I want the app to have the main colours of the app to be maroon and yellow, so that I can show to users our main colour scheme.	Should have	2
41	As the project owner, when i'm inside the zone tab I want to be able to assign a beacon within the zone, so that I have the right beacons within a zone.	Should	4

Could haves

37	As the Project owner, I want the main video of the zone to display as a person approaches a beacon, so that the video autoplays without the person initiating anything	Could have	6

39	As the project owner, i want to prioritise the artifacts autoplay in the order i want, so that the user can see the artifact that has the highest to least value to a zone	Could have	4

5.2.2 User Stories (Not Prioritised)

ID	Requirement / Story	Points
1	As a project owner, I want this app to have real-time location services, because it can provide “self-guidance” to visitors.	8
2	As a project owner, I want the real time location aspect of the project to be accurate to a maximum of 2 metres, so that this app can eliminate any "overlapping" and help visitors better.	8
3	As a product owner, I want to be able to input videos into the database for certain displays, so that there can be more interactive elements in my museum.	5
4	As a product owner, I want to be able to see which displays are most visited and the least, so that I can plan my museum accordingly.	4
5	As a project owner, I want to show the popular areas that visitors go to in the form of bar graphs, so that I can get information more easily.	4
6	As a project owner, I want the app to guide the visitors to different areas of the museum as most visitors never go deep enough to discover the rest of the pieces.	4
7	As a project leader, I want this app to connect to museum’s bluetooth, so that the beacon is able to pinpoint the user and display photos and videos depending on where the user is.	4

8	As a product owner, I want an admin account for the application, so that I can have access to sensitive information (e.g. most visited displays).	3
9	As a product owner, I want the app to be visually appealing so that it grabs the attention of the user and also adds to the user experience.	5
10	As a product owner, I want the visitors to have a tag which is linked to their device through the QR code so that it can help track the user.	3
11	As a product owner, I want the app to display the floor plan and the artefacts as a flashing dot, also having the visitors location display as a blue dot so that it can help guide the user	8
12	As a product owner, I want the artefacts to stop flashing and display as a solid dot when the user is in the vicinity, so that the user knows what they have visited.	5
13	As a product owner, I want the app to be able to start the tour at a random location so that it is convenient for the user.	5
14	As a visitor, I want a QR code, so that I can download the app on own smartphone.	2
15	As a visitor, I want a “help” menu to list all functions provided by the app, so that this will guide me on what to do next.	2

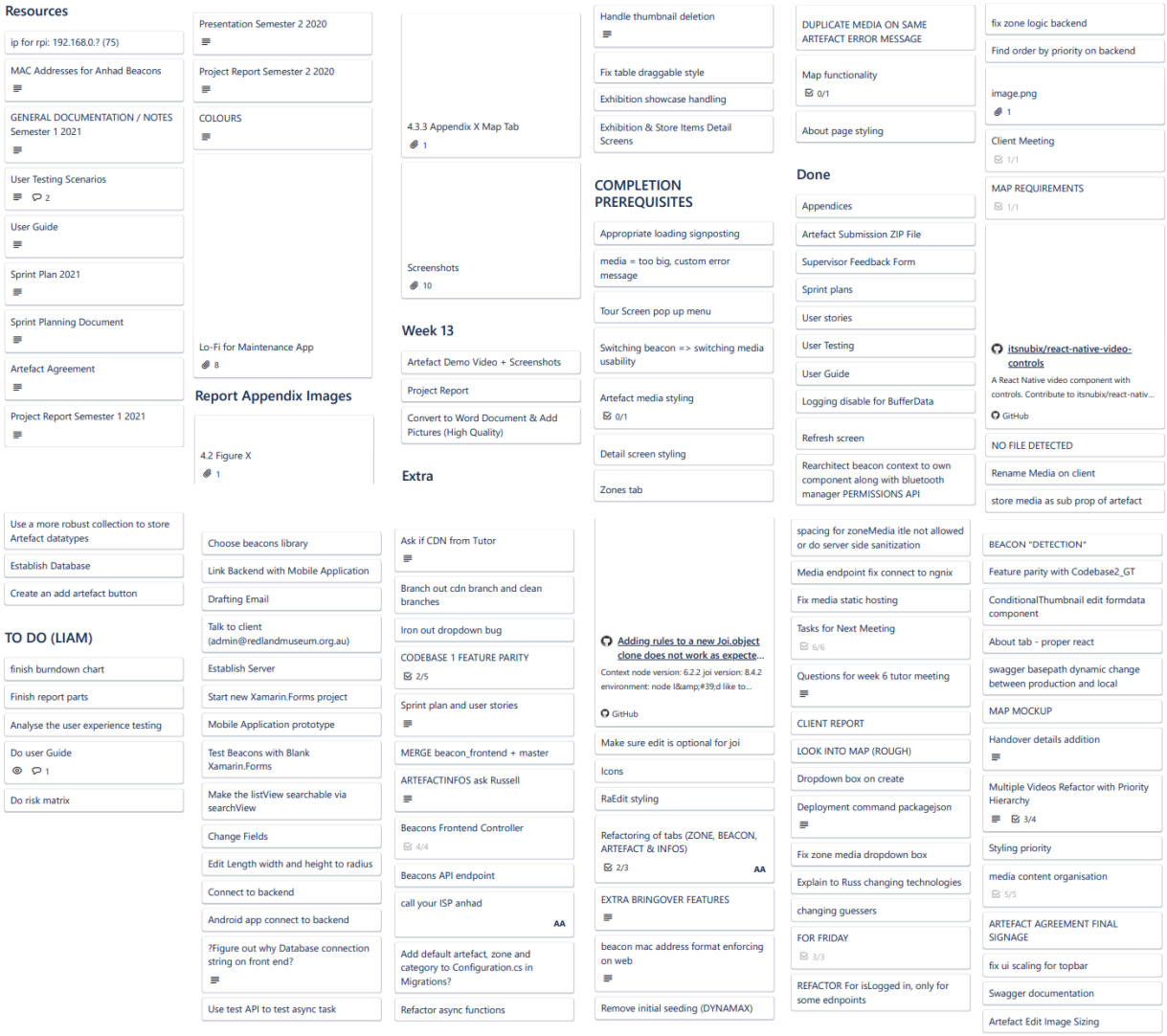
16	As a product owner, I want security features in the app that disables it out of premises of the museum, so that people who steal the tablet won't be able to use it for anything.	4
17	As a user I want the app to be simple to use so that I'm able to navigate through the app without any problems.	3
18	As a visitor, I want a map that shows some places such as display areas, exits and toilets, so that I can find the direction quickly.	1
19	As a visitor, I want to search for feature, so that I can know the exhibits' name, category and year range.	4
20	As a visitor, I want to know the current and future exhibitions, so that I can plan to visit the museum again.	2
21	As a visitor, I want to know more information about displays, such as video, photos, and text about the item, so that I can have a comprehensive understanding of the display.	3
22	As a product owner, I want the app to have the main colours of the app to be maroon and yellow, so that I can show to users our main colour scheme.	2
23	As a visitor, I want to see most visited artefacts so that I can use this information to view items I find interesting.	3
24	As a visitor, when i'm using the tour feature, I want the app to have a little icon next to active displays that have information on them, so that I can gain knowledge of the piece.	3

25	As a product owner, I want to have an option to disable and enable beacons on website, if they're disabled it won't show up on the floor plan, so that I can enable beacons that have information on them.	5
26	As a product owner, I want the app to display our logo mainly on the home page, so that it is recognisable as redland museum and make it more visually appealing.	2
27	As a visitor, I want to see labels next to most visited and help buttons, so that I am able to recognise what the buttons do.	1
28	As a product owner, I want the homepage of the app to have the text coloured black, so it's visually appealing to the visitors.	1
29	As a product owner, I want to have admin permissions so i'm able to edit, add and delete an artefact on a website.	4
30	As a visitor, when I'm viewing information on an artefact, I don't want the navigation bar to appear, as I may accidentally click on it.	3
31	As the project owner, I want to have the mobile application communicate to the backend database, so that the information is displayed in real time.	6
32	As the project owner, I want the backend to store all necessary information, so that it can all be accessed easily.	6

33	As the project owner, i want to be able to assign a zone to a artifact, so that it shows the which zone a artifact belongs to in the zone tab	5
34	As the project owner, i want to be able to login into the admin interface, so that i can view/add/edit and delete different features	3
35	As the project owner, i want to be able to insert new artifacts with descriptions, coordinates,and creation dates, so that i can add artifacts to the museums beacons	4
36	As the project owner, i want a zone media tab, so that i can upload media that fits the beacon zone so the video matches the beacon zone	4
37	As the Project owner, I want the main video of the zone to display as a person approaches a beacon, so that the video autoplays without the person initiating anything	6
38	As the project owner, I want after a person has viewed the main video of a zone, for it to autoplay a video about another artifact, so that the person can learn more about the area's artifact.	3
39	As the project owner, i want to prioritise the artifacts autoplay in the order i want, so that the user can see the artifact that has the highest to least value to a zone	4
40	As the project owner, i want to have artefact media tab to have the ability to upload videos, so that the artifacts can have a video associated with them	4

41	As the project owner, when i'm inside the zone tab I want to be able to assign a beacon within the zone, so that I have the right beacons within a zone.	4
42	As the project owner, I want an exhibition tab and a store items tab, so that I can upload upcoming events with concession prices and the ability to upload items within our store.	2
43	As the project owner, I want the map of the Redlands museum to be uploaded, so that visitors can view the layout of the museum.	4
44	As the project leader, i want a accurate user guide, so that the future of the project can be progress through another team	3
45	As the project owner, i want the everything that has a image associated with it to have a thumbnail attached, so i can see without clicking what it is	

5.3 Trello Board



5.4 Meeting Notes

Week 1

Mid-semester **artefact agreement** specifies all deliverables, discuss that in the first few meetings to get an idea before it's concrete
Handover should include technical documentation, user guide and GitHub
[WK1 SUN ; MAR8] Anhad Meeting Agenda:

1. ~~Organise Trello~~
2. ~~Refamiliarise with codebases~~
3. ~~Discuss schedule~~
4. ~~Assign rough week by week tasks~~
5. ~~Draft detailed sprints~~
6. ~~Finalise project plan to be shown to Russ and tutor~~

Meeting Minutes
Trello was restructured to account for weeks, with tasks assigned per week. Anhad and Tyrone will be working on **Tuesdays** and **Saturdays** together as well as in their own time to achieve the tasks set out per week. These tasks may be reconsidered at every client / group meeting that occurs. Re-clarification of the refactoring that needs to be done to the codebases was done below which will be part of the agenda of the client meeting the next day.

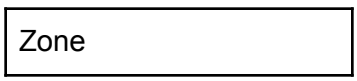
An email was sent to Shailesh Palekar, a QUT industry experience representative recommended by Fatima Kamali (tutor) regarding a planned meeting regarding best practices with CDNs and the delivery of content to the user.

Week 2's tasks were set out, which were mainly just to familiarise with the codebases as well as clarify what goals are to be set to complete this project in time. After the tutor and client meetings, it will be easier to tell what needs to be completed as well as the direction that the project will be headed

Week 2

[WK2 MON ; MAR9] Russ Client Meeting Agenda:
Get clear clarification for what refactoring will do
Get clear direction of what app should look like

- Zone has: one video / media, many artefacts => artefact content subtitles / transcript
    - Artefact media rename to Zone media, don't relate individual artefacts to media
    - Each artefact still has own image (thumbnails), discuss base64 strings



Zone name Description Zone media Just one video (10MB) Artefacts

- Artefacts has many to one relationship with categories and zone but doesn't have
- In the map view => I'm in range of this beacon => which zone am I in (red dot) => then look at artefacts in zone => highlight certain artefacts / artefact media
    - Reason for zones / beacons is because beacons aren't accurate enough
    - *zone will have many or one beacons inside of it as well as artefact(s), beacons aren't related to artefacts, you're going to retrieve what artefacts are under a zone; can have many or one medias*
- You can manually search through artefacts, zones, and categories through a 'search tab' but the map view is the main screen
- Map functionality - *colour coding zones, according to the map, AREAS front end name, turn off zones*

Meeting Minutes

Baseline Tasks:

- Client agrees with the refactoring idea since it avoids the inaccuracies of the beacons range and trying to specifically triangulate the client's position.
- The client is also completely fine with the look of the application as it matches the user experience envisioned.
- Client mentioned that the videos will be of a size 10MBs and that a single zone would have a maximum of a single video.
- Hierarchy of closeby zones, nearby zones tab shown on the side of the map.

Cache Delivery System:

- Lazy loading the main artefacts and picking and choosing stuff to be preloaded vs loading later. Give priority to loading the thumbnails on load of the app.
- Save cache on tablets or phones with images and content, need update switch for all content if it changes, check with backend; *Maybe use hashes for cache preservation.*
- **Use case** is tablets where they keep data cache of zone media.
    - One to many for zone to zone media, very efficient regarding this because the list of media can be the only thing that's cached as images. Storing imagecache using ArtefactInfos=> ZoneInfos so you have constant list of all content that is cacheable (the text option on infos conflicts with this). Or you cache only urls that are one to one with zone and URLS have timestamp if they change.

Non Priorities:

- Highlight artefact in a zone, done through a front end.
- A learn more option to expand upon a big content transcript

[WK2 TUES; MAR10] Tutor Meeting

Meeting Minutes

- Detail sprint plan - assign tasks to members, approx hour per tasks phases
- ***Delivery -*** artefact, report, demo video, user manual, user / usability testing (after each sprint),
- **Artefact agreement** between client and group, mid semester; list all must haves / good to have and details. Client come to agreement

Week 3

[WK3 FRI; MAR19] Peter & Tyrone Meeting

- Peter got up to speed on the set-up of the project for Codebase1, installed all NuGet packages and has the Docker instance running on his machine
- **TODO:** just needs to check the SQL Manager program to see if that works for him
- **CODEBASE2_GT GENERAL INSTRUCTIONS:** can use Visual Studio Code for this
    - pull project down from GitHub
    - cd to project
    - npm start on one tab
    - npx react-native run on another tab => making sure phone is hooked up and in debugging mode

[WK3 FRI; MAR20] Tyrone Independent Work

- Fixed the dropdown box issue in Codebase 1, can move onto other tasks

Week 4

[WK4 TUES; MAR23] Tutor Meeting

- By next meeting with client artefact agreement
  Deliverables
    - Must have features etc. to be delivered to the client
    - Confirm a draft with them
- Go to support session
- Erwin to ask about handover
- You're allowed to copy and paste from previous report

[WK4 FRI; MAR26] Client Meeting

Pre-Meeting:

PROCESS FOR MIGRATIONS (CHANGES TO BACKEND):

- delete database SQL server manager
- disable auto migration
- update-database
- add-migration enable auto migration

Zone
Zone name Description Zone media Just one video (10MB) Artefacts

Considerations of Refactoring Codebase1:

- Familiar with technologies, similar process to mobile application
- We would have to start from scratch although the process will be much quicker
- Play video in range of beacon
- DEADLINE BY NEXT WEEK => baseline ZONE, BEACON, MEDIA functionality in Codebase 1
    - Test proof of concept with deployability with heroku
    - Then deploy locally if that works out

- Database layer - type ORM
- Express react application
- React admin for front end

Week 5

- Activation on beacons
- Host the website
    - Connect react native application
- Relational logic
    - Beacons and zone
    - Superficial
- Zone tab showing list of artefacts
- Tabs
    - Exhibition
    - Merchandise
    - About
    - Category maybe
- Filter by zone
- Prototype for floor plan map tab

Email russ about the android application
LOGO shown on website

Week 6

Russ expectations for zone beacon technology:

- Russ wants it so when you step into the range of the beacon you are going to see the prioritized video explaining the zone and its main features. If you want to read and learn more the user can see additional videos to show different artifacts within that zone.
- One zone has one main video, no matter how many beacons in a designated zone
- Autoplay on videos, user test demographics which they prefer the autoplay or them clicking on a artifact to find out more
- Artifacts media to be shown by prioritization set by the admin

User agreement main expectations:

- The website is fully functioning having zone,artifacts, zone media and beacon tabs
- The video functioning fully on the application when uploaded via admin backend interface to be viewed on the application frontend

Questions for Week 6 Tutor Meeting:

1. How is the Scope Delivered marked (35%) - Does the client mark this or the tutor?
2. After the realization that the previous team codebase was not optimal for the future of the project, some things done in sprint plan one were not required now. Do we explain the switch up of the project direction in the report, if so where?
3. Do we include the sprint one in the first release plan or disregard it as now some work was made redundant because of new direction

Before and after screenshots of old codebase and new codebase. Highlight media efficiencies

Week 7

- Old server computer can be wiped - and running application
- **Local storage would be fine**
- Azure service account Angus has access to
- One nas being used for emails and stuff - Teamviewer RPID

Week 8 Either demo video for tutor or zoom meeting demonstration

Week 10

New burndown chart, updated user stories, sprint plans put everything in
Do user testing and user documentation

Week 12

Get Russell to send the feedback form to Fatima, user testing. Doesn't matter the user using the client admin

5.5 Project Plan

Semester 1:

Sprint 1 (Week 6)

1. Understanding previous teams' work
2. Refine backend / administration portal (codebase 1) according to client's needs
3. Updating user stories

Sprint 2 (Week 12)

1. Rework mobile application (codebase 2)
2. Establish connection between codebases
3. Choose appropriate supporting code libraries (for beacon navigation and map functionality) for easier progression next semester

Semester 2:

Sprint 3 (Week 6)

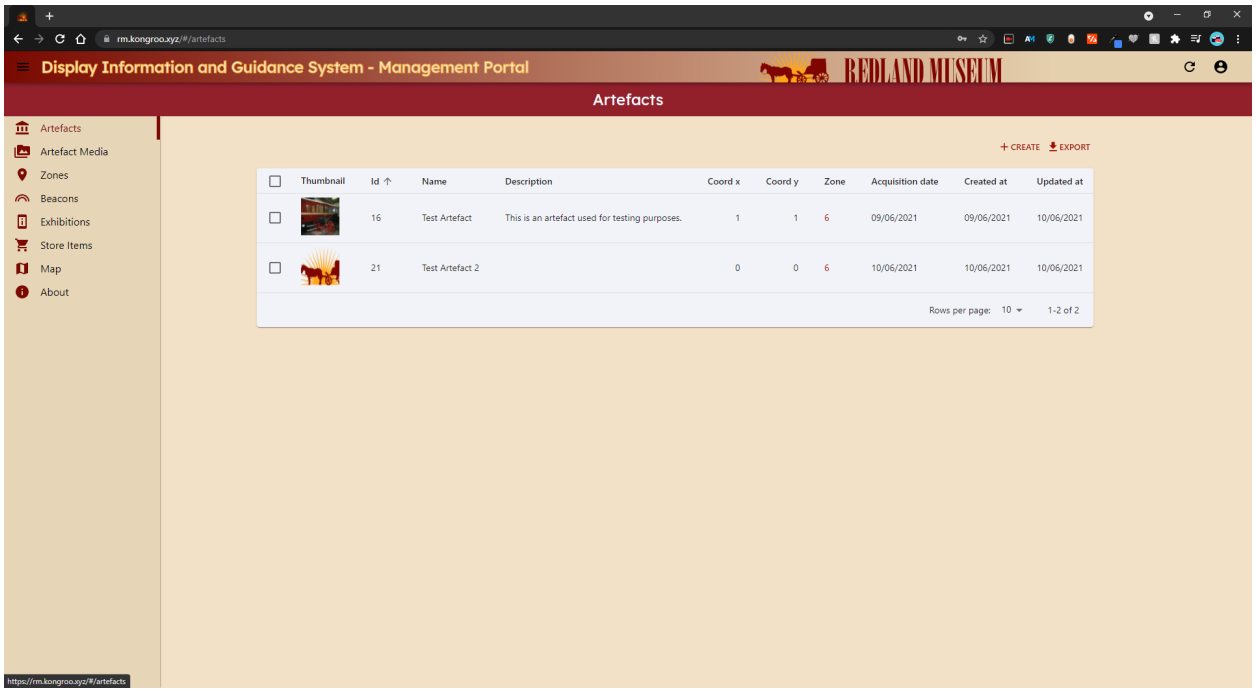
1. Restructure backend / administration portal (codebase 1)
2. Refine mobile application (codebase 2)
3. Finishing refinements to backend for smooth communication with the refined mobile application

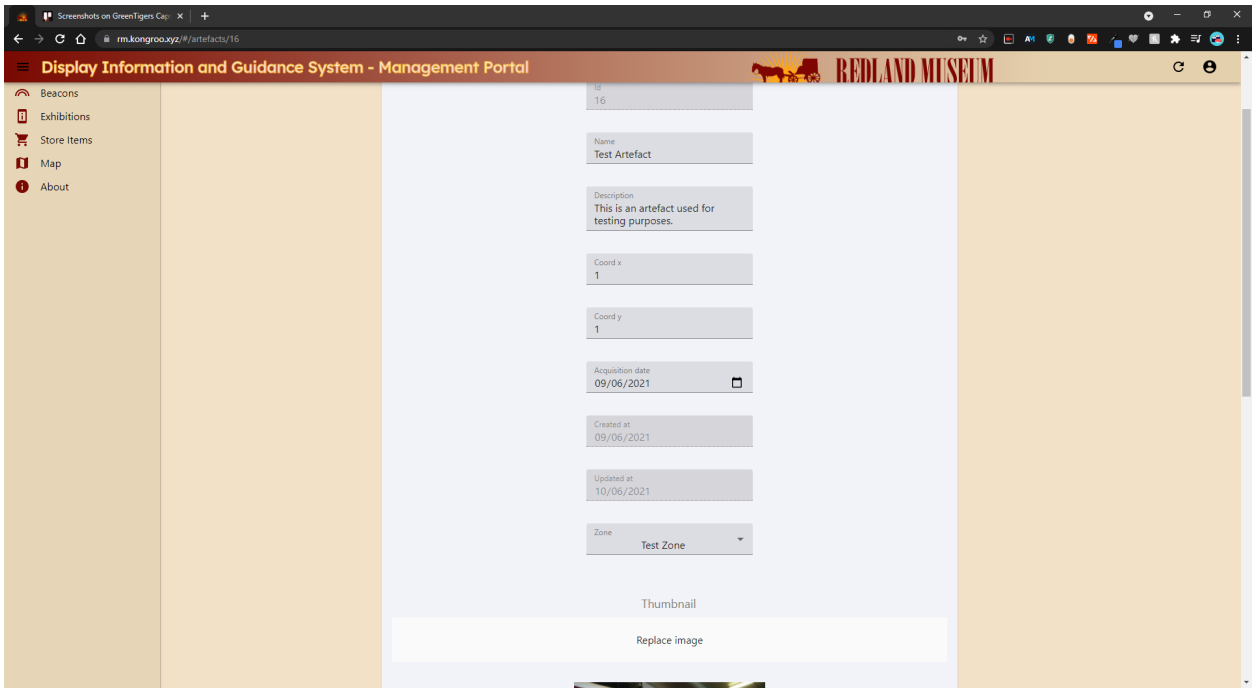
Sprint 4 (Week 12)

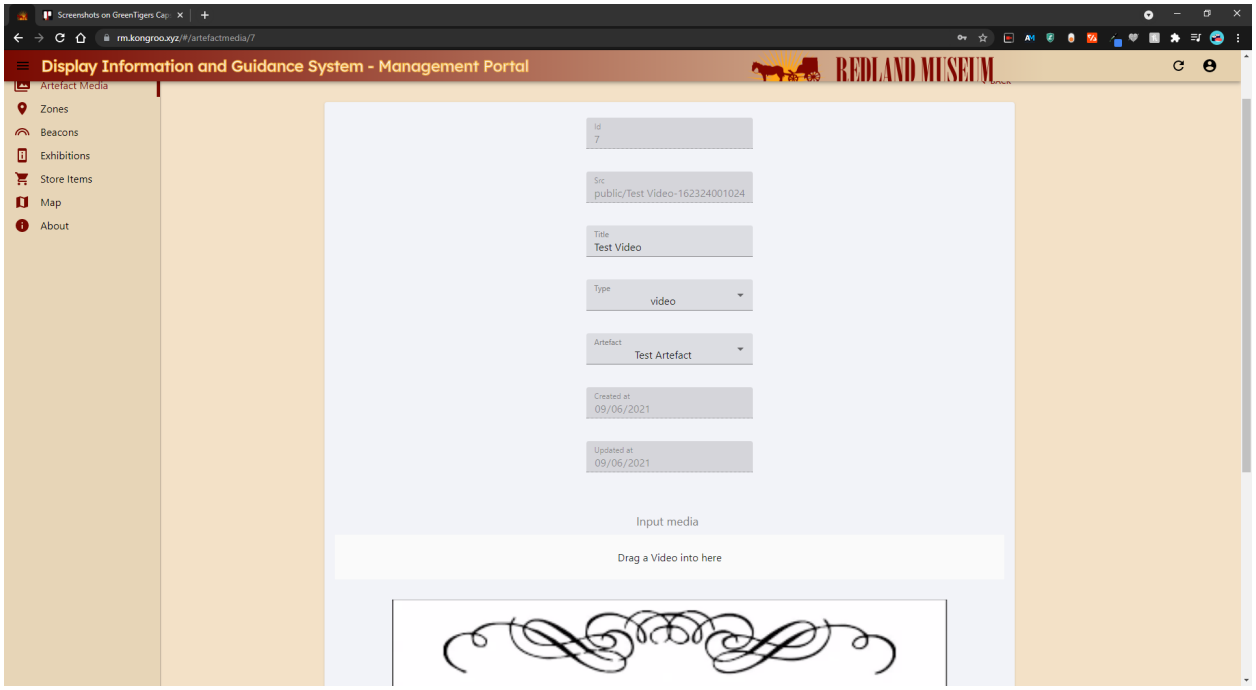
1. Start implementation of tour functionality
2. Establish communication with beacons

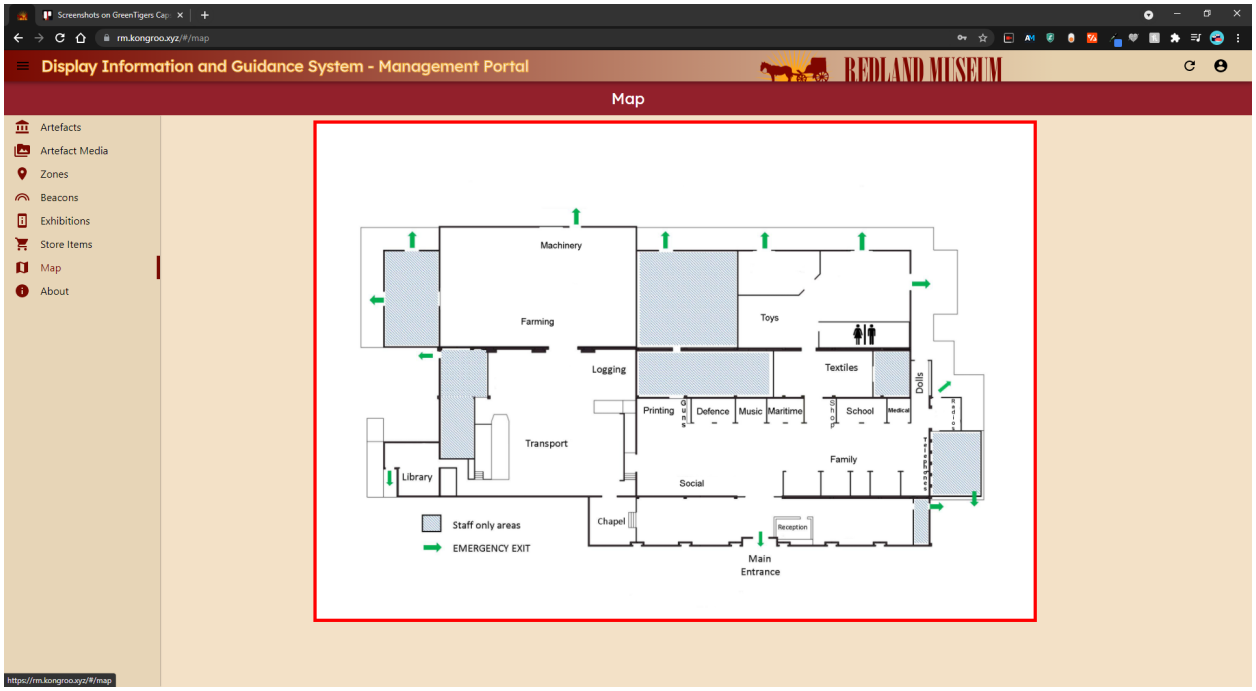
5.6 Artefact Screenshots

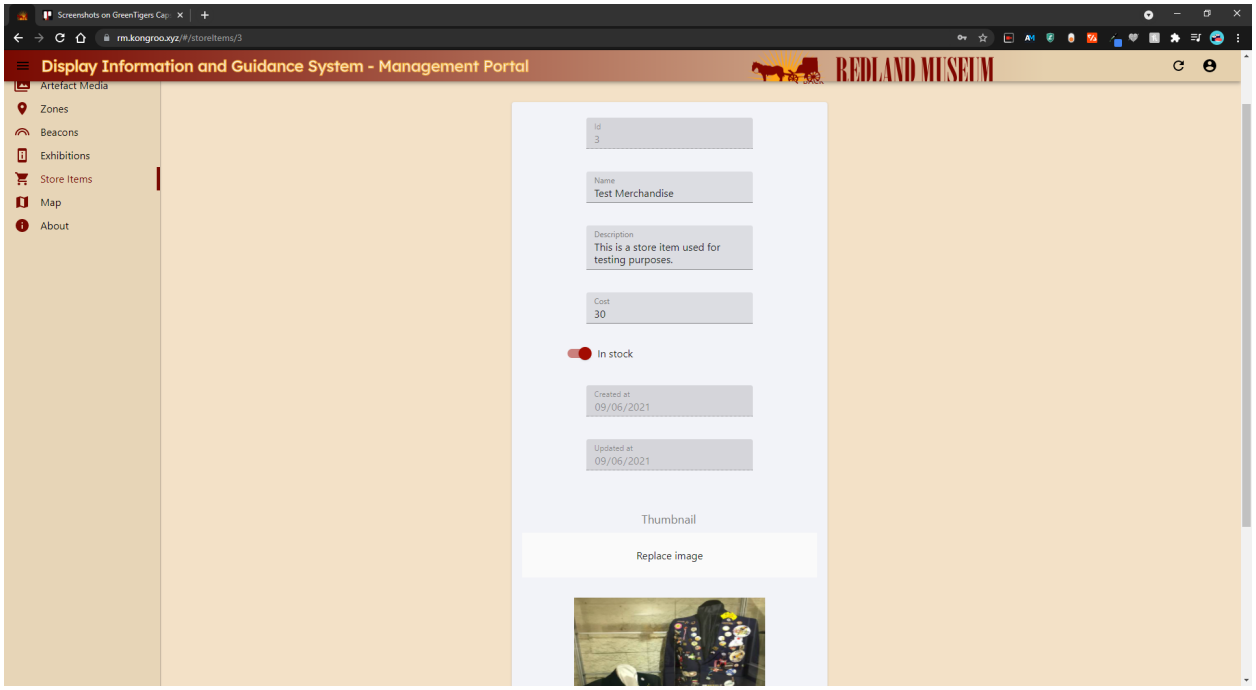
5.6.1 Codebase 1

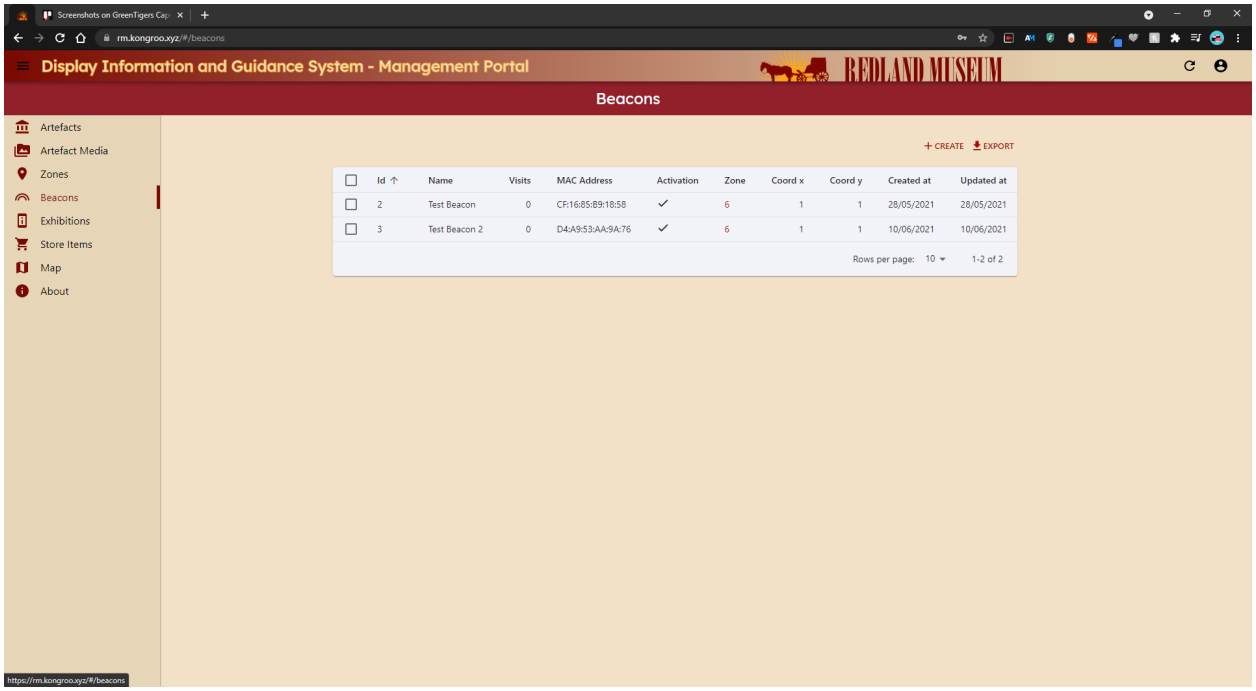


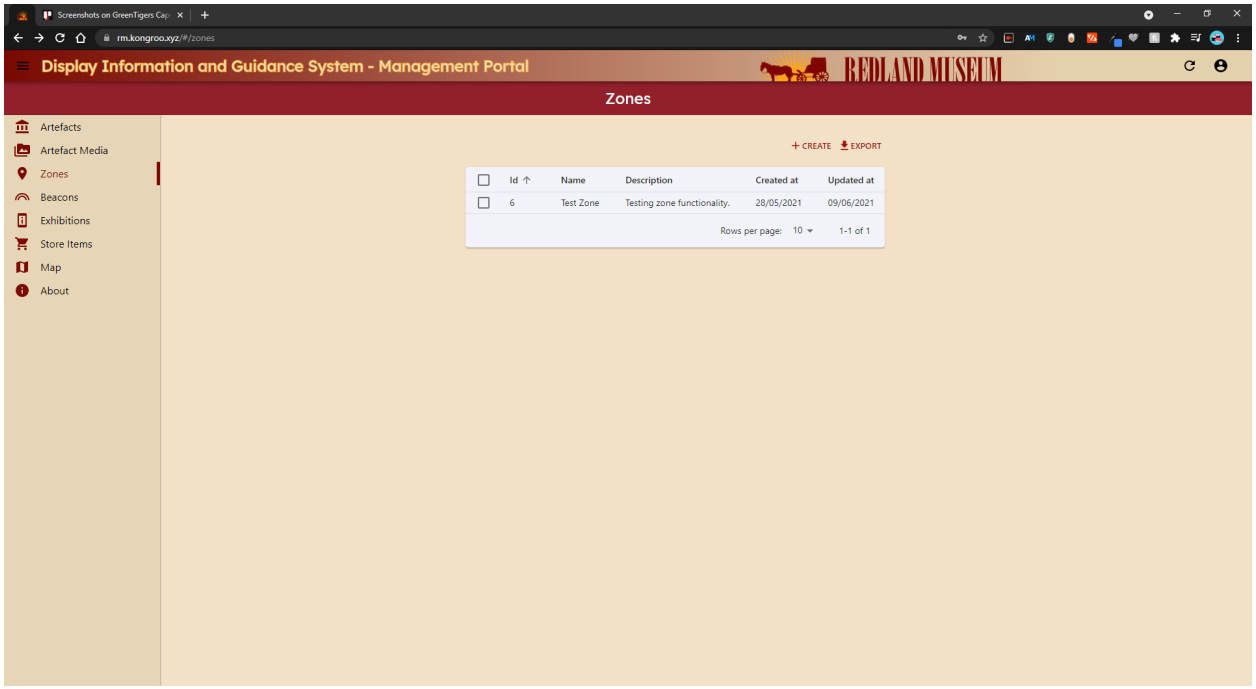


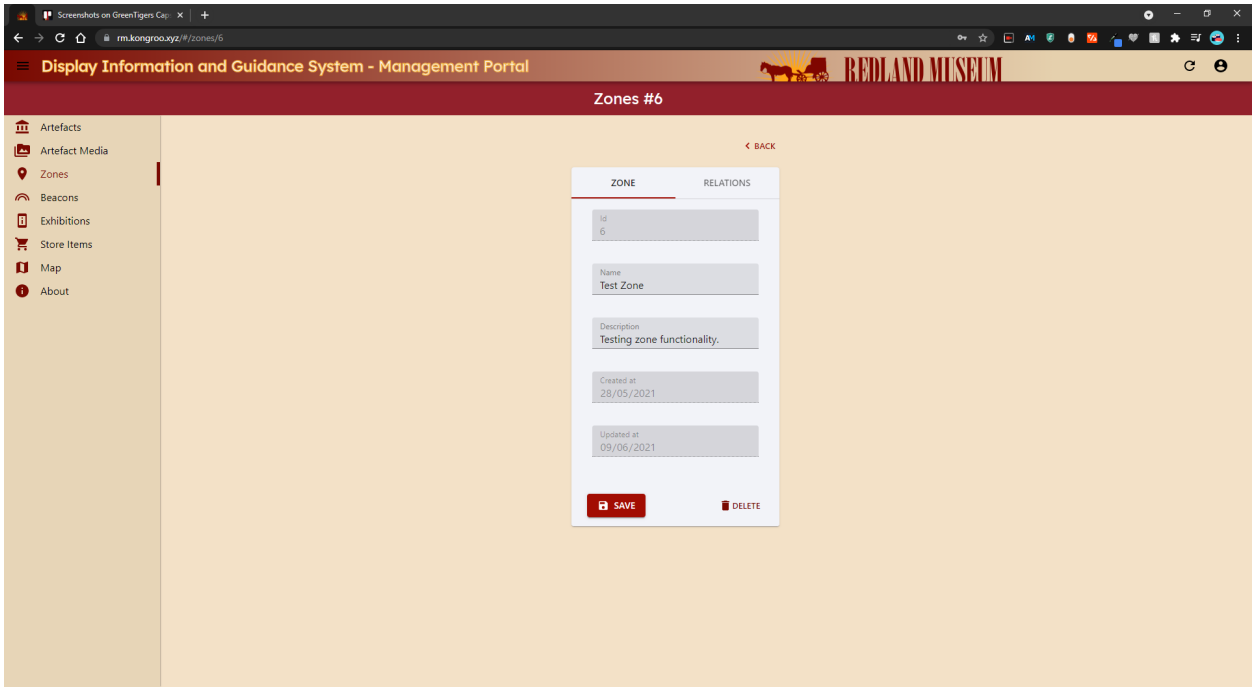

Display Information and Guidance System - Management Portal
REDLAND MUSEUM
Artefact Media
Zones
Beacons
Exhibitions
Store Items
Map
About
Id
7
Src
public/Test Video-162324001024
Title
Test Video
Type
video
Artefact
Test Artefact
Created at
09/06/2021
Updated at
09/06/2021
Input media
Drag a Video into here

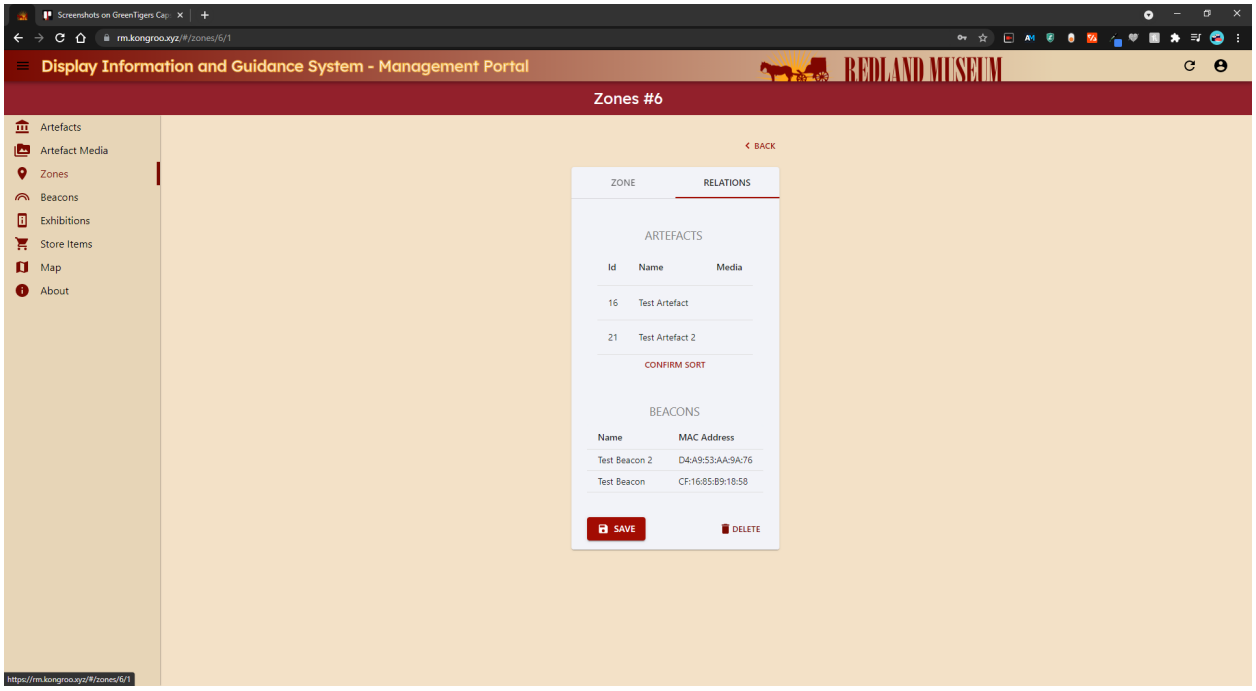

Display Information and Guidance System - Management Portal
REDLAND MUSEUM
Map
Artefacts
Artefact Media
Zones
Beacons
Exhibitions
Store Items
Map
About
Machinery
Farming
Toys
Logging
Textiles
Dolls
Printing
Defence
Music
Maritime
School
Medical
Transport
Library
Family
Social
Chapel
Reception
Staff only areas
EMERGENCY EXIT
Main Entrance

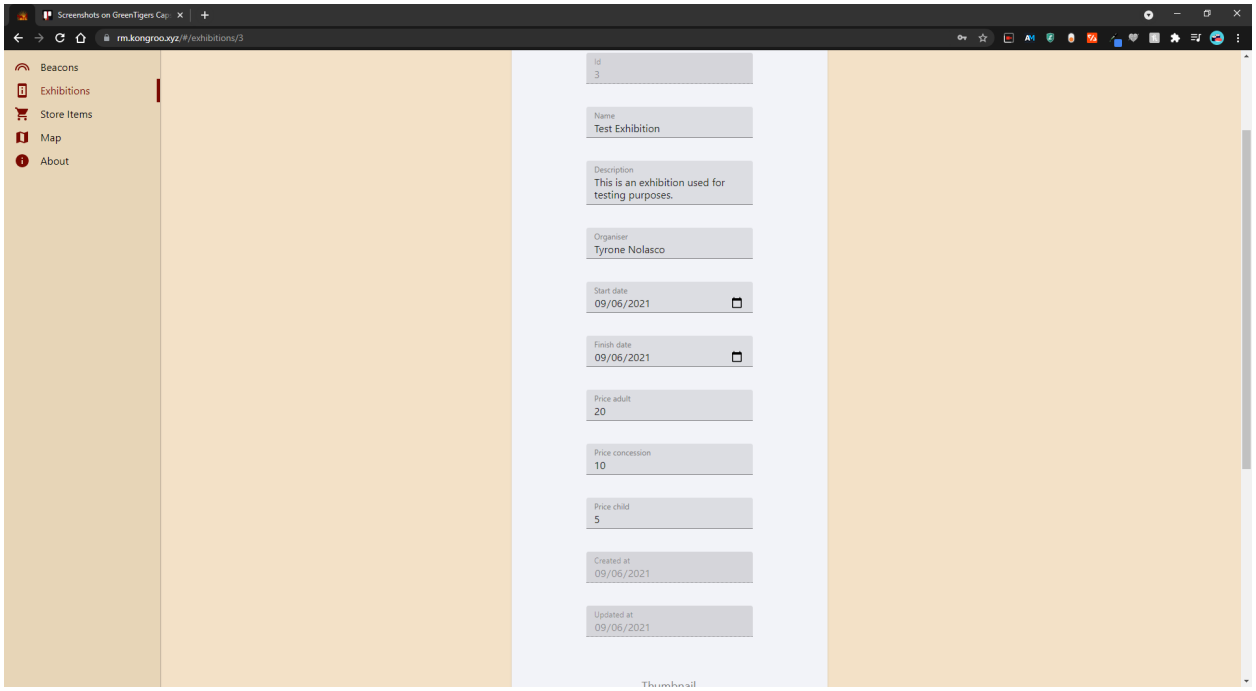

Display Information and Guidance System - Management Portal
REDLAND MUSEUM
Artefact Media
Zones
Beacons
Exhibitions
Store Items
Map
About
Id
3
Name
Test Merchandise
Description
This is a store item used for testing purposes.
Cost
30
In stock
Created at
09/06/2021
Updated at
09/06/2021
Thumbnail
Replace image


Display Information and Guidance System - Management Portal
REDLAND MUSEUM
Beacons
Artefacts
Artefact Media
Zones
Beacons
Exhibitions
Store Items
Map
About
+ CREATE
EXPORT
Id
Name
Visits
MAC Address
Activation
Zone
Coord x
Coord y
Created at
Updated at
2
Test Beacon
0
CF:16:85:B9:18:58
6
1
1
28/05/2021
28/05/2021
3
Test Beacon 2
0
D4:A9:53:AA:9A:76
6
1
1
10/06/2021
10/06/2021
Rows per page: 10
1-2 of 2

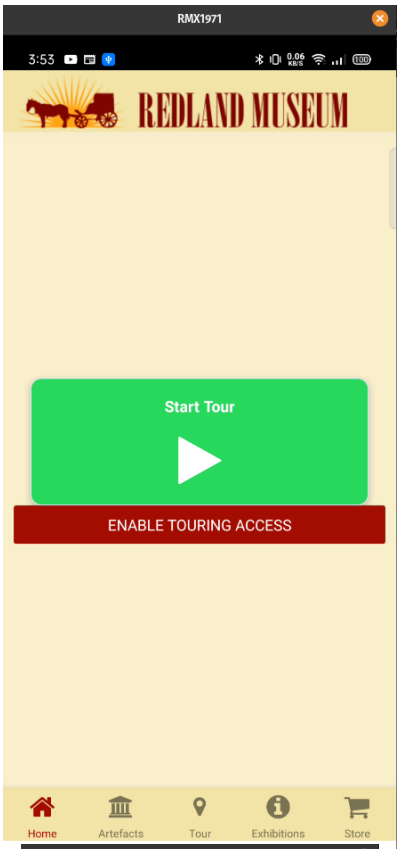

Display Information and Guidance System - Management Portal
REDLAND MUSEUM
Zones
Artefacts
Artefact Media
Zones
Beacons
Exhibitions
Store Items
Map
About
+ CREATE
EXPORT
Id
Name
Description
Created at
Updated at
6
Test Zone
Testing zone functionality.
28/05/2021
09/06/2021
Rows per page: 10
1-1 of 1

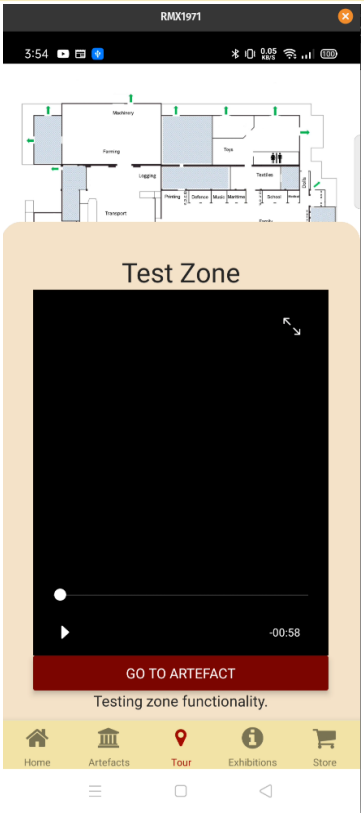

Display Information and Guidance System - Management Portal
REDLAND MUSEUM
Zones #6
Artefacts
Artefact Media
Zones
Beacons
Exhibitions
Store Items
Map
About
BACK
ZONE
RELATIONS
Id
6
Name
Test Zone
Description
Testing zone functionality.
Created at
28/05/2021
Updated at
09/06/2021
SAVE
DELETE

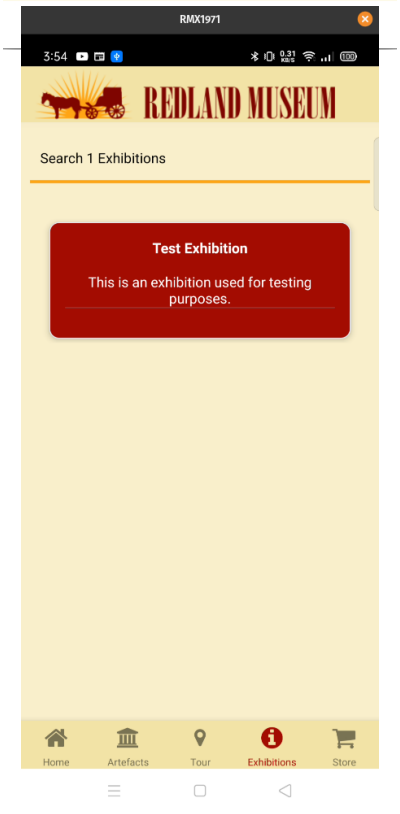

Display Information and Guidance System - Management Portal
REDLAND MUSEUM
Zones #6
Artefacts
Artefact Media
Zones
Beacons
Exhibitions
Store Items
Map
About
BACK
ZONE
RELATIONS
ARTEFACTS
Id
Name
Media
16
Test Artefact
21
Test Artefact 2
CONFIRM SORT
BEACONS
Name
MAC Address
Test Beacon 2
D4:A9:53:AA:9A:76
Test Beacon
CF:16:85:B9:18:58
SAVE
DELETE

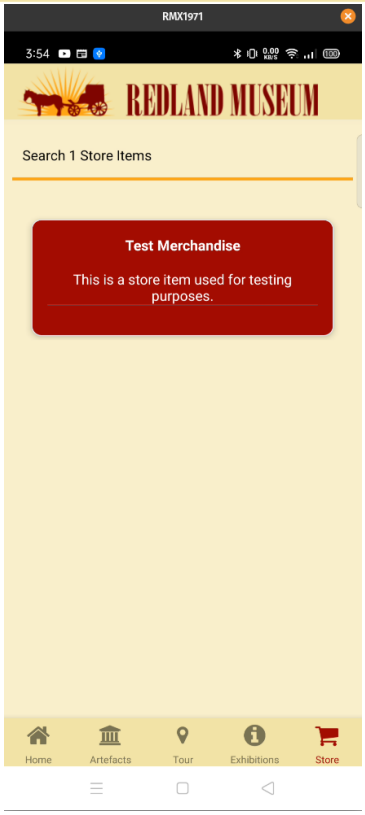

Beacons
Exhibitions
Store Items
Map
About
Id
3
Name
Test Exhibition
Description
This is an exhibition used for testing purposes.
Organiser
Tyrone Nolasco
Start date
09/06/2021
Finish date
09/06/2021
Price adult
20
Price concession
10
Price child
5
Created at
09/06/2021
Updated at
09/06/2021

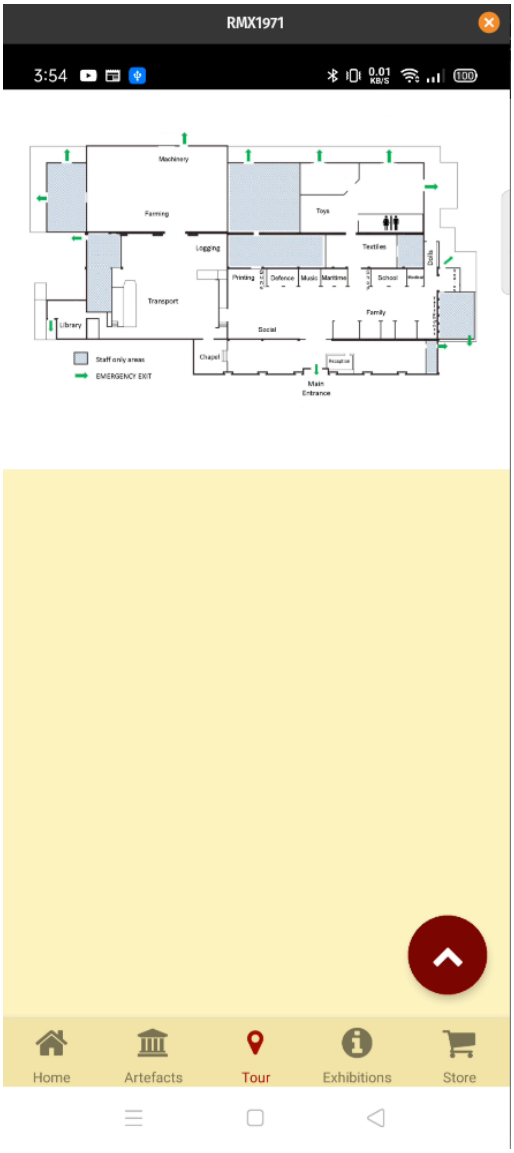
5.6.2 Codebase 2



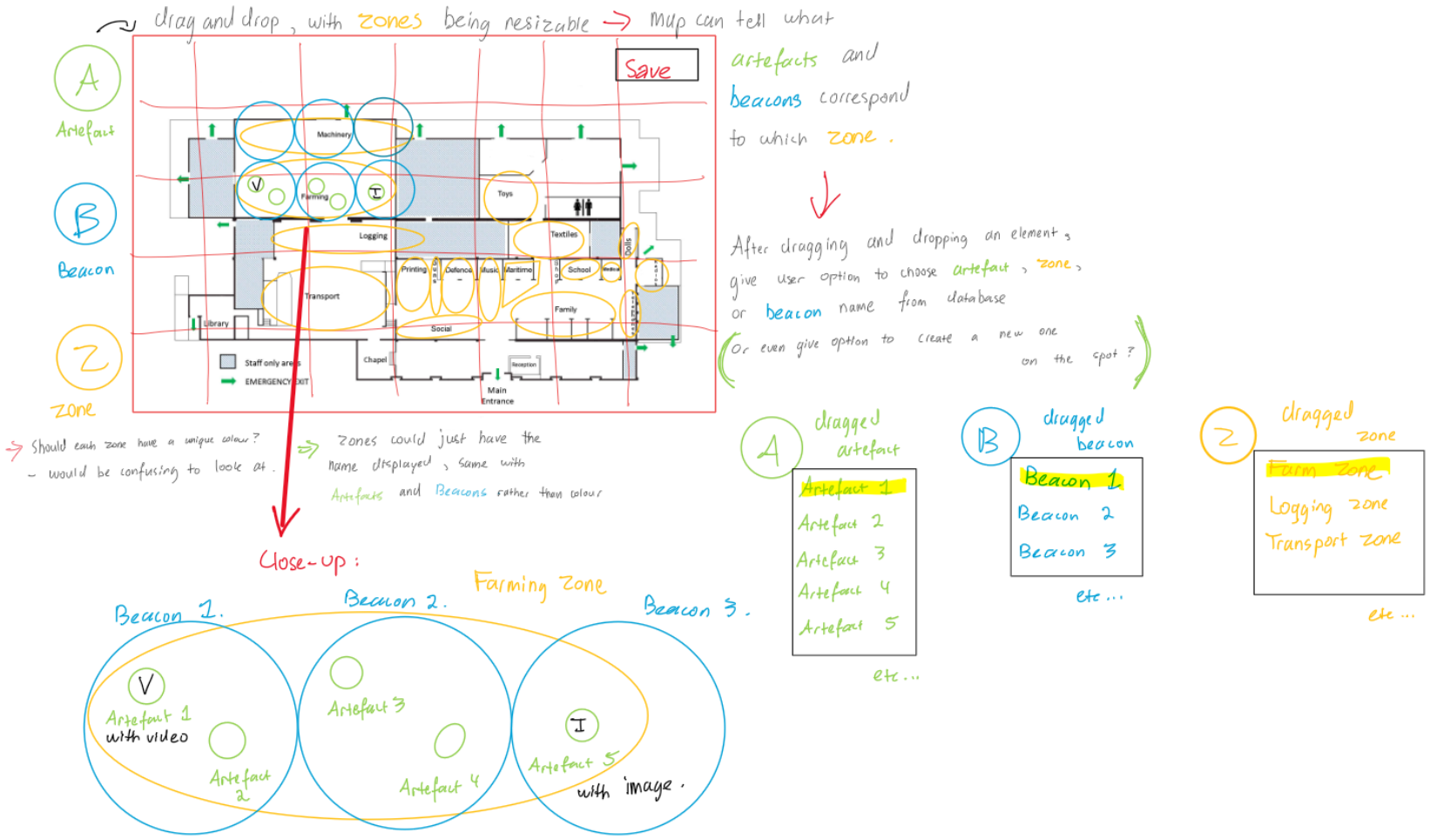







RMX1971
3:54
Machinery
Farming
Toys
Logging
Textiles
Printing
Defence
Music
Maritime
School
Dolls
Transport
Library
Family
Social
Chapel
Staff only areas
EMERGENCY EXIT
Main Entrance
Home
Artefacts
Tour
Exhibitions
Store

5.7 Map Tab


drag and drop, with zones being resizable → map can tell what artefacts and beacons correspond to which zone.
Save
A
Artefact
B
Beacon
Z
zone
Machinery
Farming
Logging
Toys
Textiles
Dolls
Printing
Defence
Music
Maritime
School
Transport
Family
Social
Library
Chapel
Staff only area
EMERGENCY EXIT
Main Entrance
After dragging and dropping an element, give user option to choose artefact, zone, or beacon name from database
(Or even give option to create a new one on the spot?)
Should each zone have a unique colour?
- would be confusing to look at.
zones could just have the name displayed, same with Artefacts and Beacons rather than colour
A dragged artefact
Artefact 1
Artefact 2
Artefact 3
Artefact 4
Artefact 5
etc...
B dragged beacon
Beacon 1
Beacon 2
Beacon 3
etc...
Z dragged zone
Farm zone
Logging zone
Transport zone
etc...
Close-up:
Farming Zone
Beacon 1.
Beacon 2.
Beacon 3.
V
Artefact 1 with video
Artefact 2
Artefact 3
Artefact 4
I
Artefact 5 with image.

5.8 User Testing Scenarios

5.8.1 Codebase 1

Hello, (insert name here). Thank you for participating in this usability test today. My name is (insert name here) and I will be walking you through our test today. Our goal here is to test our product for the redland museum, in hopes to either improve or solidify our work that has been done. Honest feedback is greatly appreciated whether that be positive or negative. Please follow the list of task instructions below and answer where appropriate. My job is to help and run you through the tasks that are being conducted here today.

Usability tasks:

Task: Please open the admin portal interface
Question: at first glance, was there anything visual appearing about the website that stood out to you?
PERSON 1 -The thumbnails of the artifacts is the first thing that stood out to me, maybe the redland museum banner at the top of the website as well. The website looks pretty basic so nothing really stood out to me there
PERSON 2 - Red bar with artefacts stands out and was the first thing I saw

Question: by looking at the website, does it look as though it is easy to navigate with the menu bar?
PERSON 1 - Yeah it looks pretty straightforward and easy to navigate if i didn't know what i was looking for.
PERSON 2 - Yep, the side menu is easy to use, and I can navigate anywhere on the site easily.

Question: In terms of the website's colours, do you like the way its colour contrasts look?
PERSON 1 - I don't really like it, it doesn't really match the same vibe for what you are going for. Would much rather see black, white and grey colours
PERSON 2 -The gradient at the top looks old. Which I guess kind of suits the website because its a museum. I don't really know about the website colour contrasts, just seems really basic which really isn't a bad thing.

Task: From an admin standpoint, you are trying to add an artifact to the application but you aren't sure how. Where you currently are, navigate to the menu bar and click the artifact tab and try creating a new artifact and save it.

Question: When entering the artifact tab, would you say that the create button was easily seeable when you first looked?

PERSON 1 - Yeah i found it it straight away on the website when i clicked on the tab, i knew what i was looking for so it didn't take me long to see it
PERSON 2 - Create button was a bit hard to see, older users might have trouble finding it when they are first looking at it.

Question: When clicking on the create button, what did you think of the look of the create artifact page when it was displayed to you?
PERSON 1 - I like its simplicity, straight to the point and looks very clean.
PERSON 2 - The grey shadowing makes the input boxes look like they cannot be used to enter data.

Question: While filling out the text boxes for the artifact, was it easy to navigate and did your descriptions show successfully when it was created?
PERSON 1 - On the first attempt of uploading the thumbnail it didn't work, the descriptions did show successfully. In terms of use, I found it very easy to press all the text boxes and make the artifact.
PERSON 2 - Yes, although I think it should redirect back to the artefact list after creating a new artefact.

Task: If you are new to being an admin, try and add something using any of the tabs on the side board. When creating something add any media (including videos) into the tabs in which they ask for it.

Question: When navigating the website, do you find it easy to seamlessly navigate through tabs? If yes, then why?
PERSON 1 - Yes it was easy, it was straightforward one after the other. I like how it was structured on the side and you have everything there. I felt like each tab was in the best order.
PERSON 2 - Yep, very easy to navigate having all the buttons on the right. Maybe make the back button easier to see

Question: While entering information into the other tabs, which ones did use? Also in relation to the previous task, was the action and feel to creating new entries the same?
PERSON 1 - I used the exhibition tab, i felt like it was the same as the artifacts tab, except in exhibition you had to choose the costs.
PERSON 2 - I created a new store item, which was very easy to use because it was similar to artefacts.

Question: When the media tab was utilized, in your opinion was the media uploading from your computer easy to use? Did you have any problem with the uploads?
PERSON 1 - Yeah it was very easy to use in uploading, it was pretty straightforward in how I did. Unlike the artifacts tab, i was able to upload a picture into the exhibitions tab without any problems
PERSON 2 - Media upload was easy although the first time I uploaded a photo it didn’t save.

Recommendations:

Question: In your interaction with the website portal, would you recommend anything be changed in terms of the website's looks (colours, fonts ect) or something to do with the website it laid out?

PERSON 1 - I feel like the whole colour scheme could be changed to look better, the white could be changed to look better in my opinion where the information to be changed. I like the labeling of everything as you can see everything clearly. The layout looks boring, there is a lot of waste of space, categories could be a bit larger, the wording could be a bit larger.

PERSON 2 - · **Colouring of the grid doesn't match well with the rest of the website**
- **Buttons above grid should be more visible**
- **Gradient at the top is very old school**
- **Dont think the refresh button adds any value when browsers have that feature**
- **Possibly add a home page, bit confusing when I log in and it takes me straight to artefacts.**

5.8.2 Codebase 2

Hello, (insert name here) thank you for participation in this usability test today, honest feedback is greatly appreciated whether that be positive or negative. Please follow the list of task instructions below and answer where appropriate.

Usability tasks:

Task: Please go to the artefact tab

Question: at first glance, was there anything that visually stood out about the application?
PERSON 1 - The first thing I noticed was the harsh colours on the home tab and then the bottom navigation bar
PERSON 2 - The nice background colour is the first thing that stood out to me and the bottom bar icons

Question: by looking at the application, does it look as though it is easy to navigate with the bottom navigation bar?
PERSON 1 - The navigation bar is nice and I feel like it is easy to understand.
PERSON 2 - The navigation bar could have a bit more contrast to signify what tab is selected.

Question: is the application's colour scheme visually appealing?

PERSON 1 - The application's colours seem outdated as I haven't really seen the red and yellow in an application in a long time.
PERSON 2 - I like how the colour scheme matches the logo, it seems like an application fit for its purpose.

Task: from a customer perspective, you are trying to view an exhibition but you aren't sure how. Where you currently are, navigate the bottom bar and click the exhibition tab and try tapping on one of the exhibitions in the list.

Question: When entering the exhibition tab, would you say that it was clear that you had to touch on one of the exhibitions in order to see it in more detail?
PERSON 1 - Yes, it was clear to me because of the scrollable list; ***PERSON 2 -*** Yes.

Question: When tapping on the exhibition, what did you think of the look of the exhibition details page when it was displayed to you?
PERSON 1 - I wish it was a bit more interactive, the details look a bit bare
PERSON 2 - I feel like I wouldn't look at this page much as the touring functionality is already enough for me with regard to the application

Question: While scrolling through the details of the exhibition, was the layout of information clear? How would you improve it?
PERSON 1 - There is little information to begin with so I think that the layout of information is fine
PERSON 2 - The layout of information was clear although maybe I would add a bit more padding so it is more readable.

Task: Navigate back to the home tab and click on the start tour. Make sure that you have your appropriate permissions enabled as per the "enable touring permissions" button.

Question: Does the application make it clear to you that location permissions are necessary?
PERSON 1 - The home page does a good job at highlighting the appropriate button although maybe the colours are a bit too harsh.
PERSON 2 - Yes, as long as it asks when the application begins I don't think users should be confused.

Question: Do you think that the layout of this touring functionality is confusing? How would you improve it?
PERSON 1 - It is a little hard to understand because there's no instruction preamble before you get right into it but I think that it should be fine as an autonomous experience.
PERSON 2 - No, the map is front and center and videos show whenever necessary. It is minimal and requires no intervention.

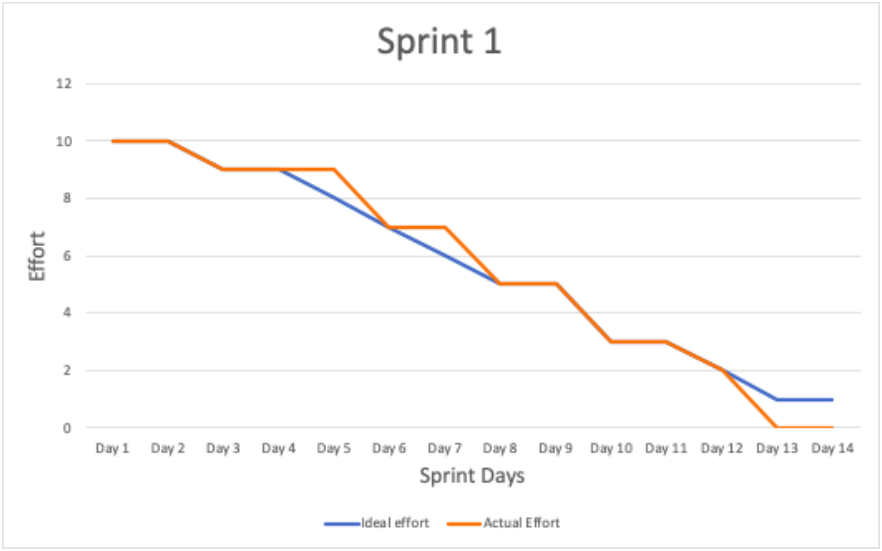
Question: When panning the map around, did it feel natural?

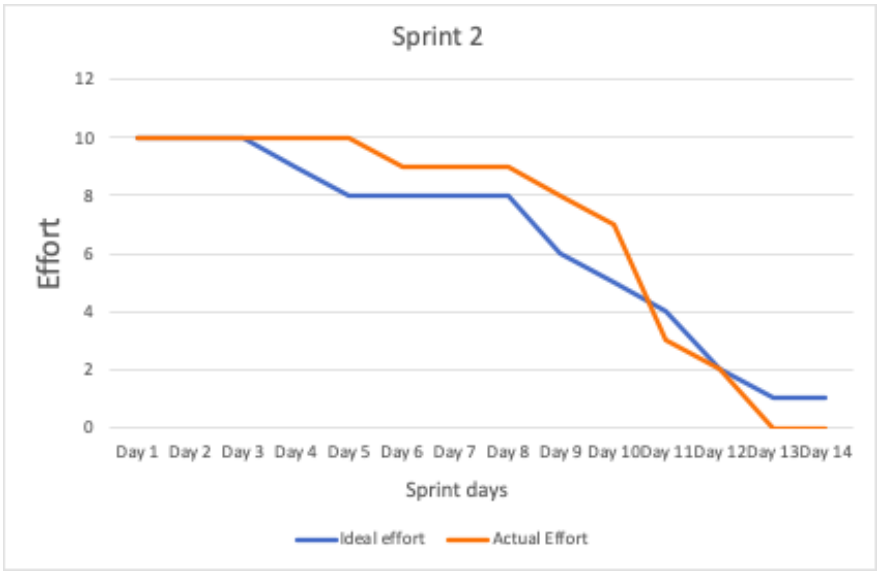
PERSON 1 - Yes it felt like I was using google maps but for a landscape map that didn't go on forever, I wish there was a way to reset the zoom though especially when I play with it and it gets too small.
PERSON 2 - I liked it.

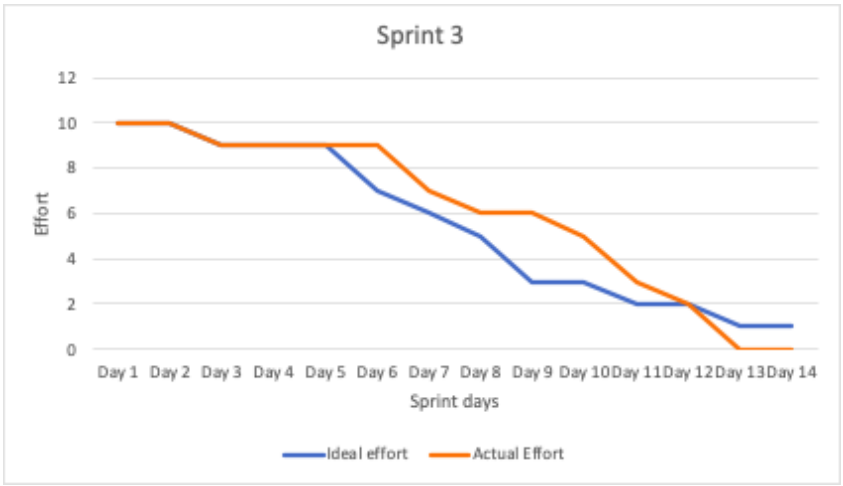
Question: When the pop up menu shows a video to you, was it jarring or did it feel natural?
PERSON 1 - Yes because at first I didn't know what it actually was or what it was indicating. Some kind of countdown to playing it would help. Honestly I feel the video pooping up out of thin air is just weird. An animation to ease me into it would be cool.
PERSON 2 - No it was fine, the video was a bit too loud though.

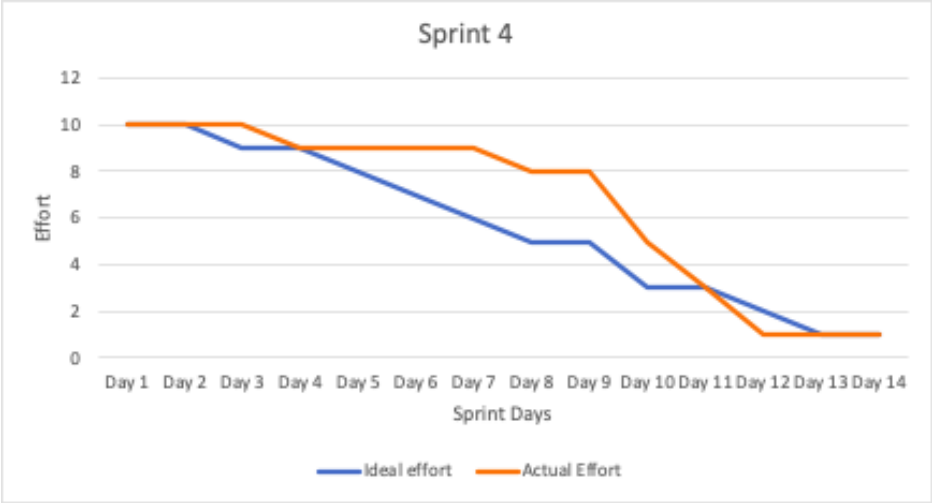
Question: In your interaction with the application, would you recommend anything be changed in terms of the application's looks (colours, fonts etc.) or something to do with the structure of the application and its navigation?
PERSON 1 - For me personally, I wasn't a big fan of the colour scheme but the application does serve its purpose and I think it's a nice extra addition to the museum experience as an option to look at if I want to consume more information about the application.
PERSON 2 - I liked the application as I feel like it ties the museum's general vibe together into one application. I don't have much recommendations-wise but I think that maybe the bottom bar needs to be more prominent in terms of its graphical design.

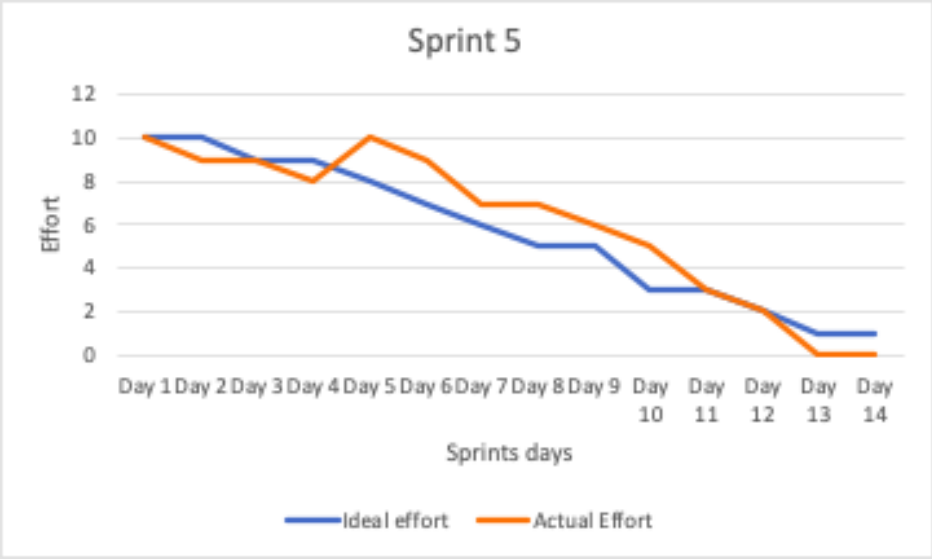
5.9 Burndown Charts

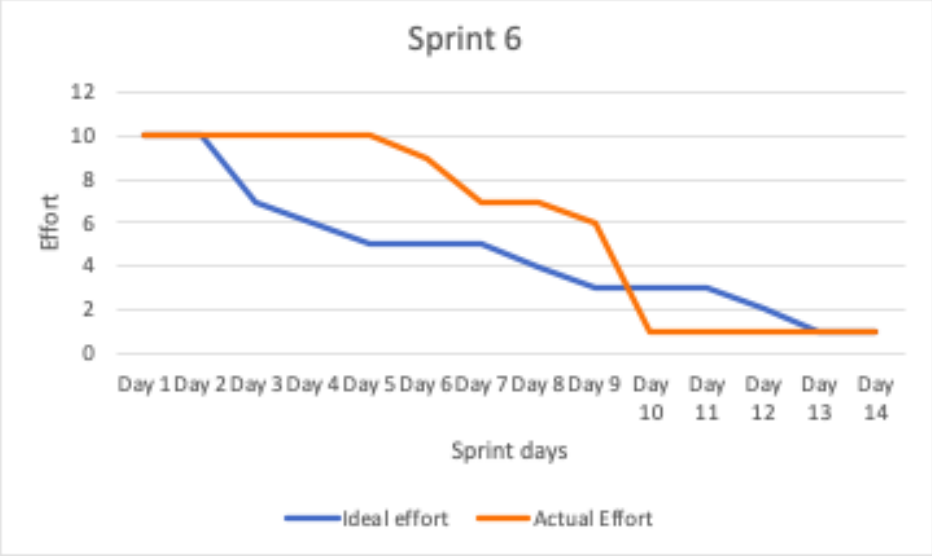







Sprint 4
12
10
8
6
4
2
0
Effort
Day 1 Day 2 Day 3 Day 4 Day 5 Day 6 Day 7 Day 8 Day 9 Day 10 Day 11 Day 12 Day 13 Day 14
Sprint Days
Ideal effort
Actual Effort


Sprint 5
12
10
8
6
4
2
0
Effort
Day 1 Day 2 Day 3 Day 4 Day 5 Day 6 Day 7 Day 8 Day 9 Day 10 Day 11 Day 12 Day 13 Day 14
Sprints days
Ideal effort
Actual Effort


Sprint 6
12
10
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Effort
Day 1 Day 2 Day 3 Day 4 Day 5 Day 6 Day 7 Day 8 Day 9 Day 10 Day 11 Day 12 Day 13 Day 14
Sprint days
Ideal effort
Actual Effort

5.10 Risk assessment table

Risks		Likelihood (1-5)	Consequences (1-5)	Overall risk (1-25)	Risk level
R1	The media handling are not compatible with code bases	4	5	20	Extreme Risk
R2	Future progression will cause decreasing velocity of work	4	4	16	High Risk
R3	Coding technology will be increasing incompatible with future technologies	3	5	15	High Risk
R4	The codebase technology will cause future problems for future teams	4	4	16	High Risk
R5	Project owner will be unsatisfied with work done	4	5	20	Extreme Risk