Comparative Analysis of Static and Interactive Form Design

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DL836 BSc (Hons) in Creative Computing

Abstract

The aim of this project was to conduct a comparative study on user experience and engagement on static and interactive form design. The web application for this study was developed using ReactJS, a JavaScript library and React Bootstrap, a JavaScript framework built for React. The purpose of this study is to examine if interactive design improves user experience and time to complete a form. The steps involved in the development of the application were finding an existing form to use for the layout, creating static and interactive versions of the design and hosting the finished application. Functional testing was carried out throughout and after implementation. The results from the study show no statistical difference was detected in the time taken to complete each form design. Nevertheless, the interactive design was preferred overall by users.

Acknowledgements

I would like to express sincere thanks to my supervisor Cyril, who supported and aided me throughout the project and motivated me to keep on track. Without his guidance I would have been lost and his knowledge provided better writing skills together with a beginner understanding of statistical reasoning.

Lastly, I would like to thank the users who took part in this study as without them this project would be incomplete.

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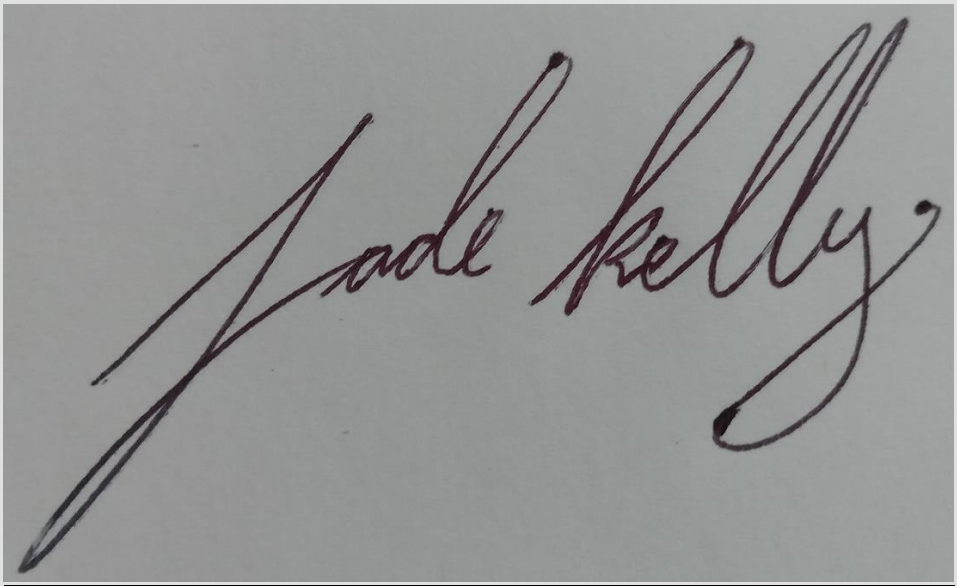

Failure to complete and submit this form may lead to an investigation into your work.

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1 Introduction

This project's overall aim was to conduct a comparative study on static and interactive form design. This was done by using ReactJS and React Bootstrap to create a web application with both form designs. Users then took part in the study by filling out a survey and completing the forms. This style of testing is called a same participant design. The time users took to complete each form was recorded and a test statistic was calculated to see if there is a statistical difference between the time taken to complete each form design. Users also answered questions of preference about the designs in the survey. The SCRUM methodology was used throughout the project.

The requirements chapter discusses the research completed for the study. Interviews and a survey were conducted, and existing applications were examined to help shape the requirements for the study and form designs. The design chapter discusses how the study will be conducted, the program design and the design process for the user interface of the web application. The implementation chapter discusses the SCRUM methodology applied to the project and what was completed in each sprint. The testing chapter shows the results of the functional testing and the user testing for the study. The results of the study are also examined in the testing chapter.

2 Research

A literature review (see **Appendix A**) was written for a different module on the topic of developing an interactive web application and has been repurposed and used as research for this project.

3 Requirements

3.1 Introduction

This project will involve conducting a comparative study between static and interactive design on forms. This will be developed using ReactJS. Users will be asked to complete each form design; they will be timed on how long they take to complete each form and then fill out a

survey. The study should be done on different demographics to see which ones prefer which design and how the user experience differs based on tech exposure and other variables.

3.2 Requirements gathering

3.2.1 Similar applications

3.2.1.1 Chill Home Insurance Form

https://www.chill.ie/home-insurance/

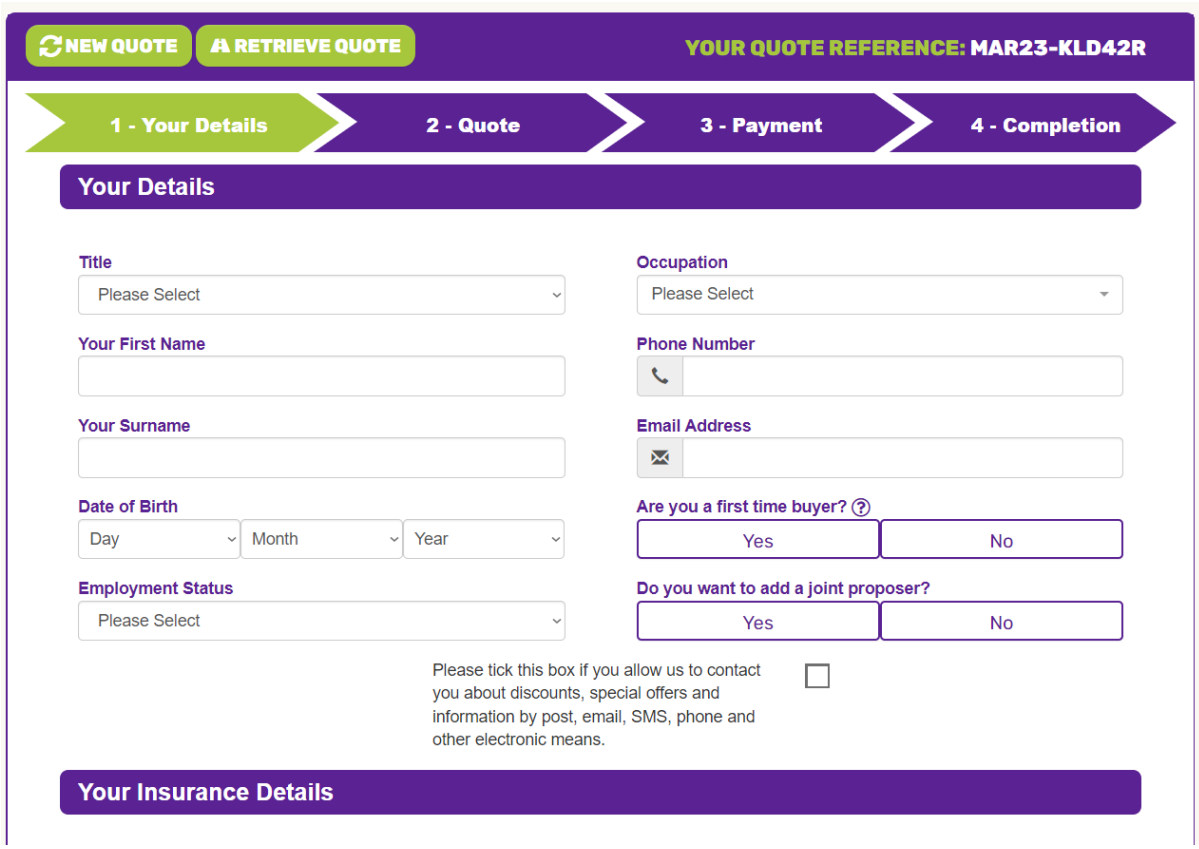


Figure 1 Chill home insurance form. Retrieved from https://www.chill.ie/home-insurance/

This form has sections that are aligned vertically. It also has inputs displaying side by side.

other electronic means.

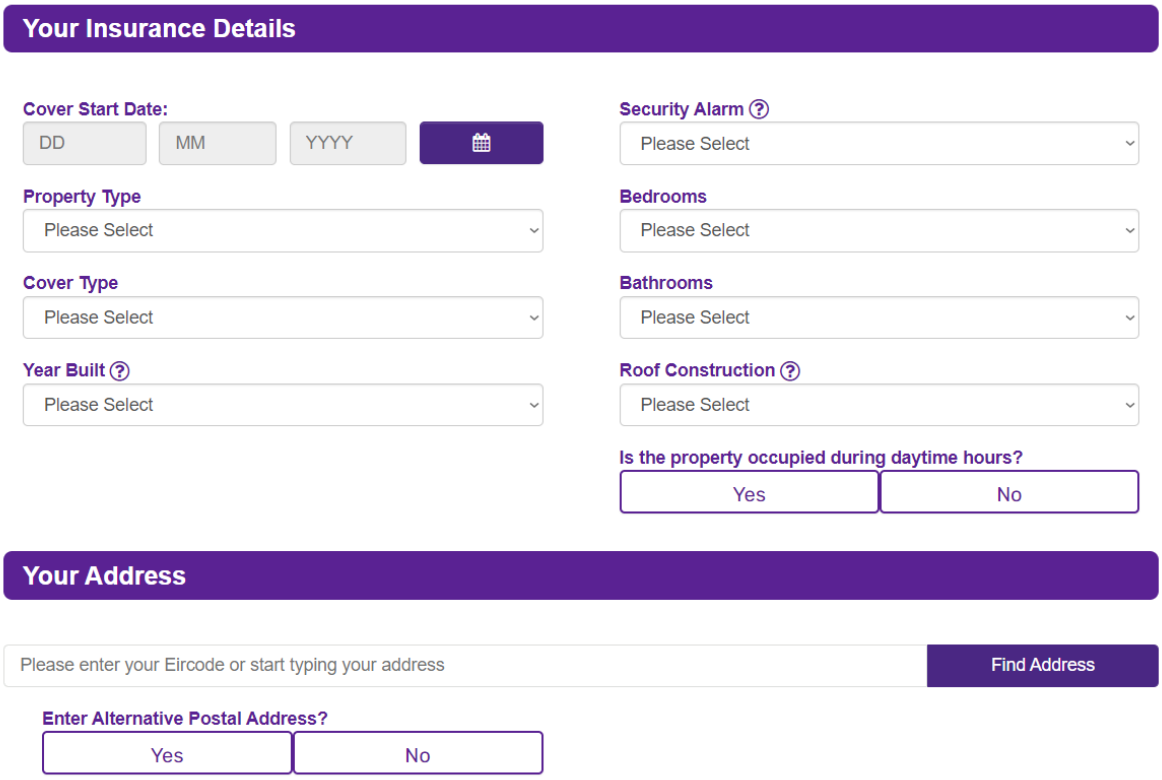


Figure 2 Chill home insurance form. Retrieved from https://www.chill.ie/home-insurance/

The cover start date uses a calendar while in the above section in figure 1 uses dropdown selection for the date of birth. There is a lot of use of dropdown selection for this section of the form. The address is an autofill input.

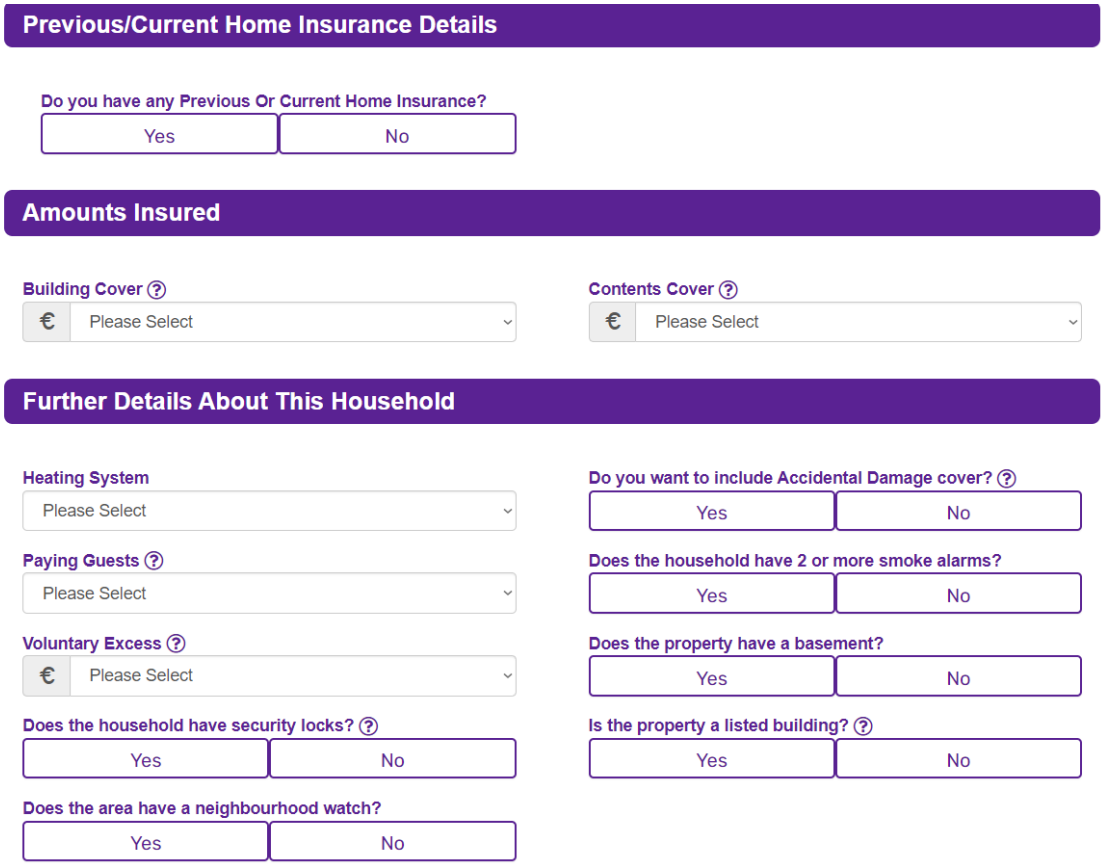


Figure 3 Chill home insurance form. Retrieved from https://www.chill.ie/home-insurance/

Instead of text fields for the cover price it is a selection input.

Advantages

- Use of selection inputs makes it easier for the user to fill out the form.
- The form is divided into sections making it less overwhelming.

Disadvantages

- The layout of the inputs is crowded.

3.2.1.2 AIG Home Insurance Form

https://www.aig.ie/insurance/home-insurance

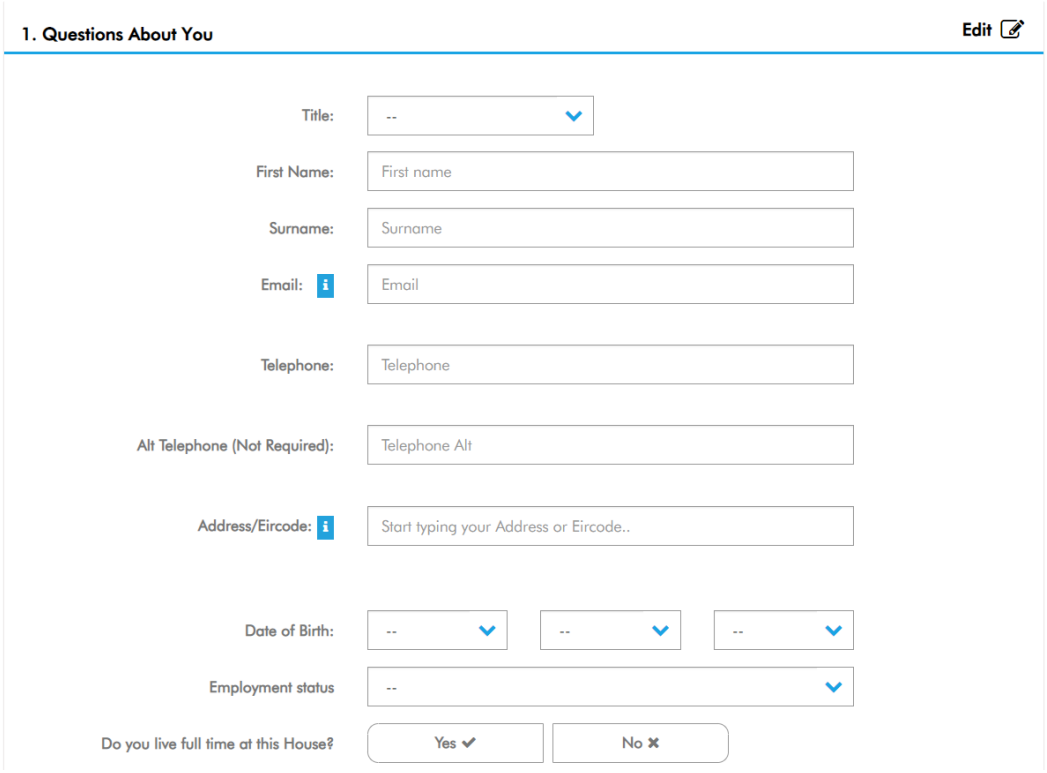


Figure 4 AIG home insurance form. Retrieved from https://www.aig.ie/insurance/home-insurance

The inputs are all aligned vertically. The date of birth uses dropdown selection.

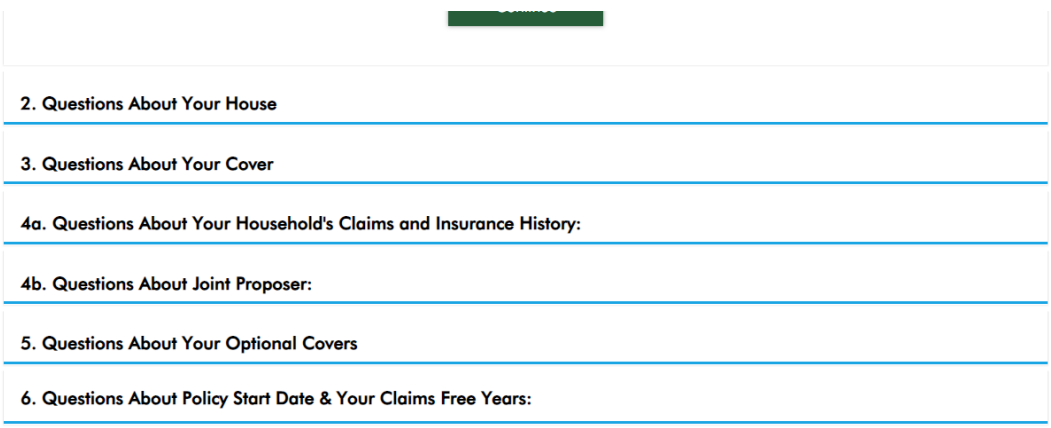


Figure 5 AIG home insurance form. Retrieved from https://www.aig.ie/insurance/home-insurance

The form uses a multistep layout where you must complete a section before moving onto the next. You can see all the sections of the form listed.

Advantages:

- Multi step form allows users to see how much of the form they have left to fill out.
- Inputs being vertically aligned prevents crowding.
- The form is divided into sections making it less overwhelming.

Disadvantages:

- Can’t prepare for what information the form needs ahead of time as the inputs are hidden till you get to that section.

3.2.1.3 Sites Suggested from Survey

Below are two websites that were examined prior to the recommended changes applied to the project after the interim presentation. These were websites suggested in the survey conducted during the requirements stage of the project.

3.2.1.3.1 Basic Site Suggested from Survey

https://ie.rs-online.com/web/

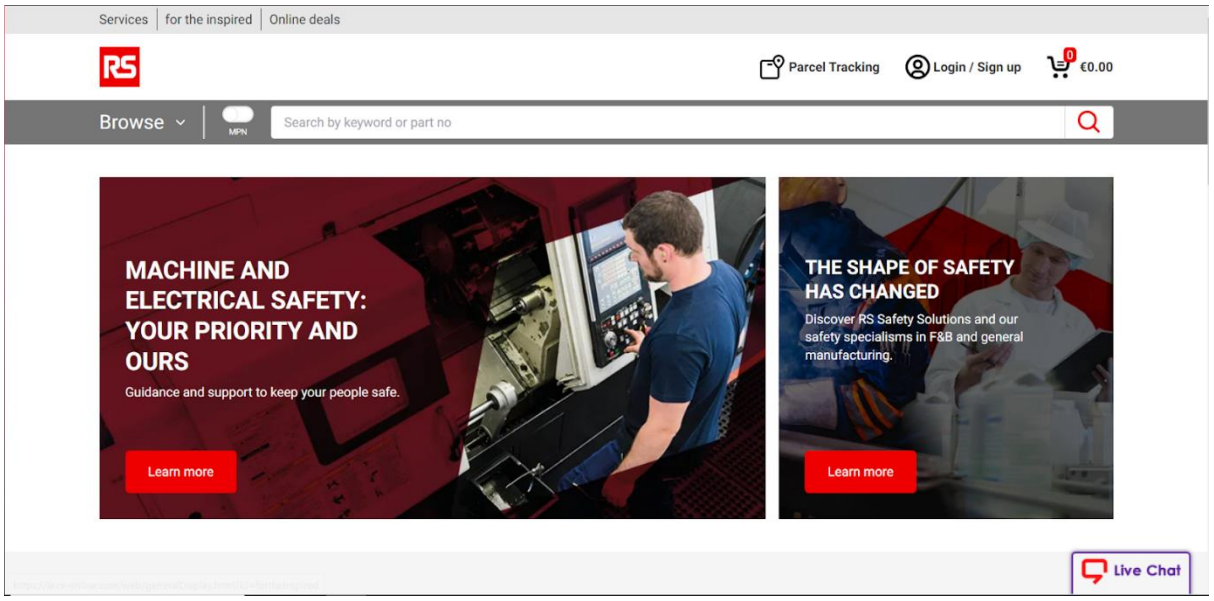


Figure 6 RS Online Homepage. Note. Retrieved from https://ie.rs-online.com/web/

The homepage has two navbars, the top nav has text links with icons and the secondary nav has a large search bar and a dropdown menu.

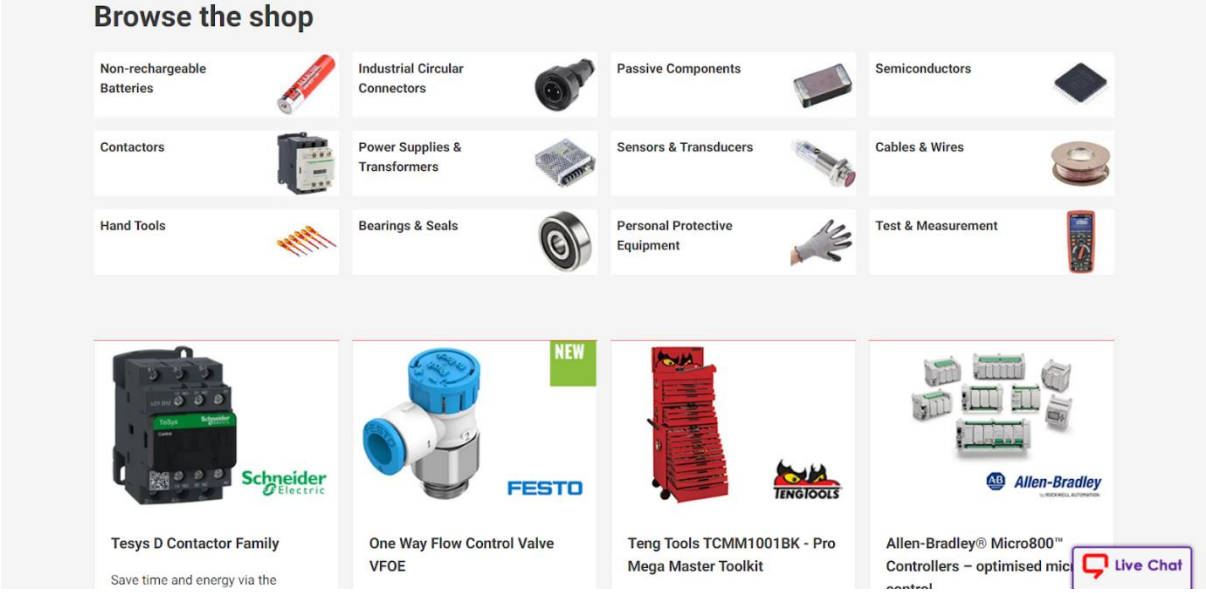


Figure 7 RS Online Homepage cards. Note. Retrieved from https://ie.rs-online.com/web/

Further down the homepage there are assorted styles of cards. There are small cards for product types and larger cards for products.

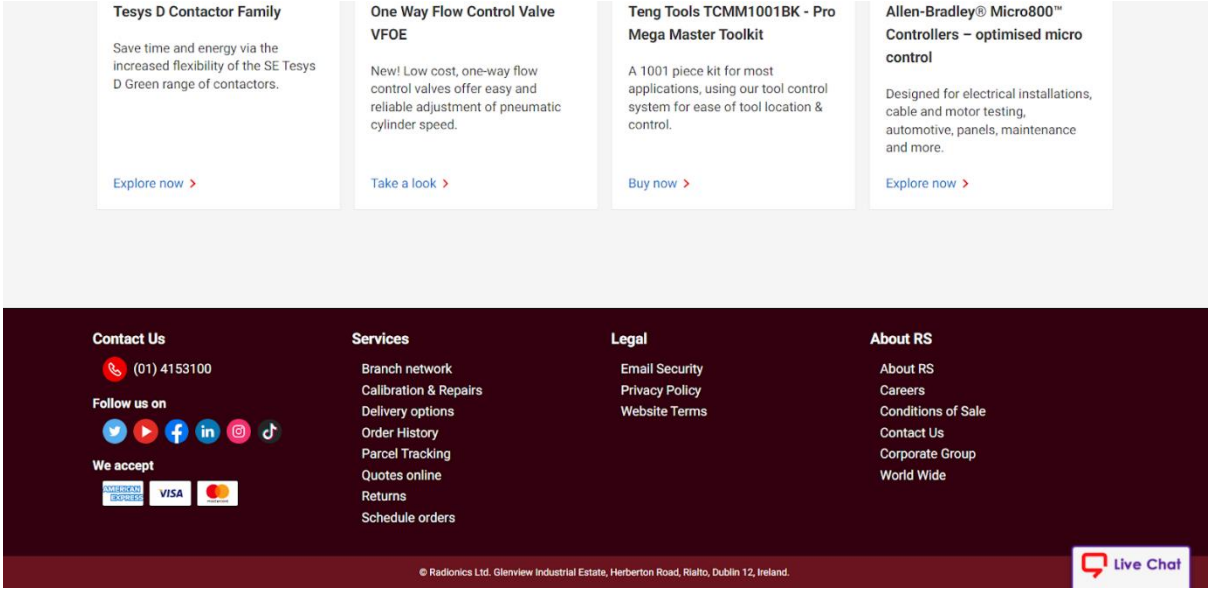


Figure 8 RS Online Footer. Note. Retrieved from https://ie.rs-online.com/web/

The footer has contact details, social icons, what cards they accept and text links.

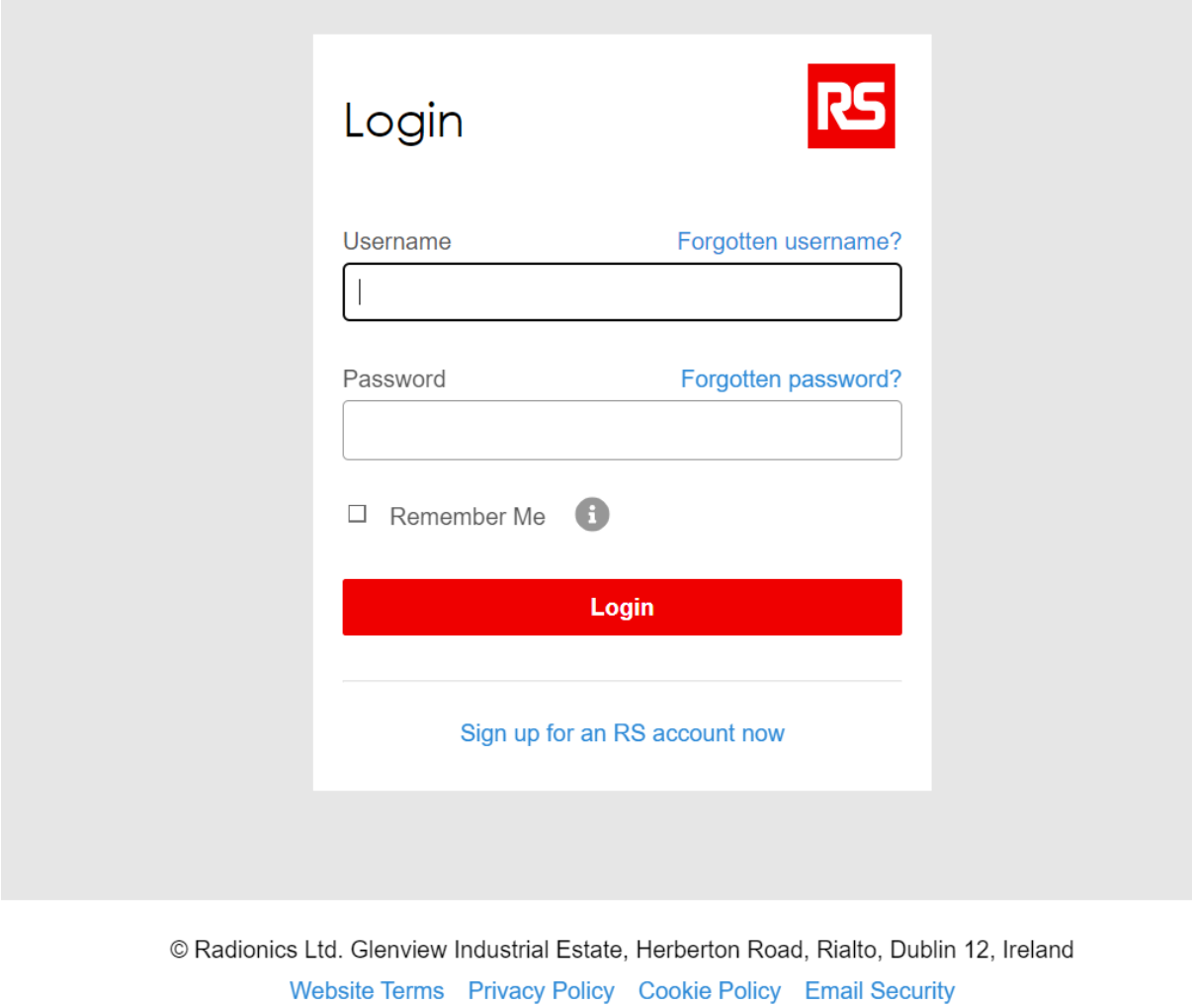


Figure 9 RS Online Login. Note. Retrieved from https://ie.rs-online.com/web/

The login form is simple. There is no navigation on the page so to leave the page you must use the back button on the browser.

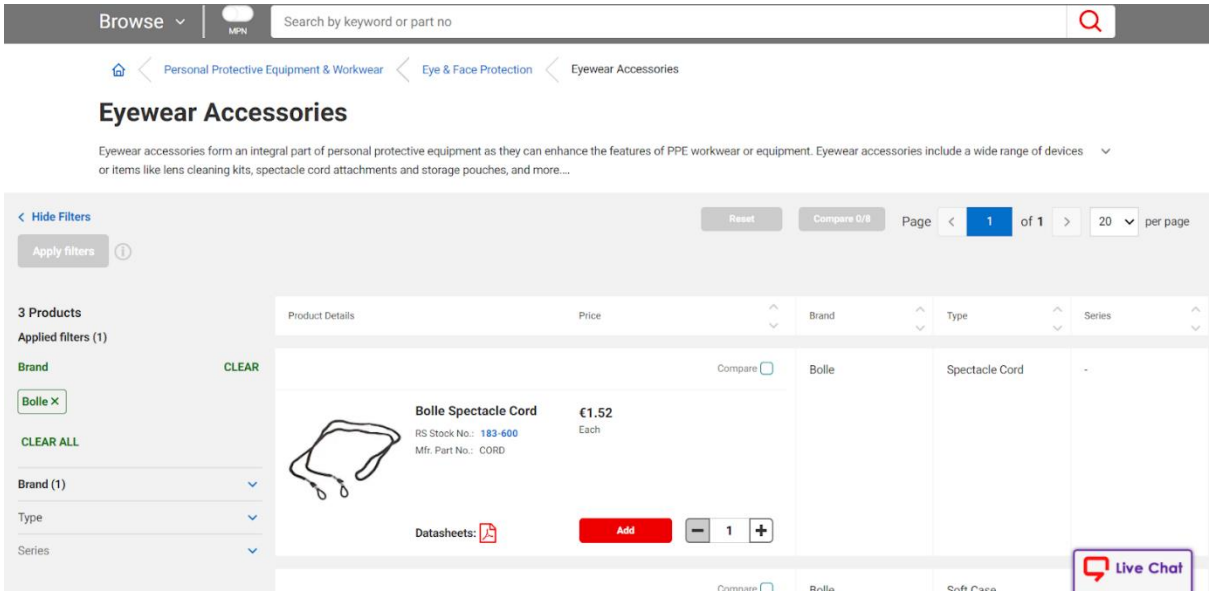


Figure 10 RS Online Products. Note. Retrieved from https://ie.rs-online.com/web/

This is what the products page looks like. The top nav is removed and a sidebar is added for filters. The products are displayed on a table.

Advantages:

- Clear navigation.
- Use of white space makes the site feel less crowded, although it has lots of information.

Disadvantages:

- No navigation on login page.
- The purpose isn't fully clear at first glance, implies it is a service for safety at work but also sells products as well which you see when scrolling down.

3.2.1.3.2 Interactive Site Suggested from Survey

https://maggiestiefvater.com/

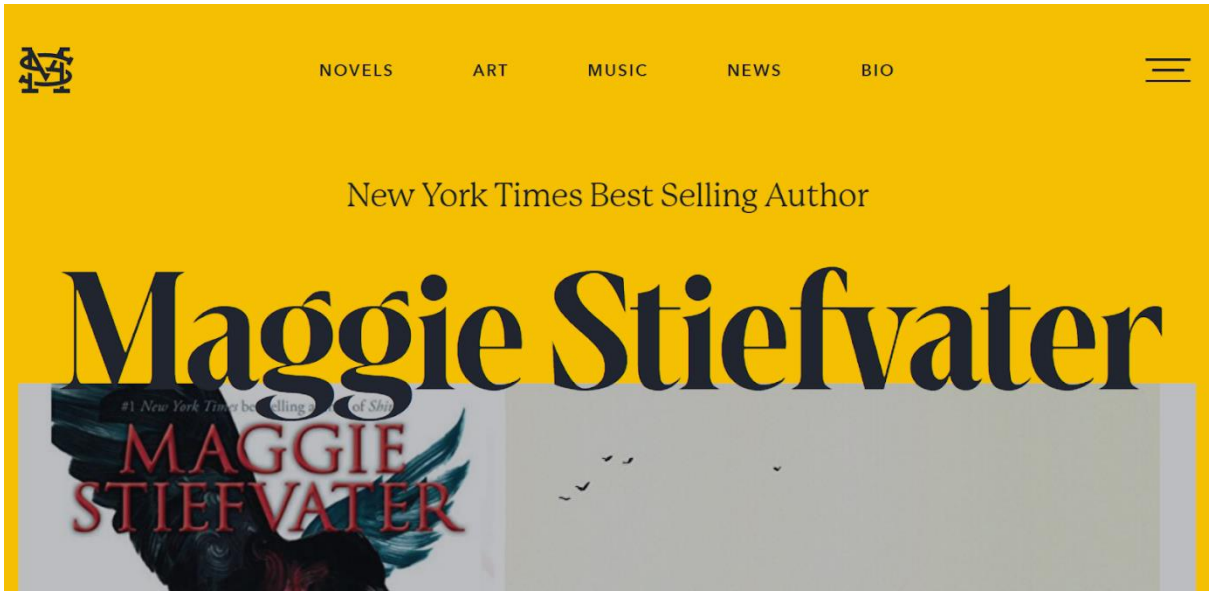


Figure 11 Maggie Stiefvater Homepage Note. Retrieved from https://maggiestiefvater.com/

The homepage has a navbar with text links and a burger menu icon. Homepage has fade animation on load and text is animated.

Figure 12 Maggie Stiefvater Homepage cards. Note. Retrieved from https://maggiestiefvater.com/

When you scroll down on the homepage, we see full image cards that have a hover animation that shows text and a button.

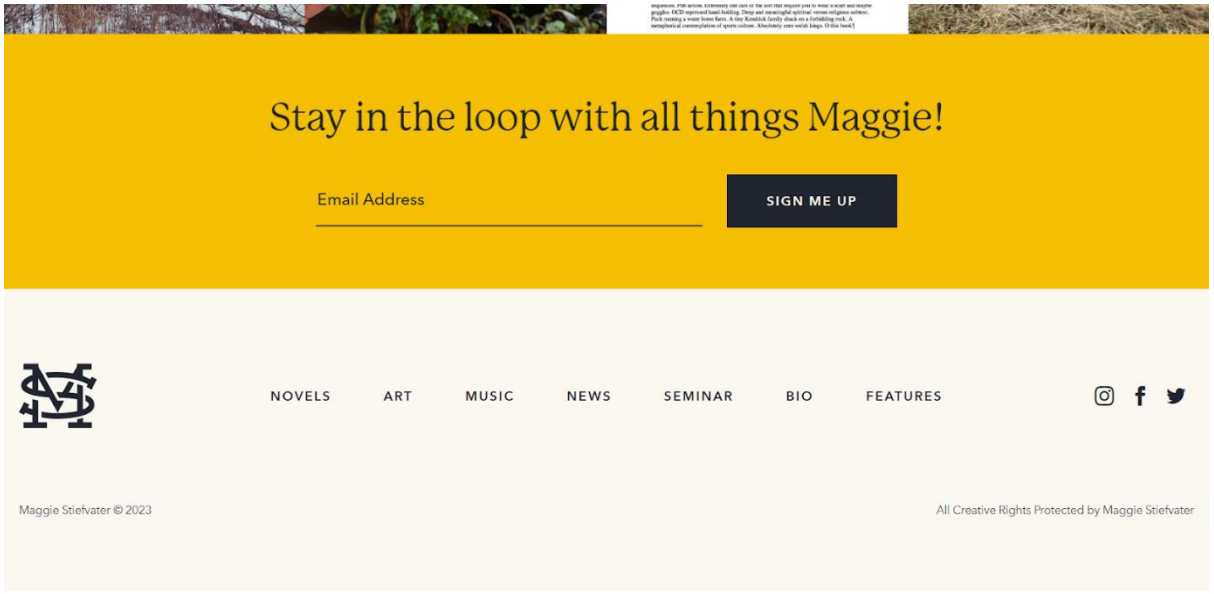


Figure 13 Maggie Stiefvater Footer. Note. Retrieved from https://maggiestiefvater.com/

There is a banner for a newsletter. The footer has text links and social icons.

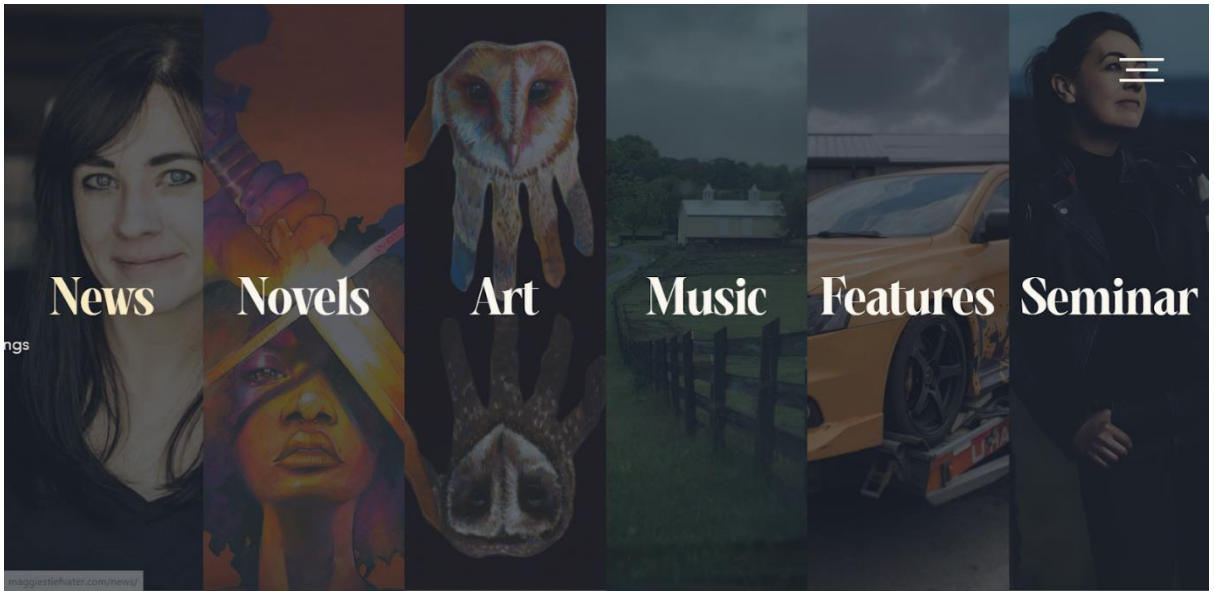


Figure 14 Maggie Stiefvater Navigation. Note. Retrieved from https://maggiestiefvater.com/

The burger menu shows more navigation with images and hover animation.

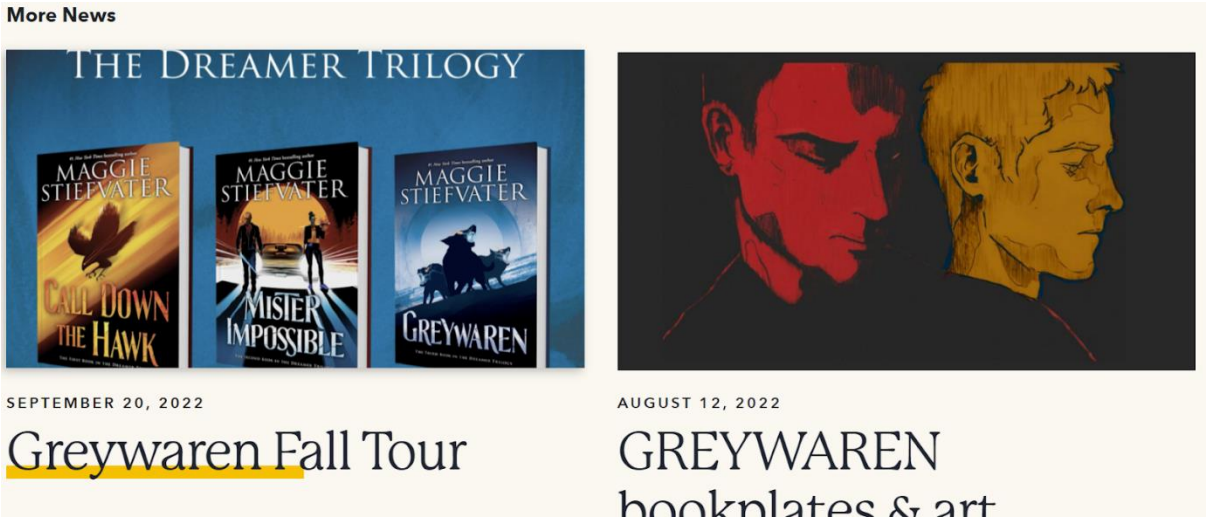


Figure 15 Maggie Stiefvater news page. Note. Retrieved from https://maggiestiefvater.com/

On the news page there are cards with image and text. The text has a hover animation that underlines the text.

Advantages:

- Lots of interactive animations
- Purpose of site is clear at first glance.
- Consistent design and colour palette
- Lots of navigation options
- Loads fast even though there is lots of animation.

Disadvantages:

- There is a lot going on with animations and big images.
- Not sure why the burger menu is used when the two other links could be on the home navbar.

3.2.2 Interviews

Three interviews were conducted where the users were asked to complete tasks on a prototype created in Figma and answer a questionnaire (see **Appendix B**).

The tasks given:

- Task 1: Starting on the basic prototype homepage locate and complete the contact form.
  (You will not be able to fill in the fields so just click submit)
  (Time and navigation method/difficulties will be noted)
- Task 2: Starting on the interactive prototype homepage locate and complete the contact form.
  (You will not be able to fill in the fields so just click through until you click the submit button)
  (Time and navigation method/difficulties will be noted)

The results:

Questions/Tasks	User 1	User 2	User 3
Age Range? (18-24) (25-34) (35-44) (45-54) (55-64) (65 and over)	18-24	55-64	55-64
Occupation? (Employed) (Student) (Student and Employed) (Not Employed) (Prefer not to say)	Employed	Not Employed	Employed
Do you consider yourself 'tech savvy'? (Yes) (No) (Partially) (Unsure) Definition: "well informed about or proficient in the use of modern technology, especially computers."	Considers themselves 'Tech Savvy'	Considers themselves 'Tech Savvy'	Considers themselves 'Tech Savvy'
Task 1 Time	5.99 sec	4.01 sec	15.29sec
Task 1 Notes	Used Navbar to navigate to contact form	Used card to navigate to contact form.	Used card to navigate to contact form. Was a bit confused with the task on the prototype (Wasn't sure if meant to fill in the form).
Task 2 Time	7.22 sec	22.82 sec	12.96sec
Task 2 Notes	Used Card link to navigate to contact form	Used Navbar to navigate to contact form. Was a bit confused with the task on the prototype (Tried to fill in the form).	Used card to navigate to the contact form
Overall, which version of the prototype are you likely to use?	Basic	Basic	Basic. The interactive is more interesting but overall time consuming.
Why?	I would use Basic due to how easy it is to navigate the website quickly and efficiently. This overall saves time	It's more simple	Everything is there in front of you.

	when it's needed most.		
Are there any components/features you can think of that you'd like to be tested like this? (Example: the basic contact form vs. the interactive design contact form)	Locating profile settings or options between basic and interactive.	None.	None.

Conducting the interviews has helped practise and prepare for conducting the study in the testing section. The results also contributed to finalising the design for the web app.

3.2.3 Survey

A quick survey (see **Appendix C**) was created to collect information to help create personas and find the requirements. Here are the relevant results:

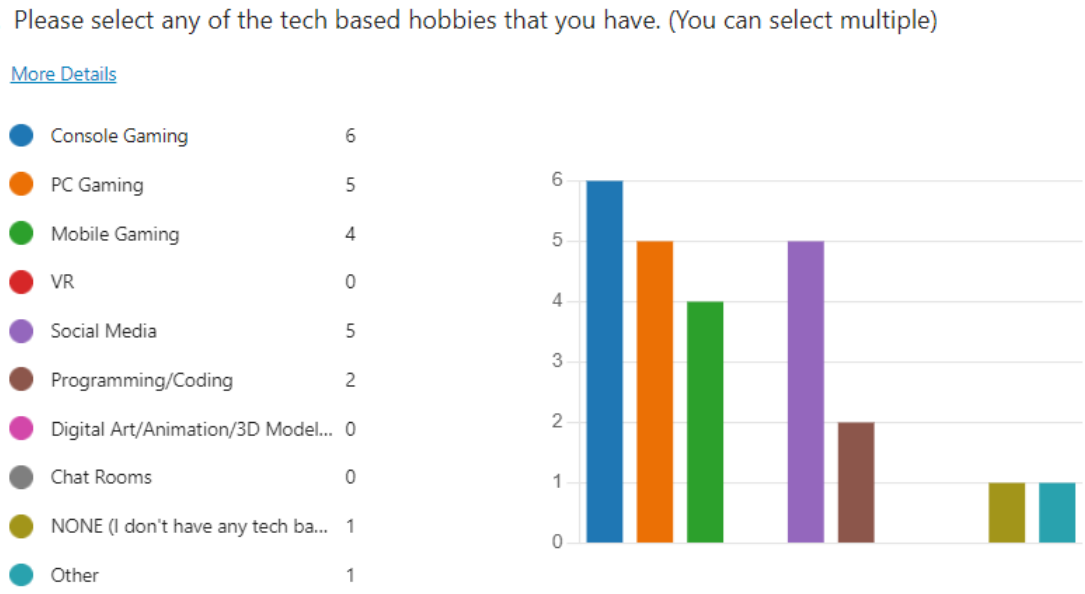


Figure 16 Survey question 5. Note. Survey made with Microsoft Office Forms

Figure 17 EPR homepage Note. Retrieved from https://www.exclusiveprs.info/home

6. Examine the screenshot of the site then fill in the scale below based on the statements. Screenshot taken from https://www.exclusiveprs.info/home

More Details

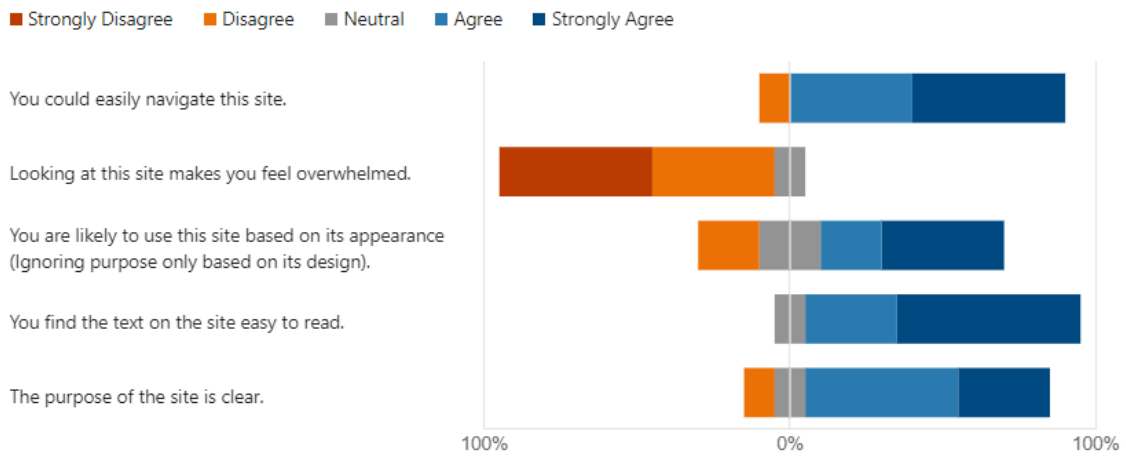


Figure 18 Survey question 6. Note. Survey made with Microsoft Office Forms

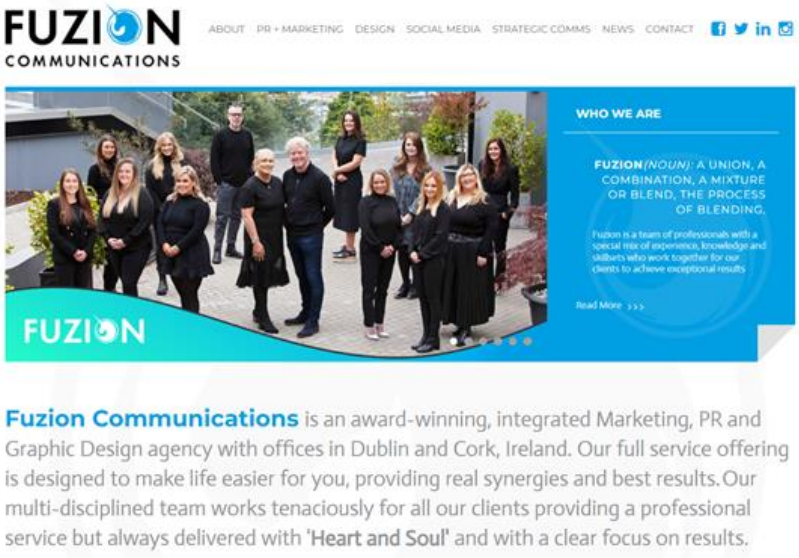


Figure 19 Fuzion homepage Note. Retrieved from https://www.fuzion.ie

8. Examine the screenshot of the site then fill in the scale below based on the statements. Screenshot taken from https://www.fuzion.ie

More Details

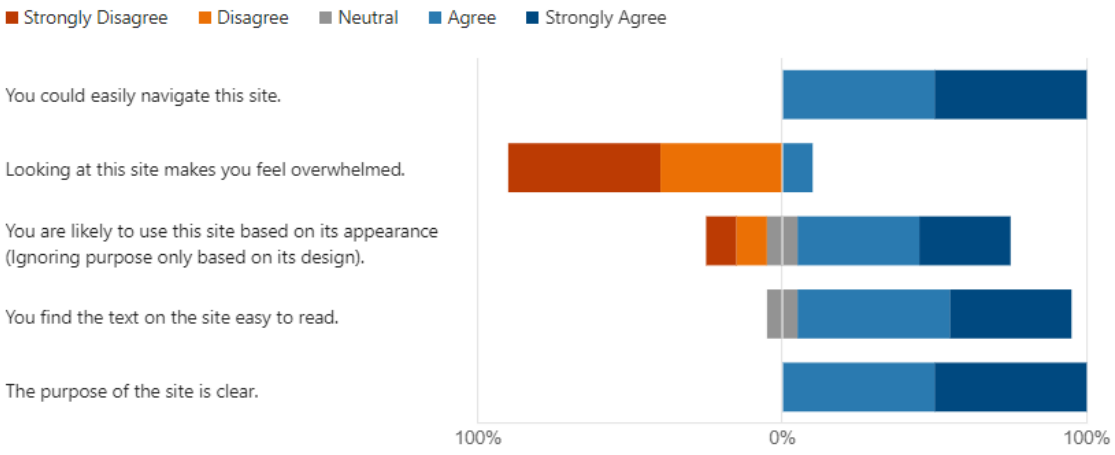


Figure 20 Survey question 8. Note. Survey made with Microsoft Office Forms

10. OPTIONAL: What are some features/functionality on sites you've used or interact with regularly that you believe to be important and should be part of this study? (Example: "...

2 Responses

ID ↑	Name	Responses
1	anonymous	Making search bars clear and easy to see for easy access to different areas of the website
2	anonymous	The scroll wheel on my mouse doesn't work properly, so I think I'd find the first site a bit annoying to navigate, presuming the navigation is a 'scroll snap' type, where you incrementally scroll down the page. I prefer the 'old fashioned' style of the second site's navigation.

Figure 21 Survey question 10. Note. Survey made with Microsoft Office Forms

11. OPTIONAL: If there is a site with a design that you enjoy please feel free to leave the name/link here.

3 Responses

ID ↑	Name	Responses
1	anonymous	amazon
2	anonymous	https://ie.rs-online.com/web/
3	anonymous	https://maggiestiefvater.com/ - I think the navigation on this site is very cool.

Figure 22 Survey question 11. Note. Survey made with Microsoft Office Forms

The results of this survey helped in the requirements modelling. Some of the responses from question 11 shown in figure 22 were used when looking at similar applications.

3.3 Requirements modelling

3.3.1 Personas

Three user personas of the types of users that may take part in the study using the results from the survey were created. For the study, the plan is to have users from different demographics take part.

Figure 23 Young Adult Persona. Note. Created using a Miro template.

Figure 24 Mature Adult Persona. Note. Created using a Miro template.

Figure 25 Tech Adult Persona. Note. Created using a Miro template.

3.3.2 Functional requirements

Due to the app being used in a study and not as a product there are very few functional requirements:

1. User should be able to navigate
2. User should be able to complete the forms
3. Application should be hosted

3.3.3 Non-functional requirements

- Users should be able to navigate between the two designs on the same single page application.
- The application should have good loading speed and no lag.
- The colour palette and style should be consistent between the two designs.

3.3.4 Use Case Diagrams

Due to this project being a comparison study the use case diagram was created to show what is expected of a user taking part to do.

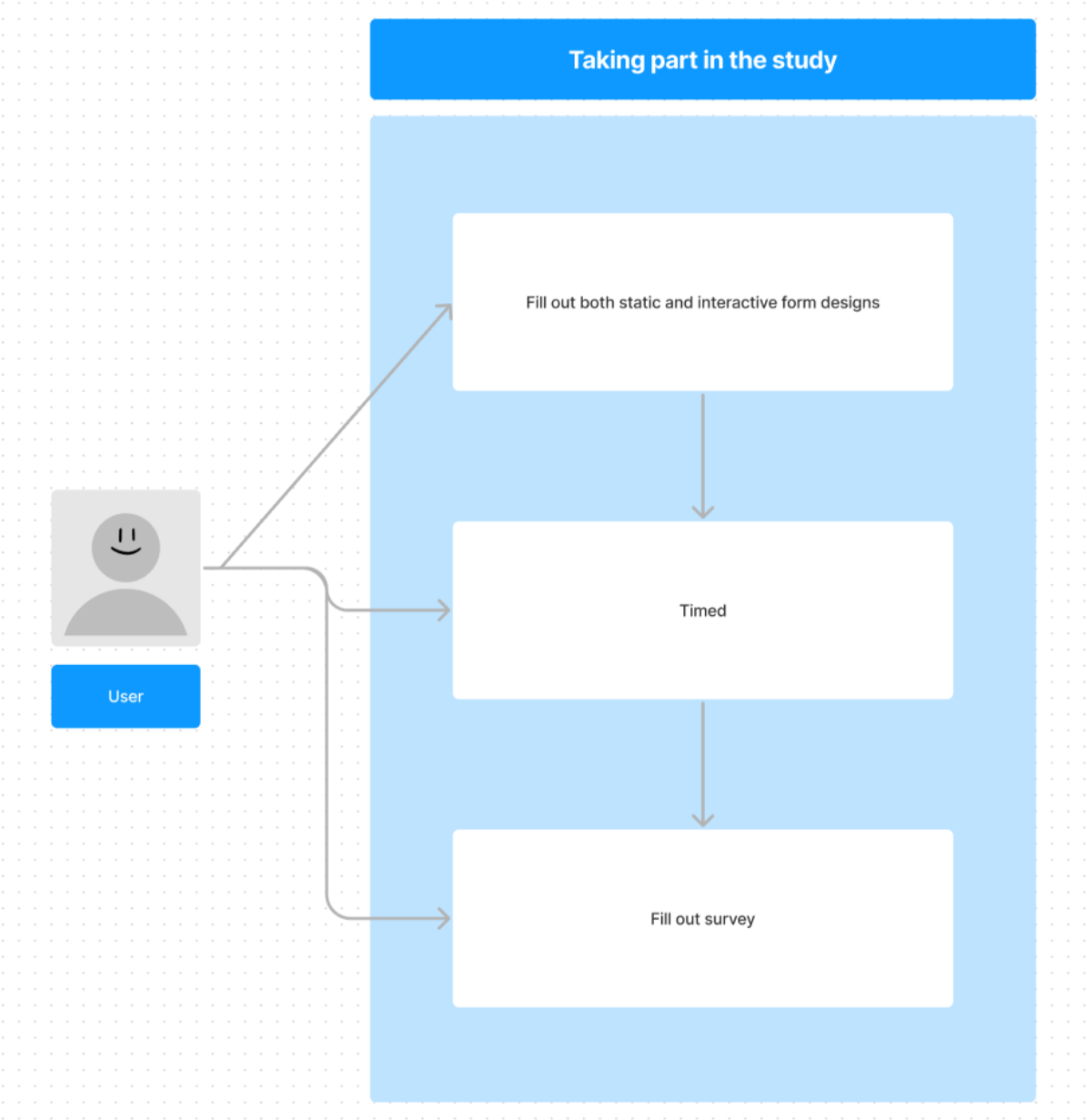


Figure 26 Use Case Diagram. Note. Created using a Figma template.

3.4 Feasibility

This project will use the JavaScript library ReactJS which has been used in a different module previously. There will still have to be further learning done as the writer is stronger in backend development than frontend.

A large part of the project will be user testing. While there is access to users to take part in the study in the college, it will be difficult to get a wide range of demographic variables. Having a good range will be important for the study to see what variables have a significant impact on each design.

3.5 Conclusion

Examining existing static and interactive web applications that have forms have contributed to what components the form designs will have. Conducting interviews with a prototype allowed the writer to test how the study will be conducted during the testing phase and what further requirements were needed. The survey was used in the creation of personas and contributed to further requirements. The personas created assisted understanding of what demographics will be taking part in the study. The use case diagram shows what a user taking part will have to do and what will be recorded. Overall, this project is feasible, but there may be difficulty in getting a range of users to take part.

4 Design

4.1 Introduction

The application for this project is a single page site made with the JavaScript library ReactJS that uses two form designs, one static and one interactive. The forms will be tested by having users completing both designs. The writer will record how long it takes them to complete each form and then the user will complete a survey. The goal of this application is to compare static and interactive design on forms to see which is most efficient in terms of time taken to complete and which form is preferred.

It was decided to use an existing form design. The AXA home insurance form was chosen as it is a good length and straightforward design to apply static and interactive components to. The real AXA form uses interactive elements so for this study a static version was created which then was redesigned with interactivity in mind.

4.2 Program Design

4.2.1 Technologies

The technologies being used to create this application are:

- ReactJS
- React Bootstrap

These technologies were chosen because ReactJS is often used when creating interactive web apps. The writer has some experience with React but could do with understanding the library better so that it can be used in their future career. React bootstrap is a front-end library for React.

Other possible technologies which could have been used were AngularJS or VueJS. The writer has a lot of experience with VueJS, but it is not often used by companies. AngularJS is discontinued so there is little support for it online although it could still be used.

4.2.2 Structure of ReactJS

Below is a diagram of the file structure of this project.

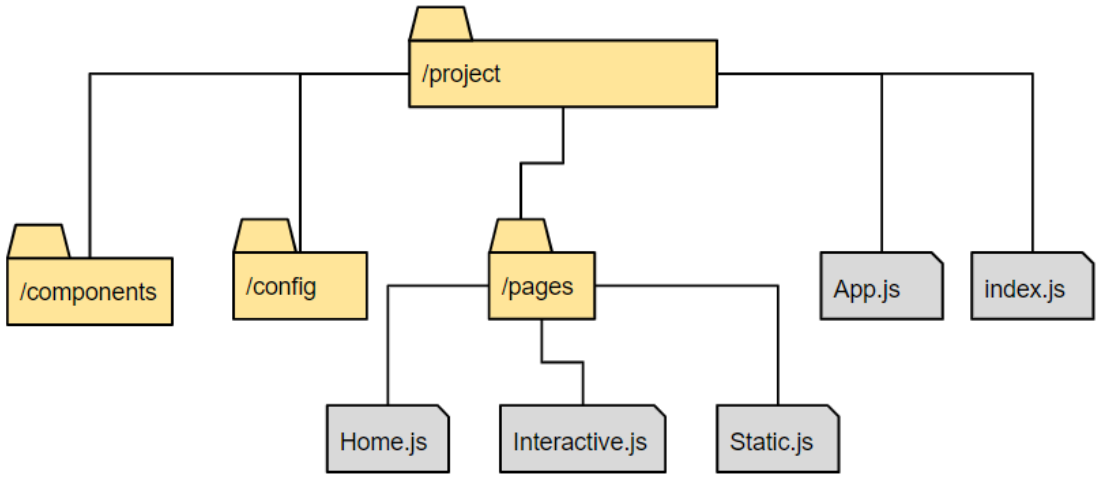


Figure 27 Structure Diagram Note. Created in Google drawing

Inside the main directory there are three folders and two files. The app.js controls the single page navigation using a router. The index.js displays the current page from the App.js. The pages folder will store the pages for the web app. There will be a page for the static form and the interactive form. The components folder will store any reusable components being used on the pages.

4.2.3 Design Patterns

React allows you to split UI elements into independent reusable pieces called components. These are like JavaScript functions.

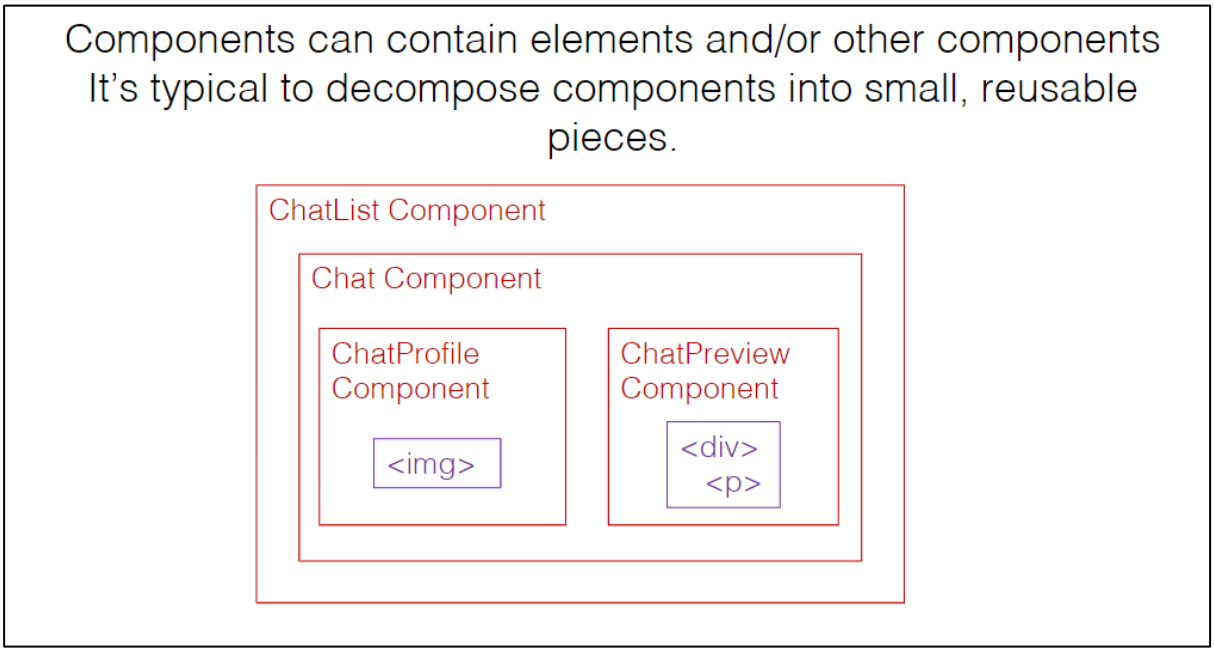


Figure 28 Component Diagram Note. Screenshot from a presentation a lecturer gave on React

The diagram above in figure 28 shows how components can be used in React.

4.2.4 Application architecture

A backend will not be created for this study. Figure 30 below shows how a user taking part will interact with the study.

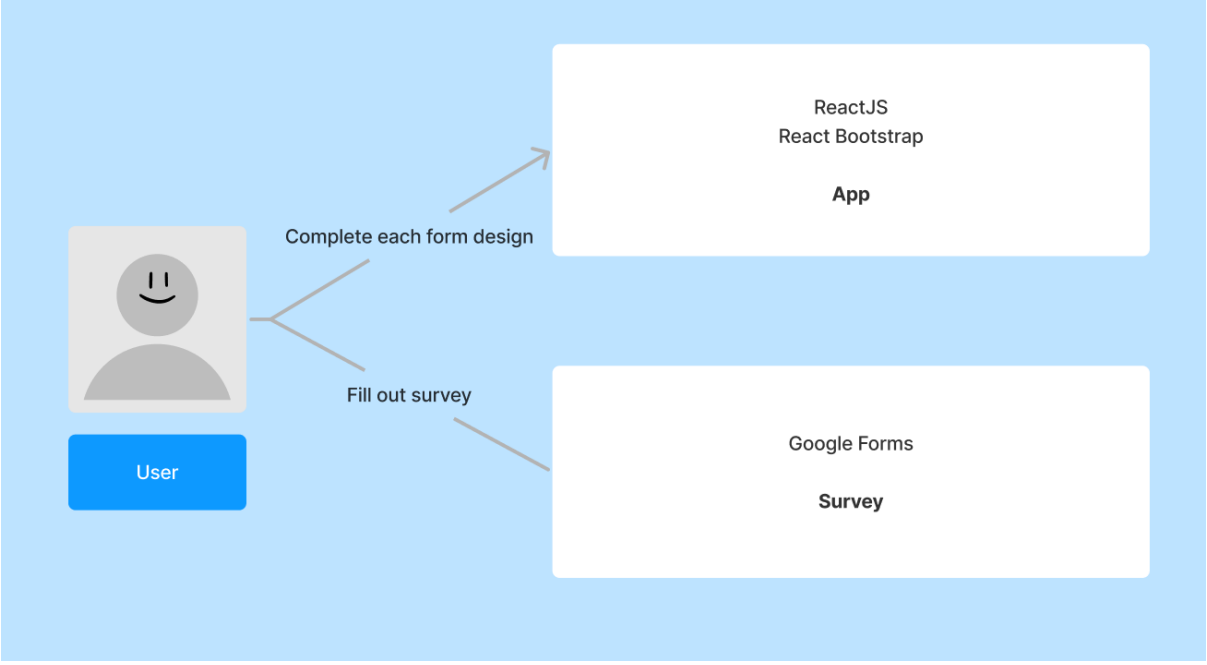


Figure 29 App Architecture. Note. Created using Figma template

As shown above in figure 29 the user will interact with both the web app and a survey. They will complete a form on the web app then fill out relevant questions on the survey for each design.

4.2.5 Process design

The following is a flow chart of what a user taking part in the study will be asked to do.

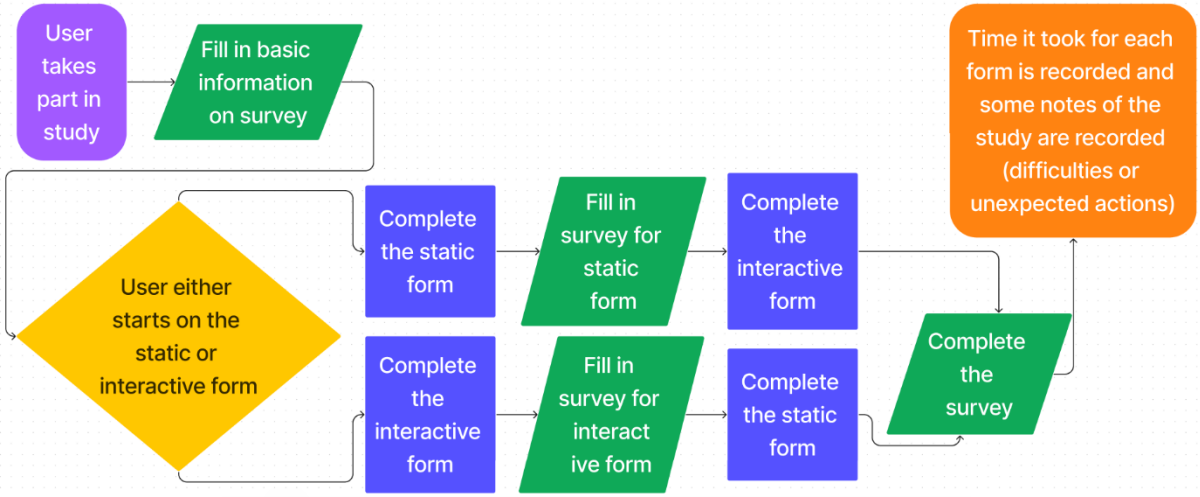


Figure 30 Flow Chart. Note. Created using Figma template.

As shown in figure 30 a user in this study will be randomly assigned the static form or the interactive form first to prevent any learning effect. They start by completing some basic information such as gender, occupation, and exposure to tech. They are told which form to start on and then complete the relevant part of the survey after completing each form. Lastly the time they took to complete each form is recorded.

4.3 User interface design

4.3.1 Wireframe

The original idea for this project was to examine static and interactive design on a whole web app. After a discussion with the supervisor and second reader after the interim presentation the idea was changed to only examine form design using an existing form. Below are some designs and prototypes from the original idea of this project.

The first two wireframes were done on paper. Using these wireframes, a prototype was created in Figma which was used in interviews.

4.3.1.1 Paper Wireframe Version 1

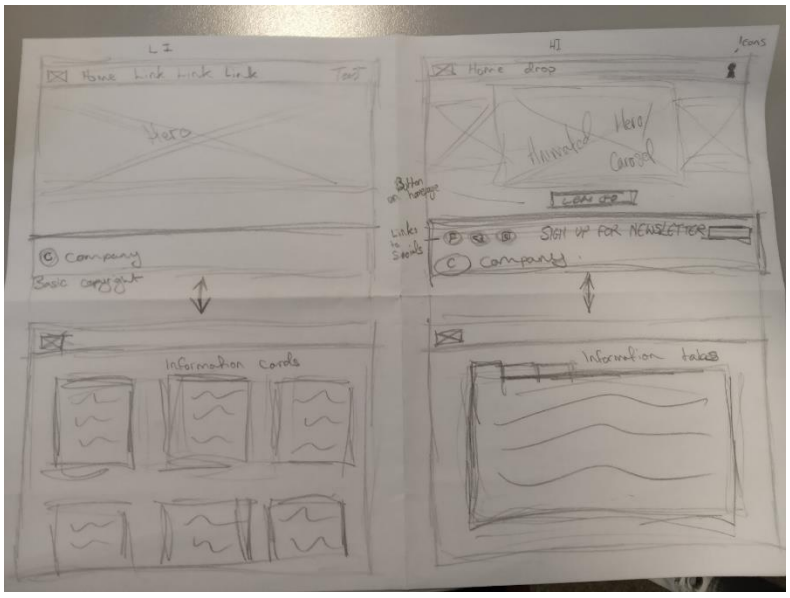


Figure 31 Paper Wireframe 1

Figure 31 shows the original idea for this project of comparing a static and interactive web app.

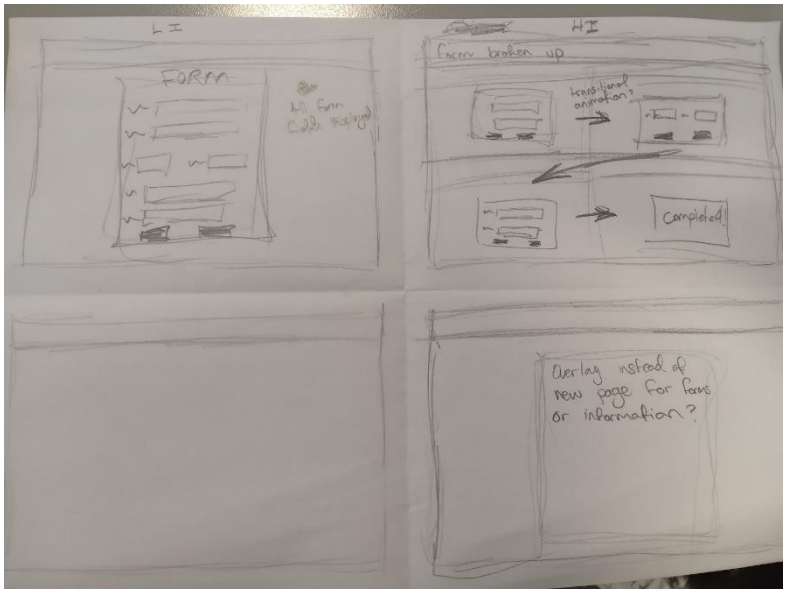


Figure 32 Paper Wireframe 1

Figure 32 shows that while these wireframes were drawn with the original idea in mind, they still shown the thought process of using a form and how to create a static and interactive version of the same form.

4.3.1.2 Paper Wireframe Version 2

Developed further from the earlier paper wireframe.

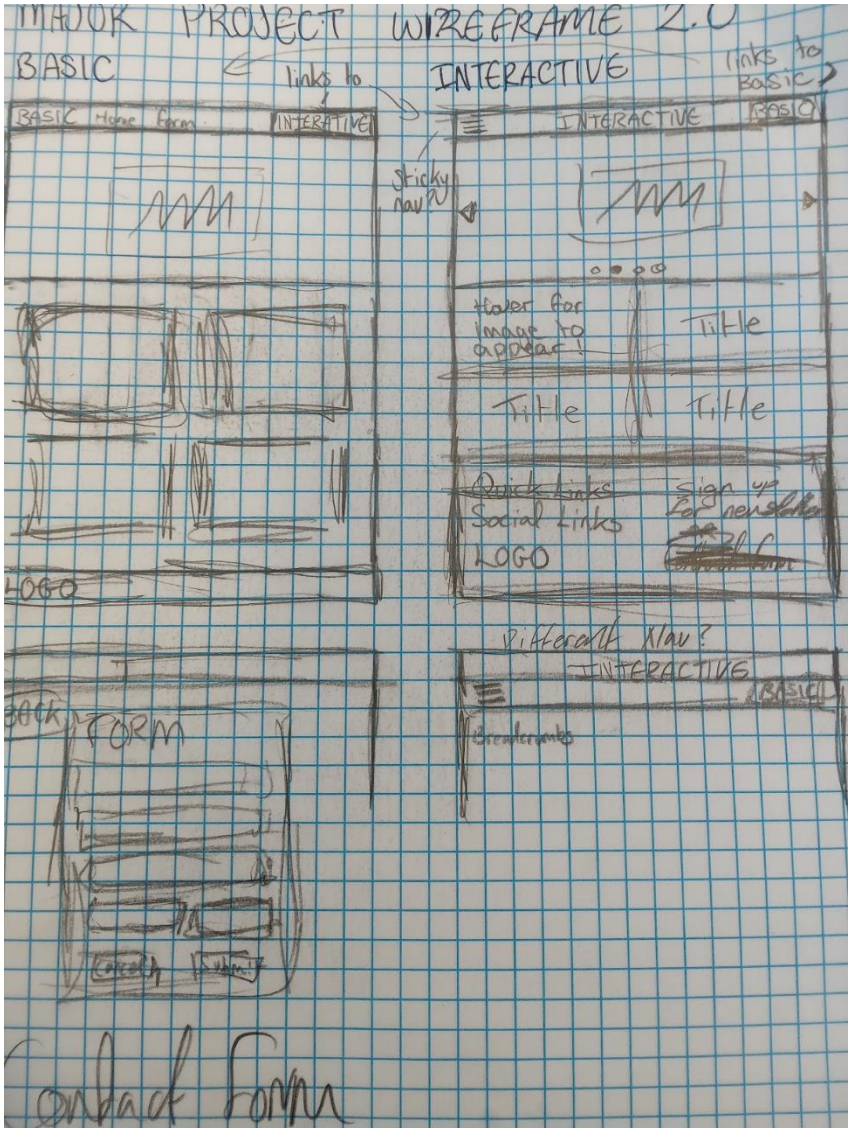


Figure 33 Paper Wireframe 2

Figure 33 shows a more finalised version of the first paper wireframes.

4.3.1.3 Figma Wireframe/Prototype Version 1

Created using Figma and the paper wireframes. This prototype was used during the requirements gathering.

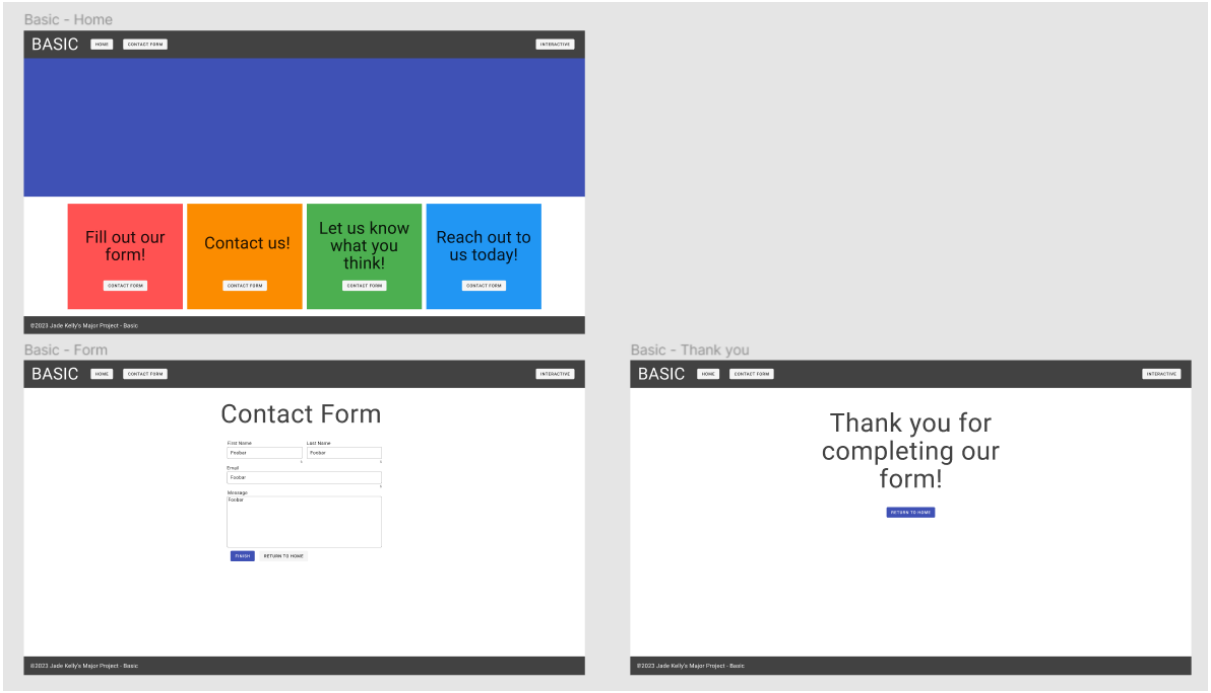


Figure 34 Figma Prototype v1 Static Design

Figure 34 shows the static design in the Figma prototype.

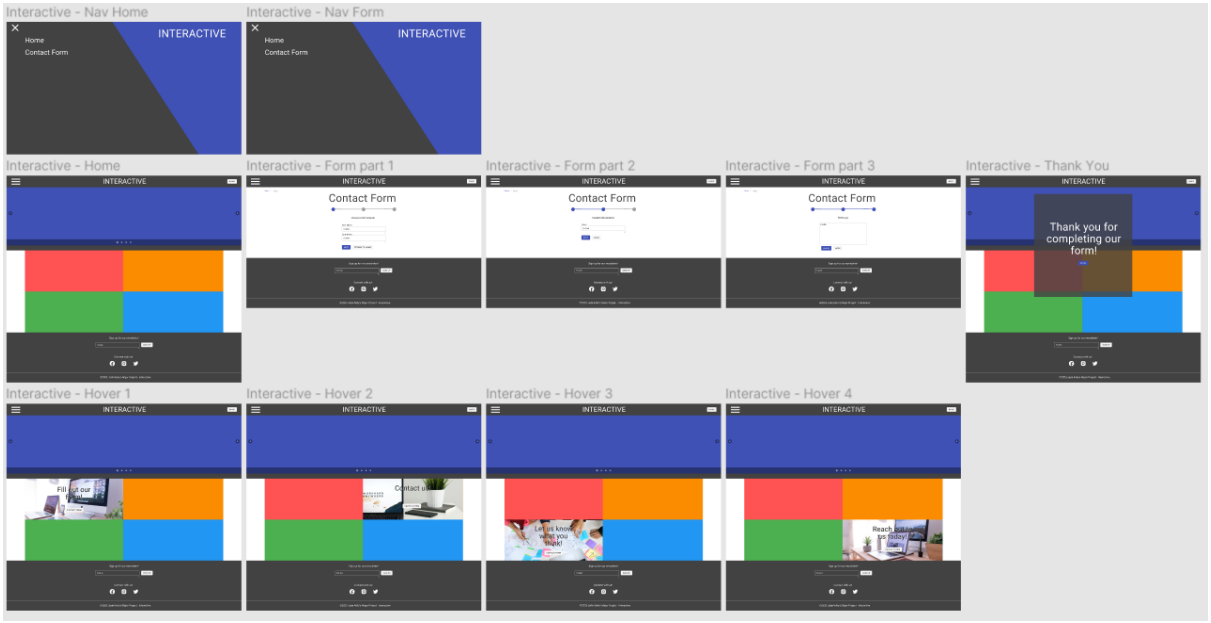


Figure 35 Figma Prototype v1 Interactive Design

Figure 35 shows the interactive design for the prototype. This prototype consists of two web app designs. Here the difference between the forms was starting to show. The form designs used in this prototype went on to help create the static and interactive versions of the AXA home insurance form.

4.3.1.4 *AXA Home insurance form and paper wireframe*

Below is a collection of screenshots of the AXA home insurance form in figure 36. This is the form design that was used for the study.

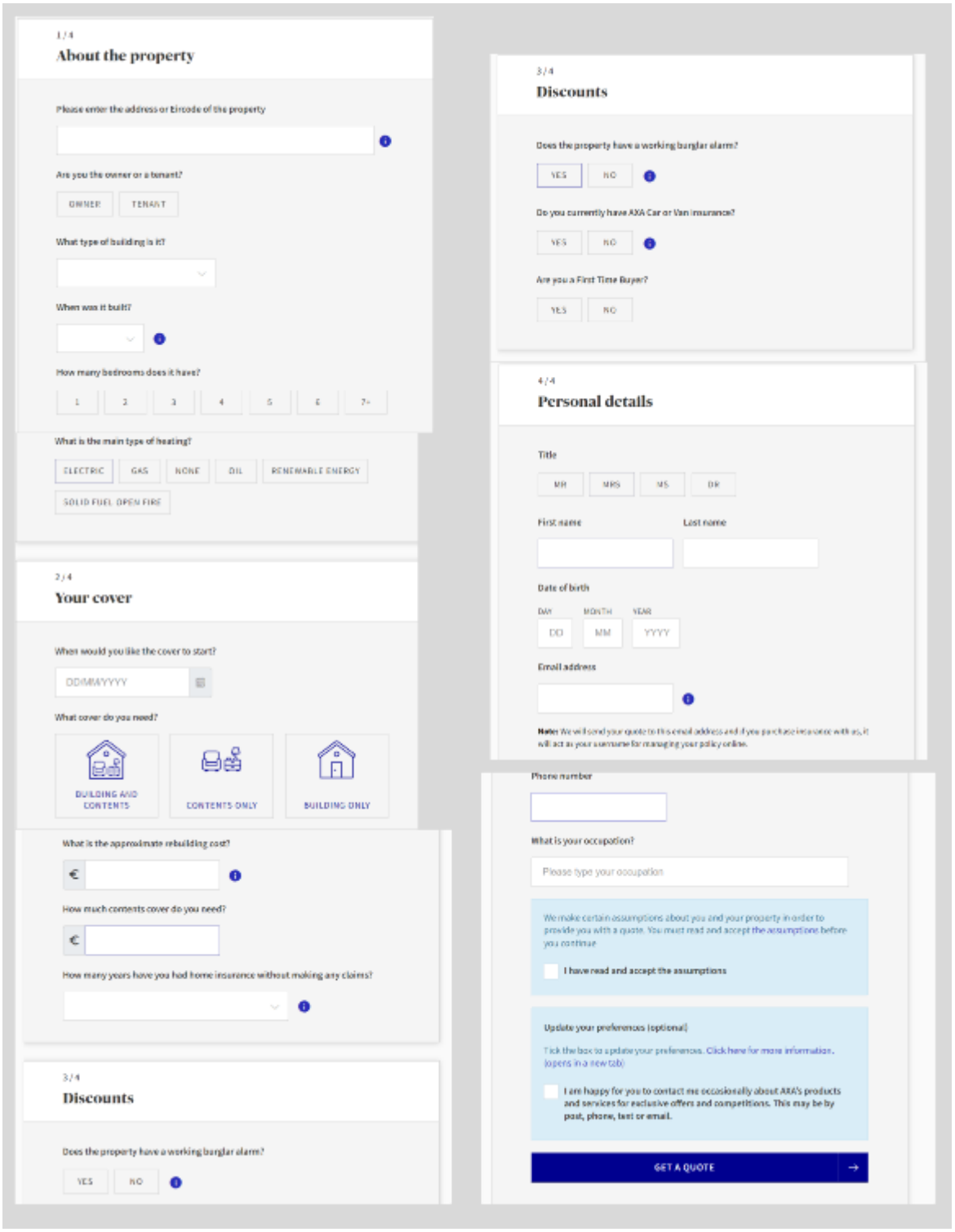


Figure 36 AXA home insurance form

Figure 36 is the AXA insurance form that made the design and inputs for this study. It was chosen due to its length and that it had multiple sections that could be used in a multistep form structure.

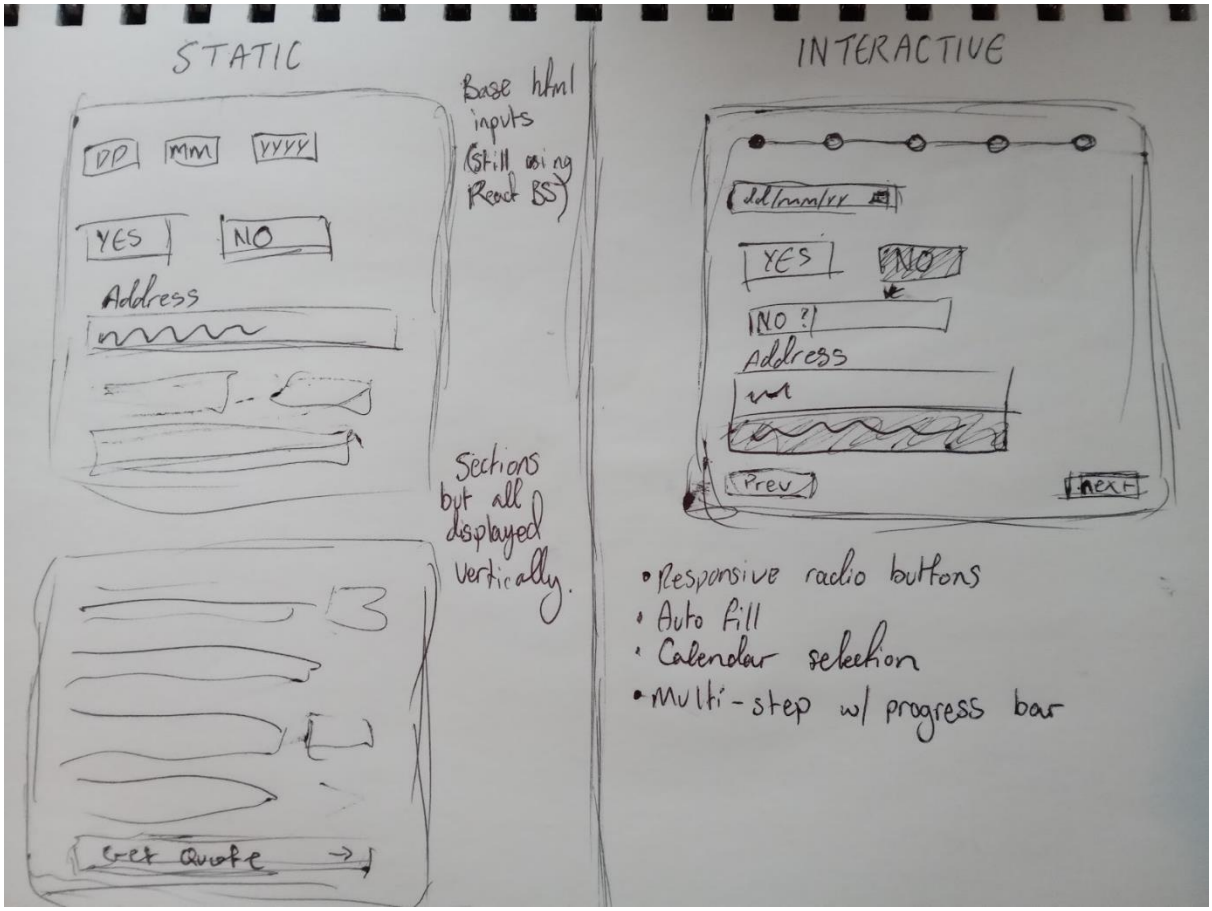


Figure 37 Form paper wireframe

Figure 37 above is a paper wireframe that plans the static and interactive elements that will be used in the study. The static design will use the structure of the AXA form but will only use inputs that can be done with html. The interactive form will be a multistep form that has auto fill for a text input, date selection and responsive radio buttons that when selected will show the necessary inputs for that selection.

4.3.2 Style guide

React Bootstrap is a JavaScript framework for React that uses Bootstrap standards. The aim for this project is to use React Bootstrap to build a form using the style of the AXA form.

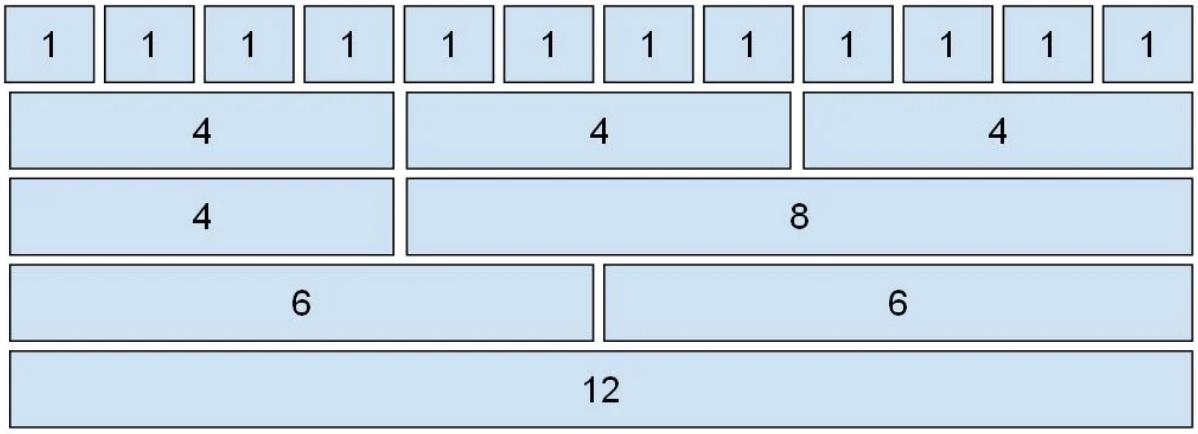


Figure 38 Bootstrap Grid Note. Retrieved from https://linuxhint.com/bootstrap5-columns-grid-system/

React Bootstrap uses the Bootstrap grid system shown in figure 38 which allows up to 12 columns. The grid is made up of three components: container, rows and columns. The container holds the rows, and the rows hold the columns.

4.4 Conclusion

ReactJS will be used to create the web app while React Bootstrap will supply the components and style. React has similar design patterns to Vue which the writer has experience with. The architecture is straightforward as no backend will be used or created. A user taking part in the study will have to complete both forms on the web app and complete a survey. It is important that the designs have the same functionality as the AXA form while also showing the difference in interactive design. The style should be consistent and like the AXA form.

5 Implementation

5.1 Introduction

The application for this project is a single page web app created using ReactJS that has both a static form and interactive form. A user taking part in the study will be tasked to complete each form and to complete a survey. React Bootstrap components were used to create the forms.

5.2 Scrum Methodology

The Scrum methodology was used for the implementation phase of this project. Below in figure 40 is a diagram of how the SCRUM methodology works.

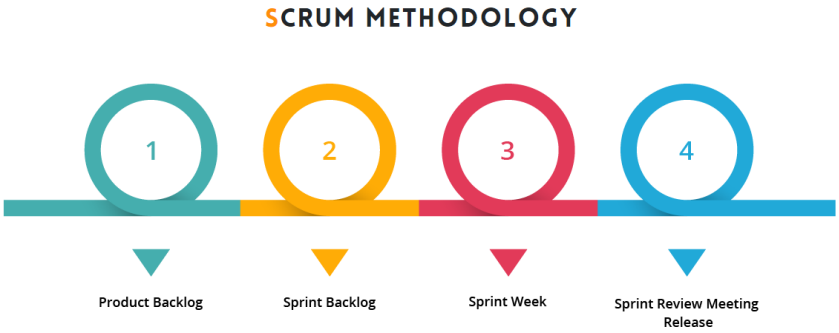


Figure 39 Scrum Diagram. Note. Retrieved from https://www.linkedin.com/pulse/scrum-methodology-sandeep-kumar-sahu/

Digite (2019) states that "Scrum is an agile development methodology used in the development of Software based on an iterative and incremental processes". It is executed in periodic blocks called sprints. During these sprints requirements in the product backlog are completed until the final product is finished. This project consisted of 9 sprints in total over the duration of four months. Each sprint was 2 weeks long. The project co-ordinator designed a sprint schedule which the product backlog for this study was applied to know what tasks needed to be completed during a sprint.

5.3 Development environment

Visual Studio Code was the choice of IDE when programming the web app. It has useful extensions that help with coding, syntax errors and cleaning up the files. These extensions are shown below in figure 40.

Figure 40 Visual Studio Code Extensions

GitHub Desktop was used to commit and push to the project repository. The project was committed when a requirement was completed from the backlog.

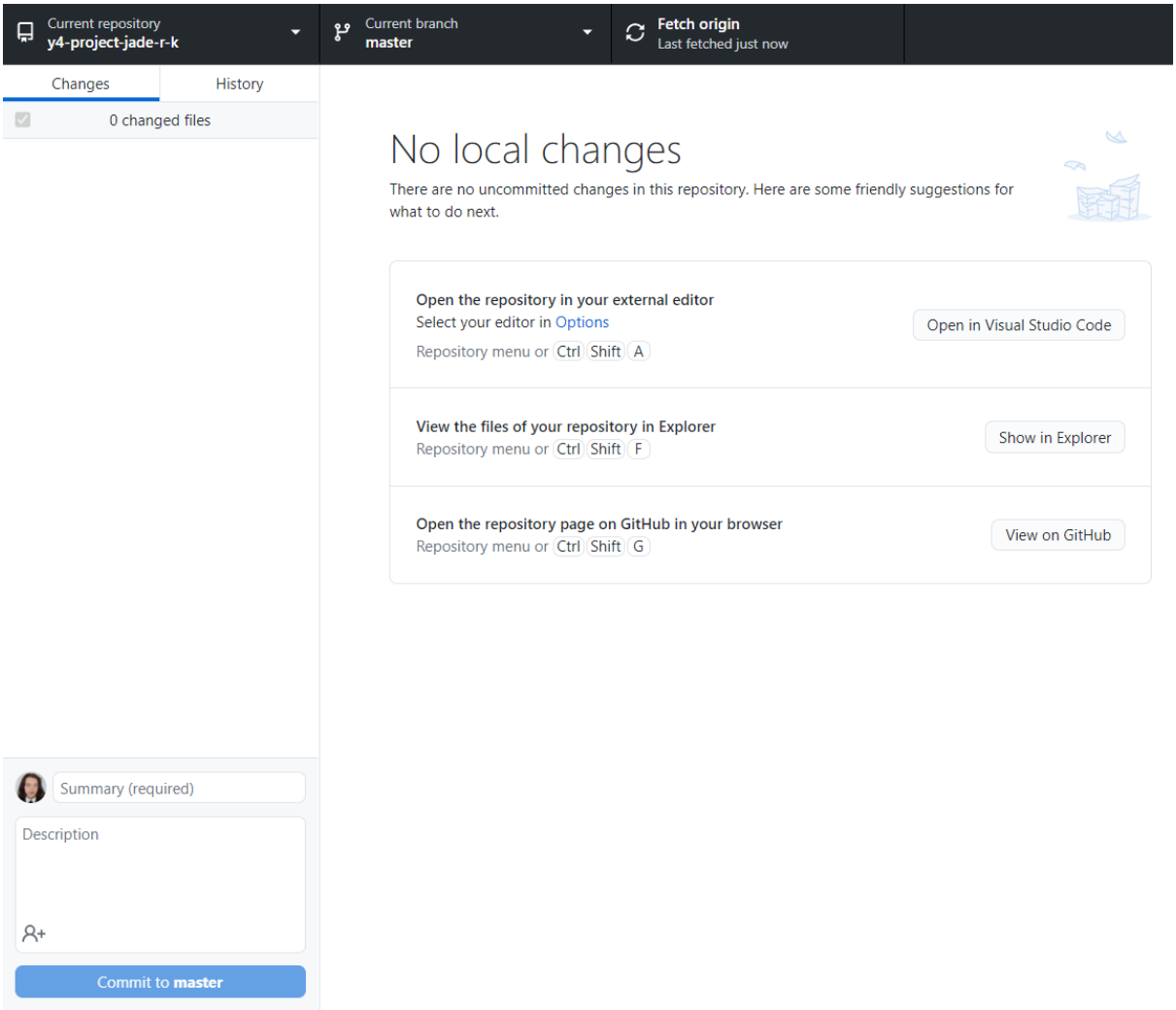


Figure 41 GitHub Desktop

5.4 Sprint 1

5.4.1 Goal

Sprint 1 was the beginning stages of the project.

The main tasks for the sprint were:

- Backlog of Features
- Research
- Hi-Fi Prototype

5.4.2 Item 1 – Backlog of Features

Wireframes were drawn on paper to visualise the prototype and the features the web app will have. It was decided that the app would have a form component that users could be tasked to complete as part of the study. These wireframes were shown in the design part of the report.

5.4.3 Item 2 - Research

A literature review that was written for another module was examined by the supervisor. Recommended edits were applied so that the paper could be used as research for the project. The edited literature review is at the start of this report.

5.4.4 Item 3 – Hi-Fi Prototype

Using the paper wireframes, a hi-fi prototype was started to be created using Figma. The Figma prototype uses a material library designed for Angular instead of React as that was the JavaScript framework that was originally going to be used.

5.5 Sprint 2

5.5.1 Goal

Sprint 2 was the requirements gathering phase of this project.

The main tasks for the sprint were:

- Hi-Fi Prototype
- Requirements Chapter v1
- Design Chapter v1

5.5.2 Item 1 – Hi-Fi Prototype

The prototype created in Figma was completed to be used in interviews for the requirements chapter.

5.5.3 Item 2 – Requirements Chapter

In the requirements chapter existing applications with static and interactive design were examined. Interviews and surveys conducted. Diagrams for personas and use case diagrams were created. The feasibility of the project was discussed.

5.5.4 Item 3 – Design Chapter

In the design chapter the technologies being used were discussed. Diagrams were created for app architecture, process design and user flow. Pictures of wireframes and prototypes were added. The style guide for the project was decided.

5.6 Sprint 3

5.6.1 Goal

Sprint 3 was the beginning of implementation of the project.

The main tasks for the sprint were:

- Update previous docs.
- Application Prototype v1
- Implementation Chapter v1

5.6.2 Item 1 – Update previous docs

The supervisor for this project gave corrections for the requirements and design chapters that were applied.

5.6.3 Item 2 – Application Prototype

A prototype was started using HTML and CSS languages to prepare for creating the site using ReactJS. Folder structure and components were planned, and the design further finalised.

5.6.4 Item 3 – Implementation

The SCRUM methodology was explained, and the development environment described. The tasks of each sprint were added, and further detail was explained on the completed sprint so far.

5.7 Sprint 4

5.7.1 Goal

The main tasks for the sprint were:

- Implementation Chapter v2
- Application Prototype v2
- Design Chapter v3

5.7.2 Item 1 – Implementation Chapter v2

Edit recommendations given by the supervisor were applied to the chapter. The HTML/CSS prototype was added as the final homepage design that the web app will be styled using.

5.7.3 Item 2 – Application Prototype v2

The HTML/CSS prototype had the static homepage completed and then it was decided to begin using React. First the React app was created using a terminal which creates a base to start programming using React. This base was cleaned up and the folder structure was created which is shown in figure 42 below.

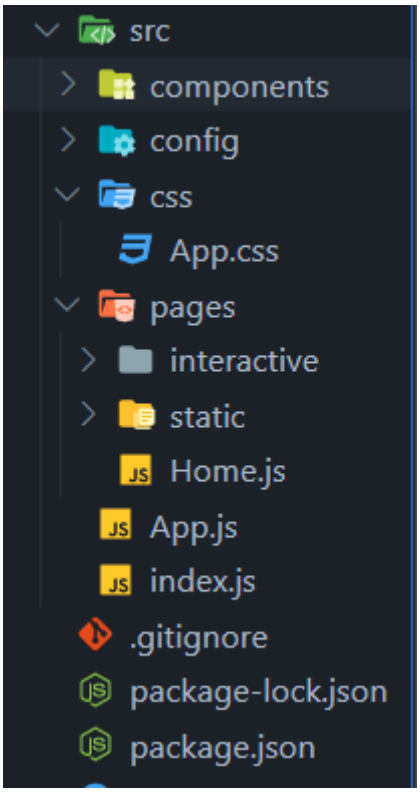


Figure 42 Folder structure for React app in Visual Studio Code

React Router and Axios was installed so that the app could navigate as a single page application and an API could be consumed. The necessary files were created, and the routing was completed in the App.js file. Figure 43 below shows the routing in App.js.

```jsx
//pages
import Home from './pages/Home';
//static pages
import StaticHome from './pages/static/Home';
import StaticForm from './pages/static/Form';
import StaticGallery from './pages/static/Gallery';
//interactive pages
import InteractiveHome from './pages/interactive/Home'
import InteractiveForm from './pages/interactive/Form'
import InteractiveGallery from './pages/interactive/Gallery'


function App() {
  return (
    <Router>
      <Routes>
        {/* Routes to pages */}
        <Route path='/' element={<Home />} />

        <Route path='/static/' element={<StaticHome />} />
        <Route path='/static/form' element={<StaticForm />} />
        <Route path='/static/gallery' element={<StaticGallery />} />

        <Route path='/interactive/' element={<InteractiveHome />} />
        <Route path='/interactive/form' element={<InteractiveForm />} />
        <Route path='/interactive/gallery' element={<InteractiveGallery />} />
      </Routes>
    </Router>
  );
```

Figure 43 App.js Routing

Home.js was created as a landing page for the study and web app. The API was tested using this page in the console log and was successfully retrieved.

src > config > index.js > ...

```jsx
import axios from 'axios';

//api url
export default axios.create({
    baseURL: 'https://api.artic.edu/api/v1/artworks'
});
```

src > pages > Home.js > Home

```jsx
import axios from '../config';
import { useState, useEffect } from 'react';
import { Button, Stack } from '@mui/material';
import { Link } from 'react-router-dom';

const Home = () => {
    const [artworks, setArtworks ] = useState(null);

    //get artworks from API
    useEffect(() => {
        axios.get()
        .then((response) => {
            console.log(response.data.data);
        })
        .catch((err) => {
            console.error(err);
        });
    });
    return (
```

Figure 44 config/Index.js and Home.js

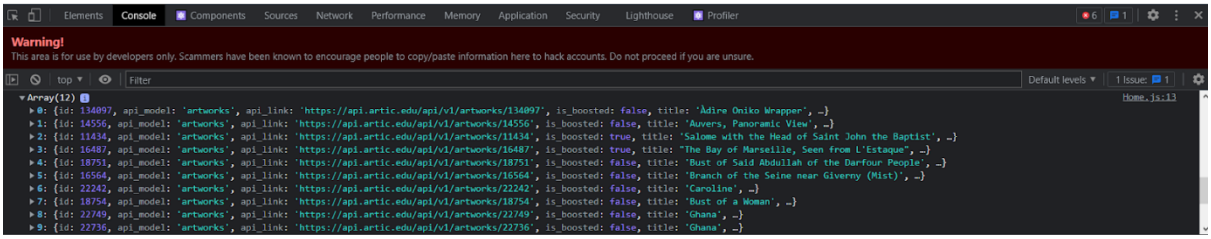


Figure 45 Landing page for the web app and console.

Figure 44 shows the code for retrieving the API and figure 45 shows the result in the console of the home page.

Lastly a navbar component was created for the static design pages and applied which is shown below.

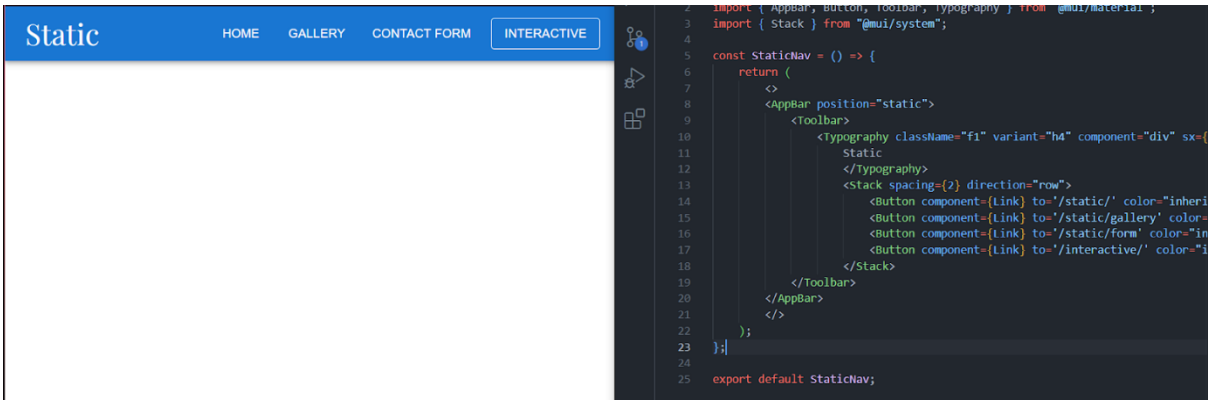


Figure 46 Navbar for the static design and StaticNav.js

5.7.4 Item 3 – Design Chapter v3

Recommended changes given by the supervisor were applied. This sprint was written, and necessary screenshots added.

5.8 Sprint 5

5.8.1 Goal

The main tasks for the sprint were:

- Interim Presentation

- Application Prototype v3
- Update previous docs.
- Implementation Chapter v3

5.8.2 Item 1 – Interim Presentation

An interim presentation was given to the supervisor and second reader for this project. During the presentation slides and the application prototype so far were shown. After a thorough discussion it was decided to change the focus of the project to a comparative analysis on static and interactive forms. Instead of creating two designs for a site, an existing form would be used, and a static and interactive version of the form created.

5.8.3 Item 2 – Application Prototype v3

After the interim presentation, the code for the prototype so far was dropped. React Bootstrap was installed for the project and the new necessary files and folders were created. The form chosen to replicate was the AXA home insurance form https://www.axa.ie/home-insurance/.

The static form was created first. The structure and layout of this form is a copy of the AXA insurance form, but only inputs achievable with html were used. The inputs the form uses were created first then the styling applied to them. Below in figures 47 and 48 show the design and a snippet of code from the static form page.

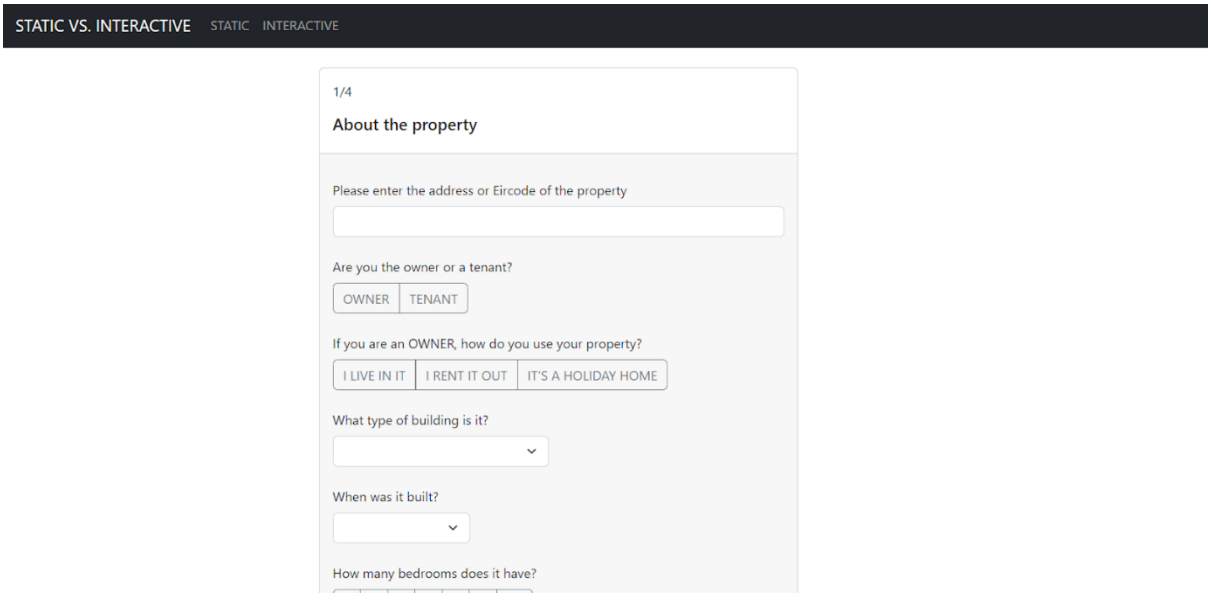
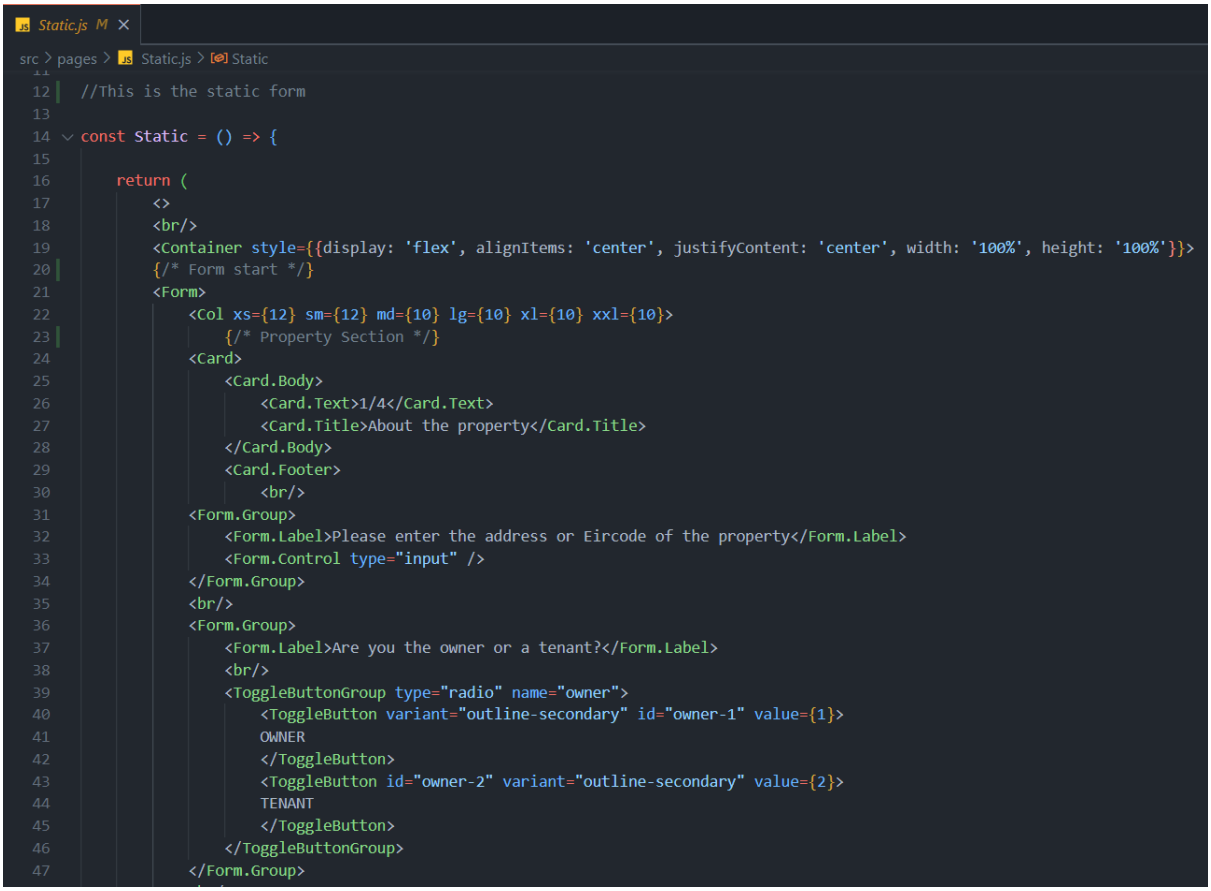


Figure 47 Static form page



```
Static.js M
src > pages > Static.js > Static
//This is the static form

const Static = () => {

    return (
        <>
        <br/>
        <Container style={{display: 'flex', alignItems: 'center', justifyContent: 'center', width: '100%', height: '100%'}}>
        {/* Form start */}
        <Form>
            <Col xs={12} sm={12} md={10} lg={10} xl={10} xxl={10}>
                {/* Property Section */}
            <Card>
                <Card.Body>
                    <Card.Text>1/4</Card.Text>
                    <Card.Title>About the property</Card.Title>
                </Card.Body>
                <Card.Footer>
                    <br/>
            <Form.Group>
                <Form.Label>Please enter the address or Eircode of the property</Form.Label>
                <Form.Control type="input" />
            </Form.Group>
            <br/>
            <Form.Group>
                <Form.Label>Are you the owner or a tenant?</Form.Label>
                <br/>
                <ToggleButtonGroup type="radio" name="owner">
                    <ToggleButton variant="outline-secondary" id="owner-1" value={1}>
                    OWNER
                    </ToggleButton>
                    <ToggleButton id="owner-2" variant="outline-secondary" value={2}>
                    TENANT
                    </ToggleButton>
                </ToggleButtonGroup>
            </Form.Group>
```

Figure 48 Static form code

The design was achieved by using a card and putting the form inputs in the footer of the card as shown in figure 48 line 29 onwards.

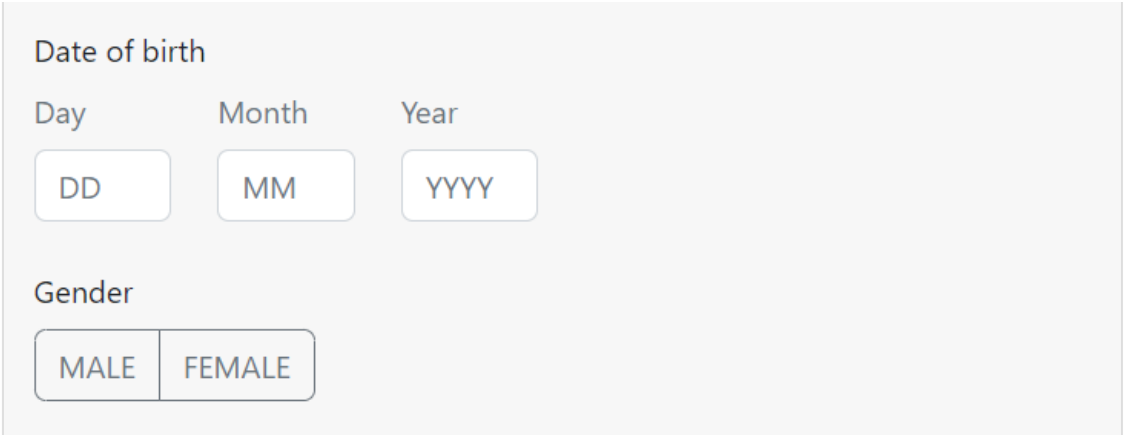


Figure 49 Date of birth static input

```
340             <Form.Group>
341                 <Form.Label>Date of birth</Form.Label>
342                 <Row xs={3}>
343                     <Col xs={2} sm={2} md={2} lg={2} xl={2} xxl={2}>
344                     <Form.Label className="text-muted">Day</Form.Label>
345                 <Form.Control type="input" placeholder='DD' />
346                 </Col>
347                 <Col xs={2} sm={2} md={2} lg={2} xl={2} xxl={2}>
348                 <Form.Label className="text-muted">Month</Form.Label>
349                 <Form.Control type="input" placeholder='MM' />
350                 </Col>
351                 <Col xs={2} sm={2} md={2} lg={2} xl={2} xxl={2}>
352                 <Form.Label className="text-muted">Year</Form.Label>
353                 <Form.Control type="input" placeholder='YYYY' />
354                 </Col>
355                 </Row>
356             </Form.Group>
```

Figure 50 Date of birth static code

Some of the interactive elements removed from the AXA form for the Static design were the dates that used a calendar selection input and the responsive radio buttons. Figure 49 shows the static version of the date input and figure 50 shows the code used to achieve and style it.

The first step for the interactive form was creating a multi-step form following a tutorial.

```
IxDForm.js M
src > components > IxDForm.js > IxDForm
16  //This page controls the interactive form so it is multistep
17  const IxDForm = () => {
18      const [page, setPage] = useState(0);
19
20      //The titles of the sections
21      const FormTitle = ["About the property", "Your cover", "Discounts", "Personal Details"]
22
23      //displays the current form section
24      const PageDisplay = () => {
25          if (page === 0) {
26              return <Property />
27          } else if (page === 1) {
28              return <Cover />
29          } else if (page === 2) {
30              return <Discounts />
31          } else if (page === 3) {
32              return <Personal/>
33          } else {
34              return <Welcome/>
35          }
36      }
```

Figure 51 Multistep code variables

Figure 51 shows some of the code used to achieve the multi-step form structure in lines 24 to 36. This code displays the correct section of the form that the user is currently on.

```
62                  <Card.Footer>
63                      {/* Display the current page */}
64                      <PageDisplay/>
65                      <div>
66                          {/* Shows the correct buttons for the page displayed (prev and next/get quote) */}
67                          {page !== 0 && page !== 4 ? (
68                              <FormButton
69                              onClick={(e) => {
70                                  e.preventDefault();
71                                  setPage((currPage) => currPage - 1);
72                              }}
73                              text="Prev"
74                              />
75                          ) : null} {' '}
76                          <FormButton
77                          onClick={(e) => {
78                              e.preventDefault();
79                              if (page === FormTitle.length) {
80                                  window.location.reload();
81                                } else {
82                                  setPage((currPage) => currPage + 1);
83                                }
84                          }}
85                          text={page !== 3 ? "Next" : "Get your quote →"}
86                          />
87                      </div>
88                  </Card.Footer>
```

Figure 52 Multistep code

Figure 52 shows how the buttons were coded for the multistep form in lines 67 to 86. If the 'Prev' button is pressed it goes to the earlier section and the button is only displayed if the page number is higher than 0. The 'Next' button is shown until it changes to 'Get your quote' on the last section.

The tutorial followed was 'Create a multi step form using React JS and the useState Hook' by Shannon Atkinson (https://morioh.com/p/2a5b8afeebc3). Files were created for each part of the form using the inputs and styling created in the static version.

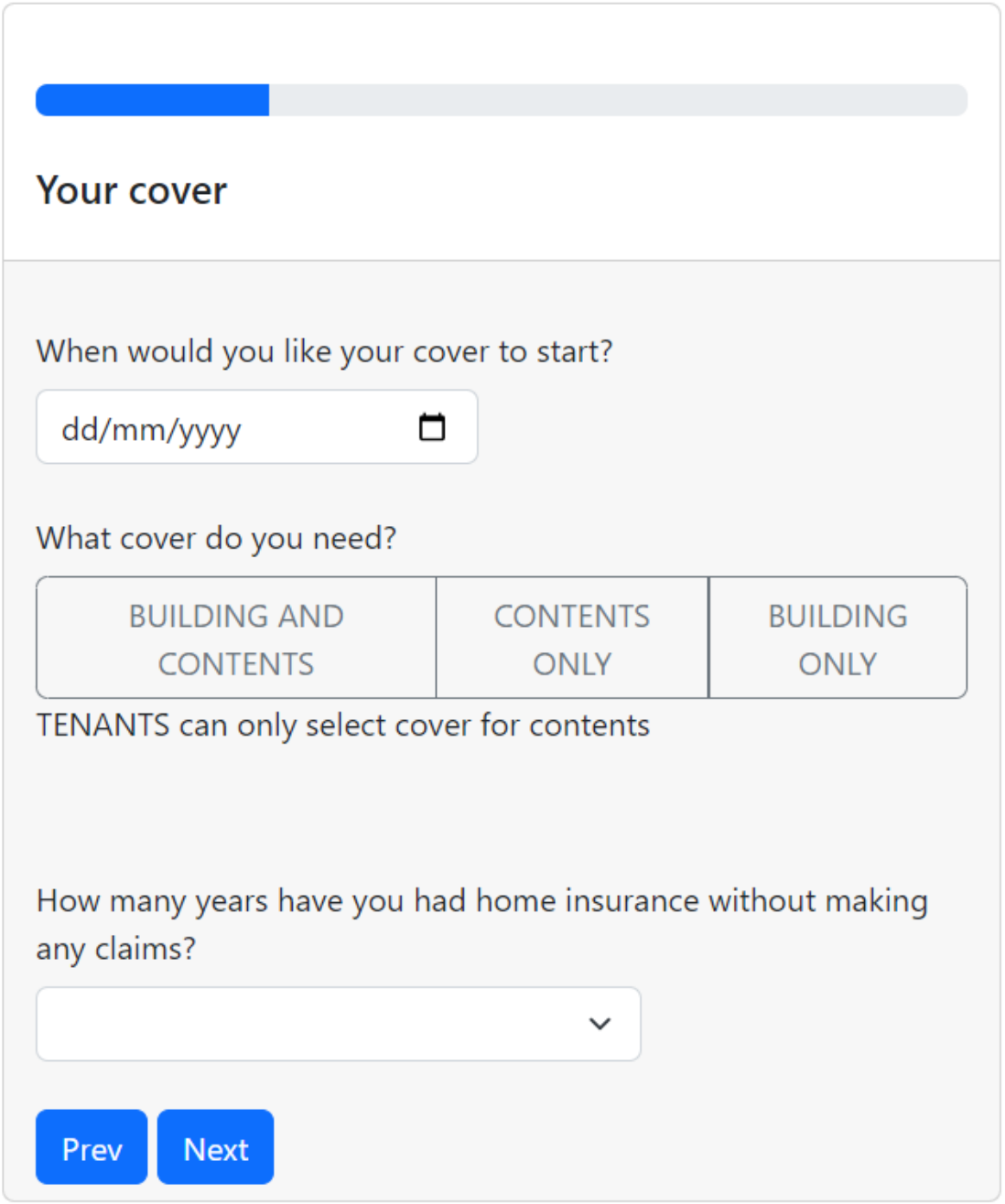


Figure 53 Static multi step form

Figure 53 shows the final structure of the interactive form using the multistep code and the progress bar. Here we can also see that the date input with a calendar selection was used.

In the AXA form they have an autocomplete search for the address which was replicated using another tutorial.

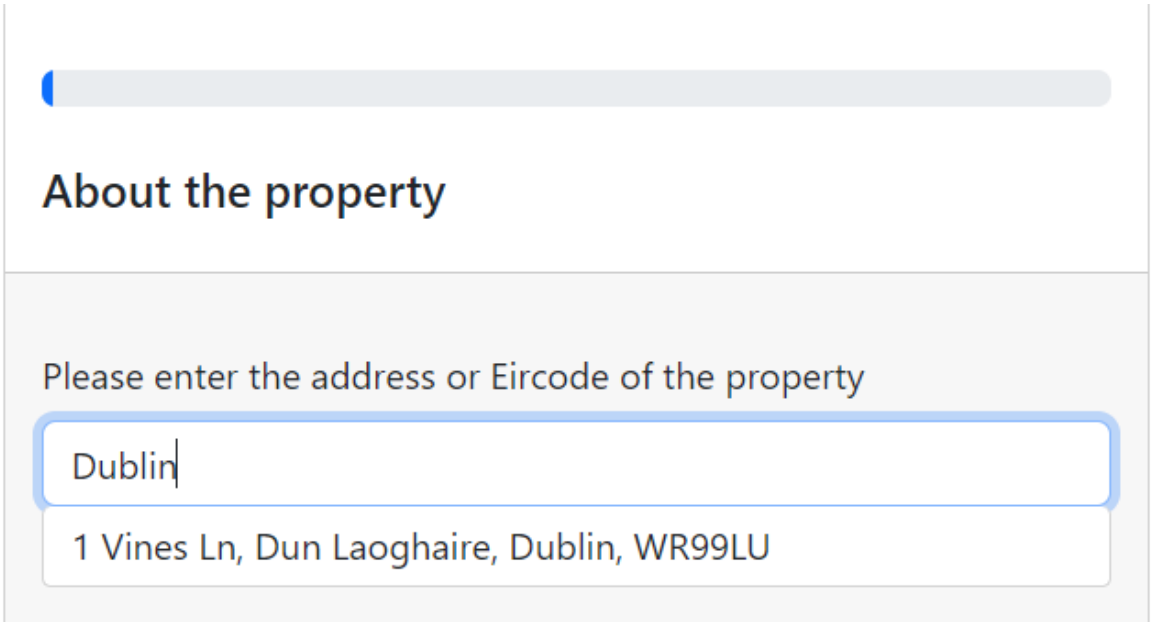


Figure 54 Autocomplete search

Figure 54 shows what the completed autocomplete search looked like on the interactive form. Below are screenshots of the code used to achieve this.

```
12    //Setting up the varaibles for the auto complete search for the address
13    const [text, setText] = useState('');
14    const [suggestions, setSuggestions] = useState([]);
15
16    const addresses = [
17        {
18            text: "1 Vines Ln, Dun Laoghaire, Dublin, WR99LU"
19        }
20    ]
21
22    const onSuggestHandler = (text) => {
23        setText(text);
24        setSuggestions([]);
25    };
26
27    const onChangeHandler = (text) => {
28        let matches = [];
29        if (text.length>4) {
30            matches = addresses.filter(address=>{
31                const regex = new RegExp(`${text}`,"gi");
32                return address.text.match(regex)
33            })
34        }
35        setSuggestions(matches);
36        setText(text);
37    };
```

Figure 55 Autocomplete code variables

In figure 55 the necessary variables and handlers were created for the autocomplete search. In lines 16 to 20 the addresses array was created which had the address input that the users will be given to use during the study. In lines 22 to 25 the suggestion handler is created which sets text to the selected suggestion and clears the suggestions. In lines 27 to 37 the on-change handler was created which filters the addresses array to find an address that matches the current input and sets the suggestions to that address.

```
42    return (
43        <>
44        <br/>
45            <Form.Group>
46                <Form.Label>Please enter the address or Eircode of the property</Form.Label>
47                {/* When the input field is changed a suggestion appears that matches the current input */}
48                <Form.Control type="input"
49                onChange={e => onChangeHandler(e.target.value)}
50                value={text}  />
51                {suggestions && suggestions.map((suggestion,i)=>
52                <div className='suggestion'
53                onClick={()=>onSuggestHandler(suggestion.text)}
54                 key={i}>{suggestion.text}</div>)}
55            </Form.Group>
```

Figure 56 Autocomplete code

Figure 56 shows the code for the autocomplete search in lines 48 to 54. When the input field is changed the on-change handler is run which checks for a matching address which is then displayed under the input field and can be selected and applied to the input field using the suggest handler.

The tutorial followed was a YouTube video called 'React autocomplete search from API' by ckmobile (https://www.youtube.com/watch?v=Q2aky3eeO40). The tutorial was changed to suit this project as it doesn't consume an API.

Another interactive element that was used on the AXA Home insurance form was responsive radio buttons that would display inputs based on the radio selection.

```
11  const Cover = () => {
12
13      //The booleans for the responsive radio buttons
14      const [showBuildCont, setShowBuildCont] = useState(false);
15      const [showBuild, setShowBuild] = useState(false);
16      const [showCont, setShowCont] = useState(false);
```

Figure 57 Responsive radio button variables

Figure 57 shows the Boolean variables created to display the content when set to true.

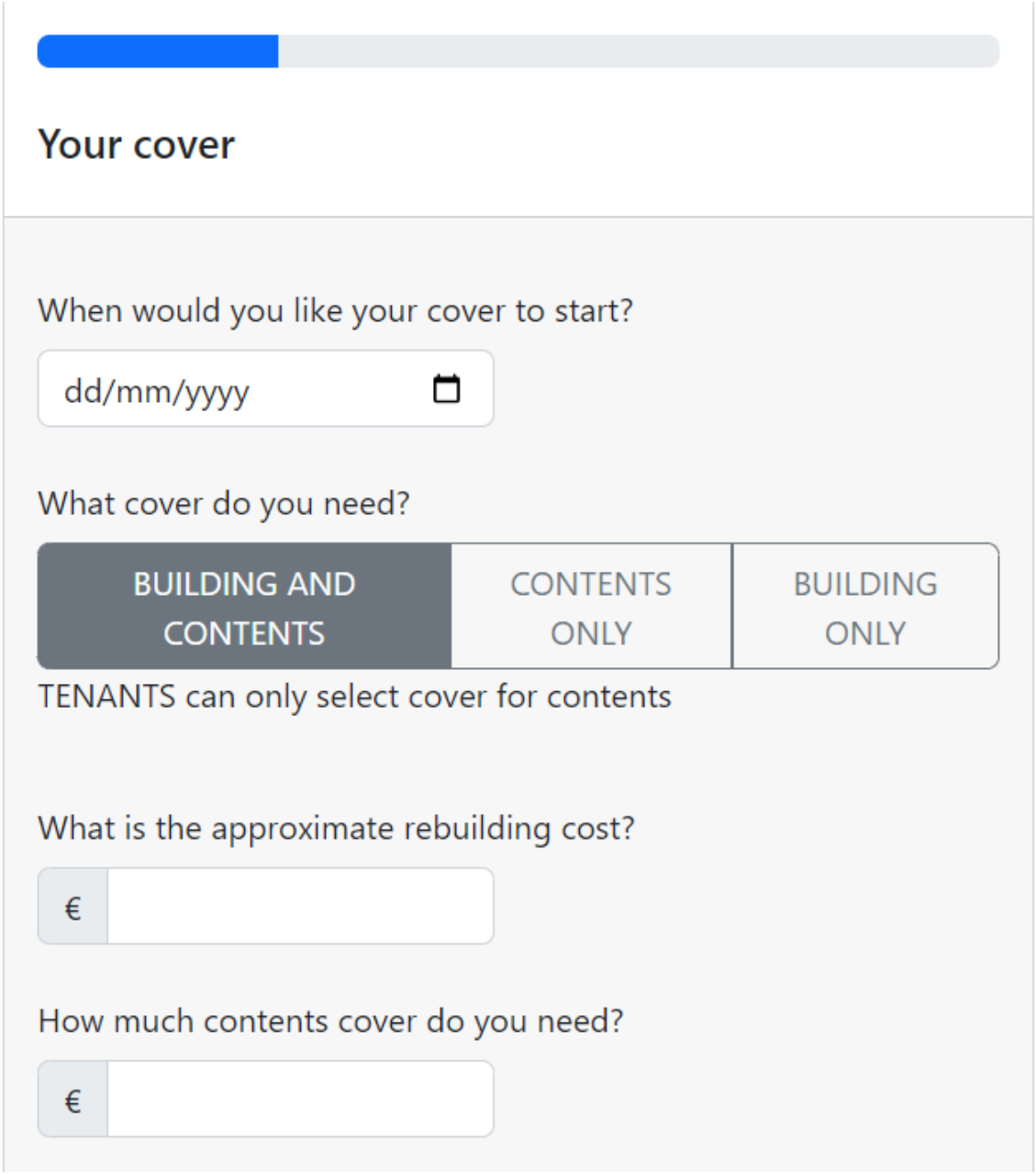


Figure 58 Responsive radio button on interactive form

Figure 58 shows what the result looks like on the interactive form. When compared to figure 53 we can see that when the first radio button is selected the required inputs for that selection are shown.

A YouTube tutorial was followed to achieve this called 'Show and hide div on button click react js' by Access world (https://www.youtube.com/watch?v=uXk62ZgPH-4).

When both forms were complete and working as expected the web app was hosted to Firebase. The link to the hosted project is https://static-and-interactive-form.web.app.

5.8.4 Item 3 – Update Previous Docs

Due to the change in the project most of the work done in this sprint was programming as the web app needed to be finished for the testing chapter so the study could be conducted. The earlier chapters were looked through to record what needed to be changed or updated to suit the new direction of the project.

5.8.5 Item 3 – Implementation Chapter v3

Once all the earlier items for this sprint were completed this sprint was written and all updates were sent to the supervisor.

5.9 Sprint 6

5.9.1 Goal

The main tasks for the sprint were:

- Update previous docs.
- Conducting the Study
- Testing Chapter v1

5.9.2 Item 1 – Update Previous Docs

The earlier chapters in this report needed to be changed to suit the new direction of the project. This was done by going through the chapters in order, finding the needed changes and updating them. These were sent to the supervisor to examine for any possible changes or recommendations.

5.9.3 Item 3 – Implementation

A Google Form was created for the study that the users filled out while taking part in the study. There are multiple sections to the form. The first section asks for gender, age range and occupation. Based on their choice in the occupation the user was also asked if they primarily use computers in their occupation. The next section asks if the user considers themselves 'Tech Savvy' and asks them to select tech-based hobbies they have.

After the personal questions are questions about the forms in the study. They select if they completed the static or interactive form first then fill in Likert scales about each form after each completion. After both forms have been completed, they are taken to the last section of the google form which asks them which form they preferred visually, which was easier to complete, which had better structure and overall, which they preferred. After this the user has completed the study but there is a short section for the writer to input the times the user took to complete each form.

The user firstly filled in the personal sections of the form then would complete either the static or interactive version of the form. Which form they started with had been decided by a coin flip for the first user then always the opposite from the last user that took part. This

was done to prevent the learning effect which was present while conducting the study. After completing the first form they would fill in the Likert scales for that form then do the same thing for the remaining form. The users taking part were given a list of inputs that was the same for each form and every user to keep consistency and have less pressure on the user taking part. After both forms are completed, they fill in the last section of the form and the times are inputted by the writer. Any issues were recorded by the writer.

The writer had difficulty finding users for the study as they had to be present to record the times and aid the user in understanding what they needed to do during the study. The focus when finding users was getting a good range of demographic variables e.g., age or gender.

5.9.4 Item 3 – Implementation

The testing chapter was prepared and written.

5.10 Sprint 7

5.10.1 Goal

The main tasks for the sprint were:

- Update previous docs.
- Analysing results
- Thesis v1

5.10.2 Item 3 – Update previous docs

The earlier chapters had recommendations applied given by supervisor.

5.10.3 Item 3 – Analysing Results

The results from the study were analysed. A program called Data Desk was used to run a simulation after calculating the test statistic for the paired test. Charts were made from the results of the survey.

5.10.4 Item 3 – Thesis v1

All earlier chapters written were combined in this document and the thesis draft was created.

5.11 Sprint 8

5.11.1 Goal

The main tasks for the sprint were:

- Final Application
- Final Thesis

5.11.2 Item 1 – Final Application

Due to this project being a study there was no final application to produce from the results of the testing. The comments in the code were proofread and the readme doc was updated with the link to the hosted site that has the form designs. This thesis was also uploaded to the repository after it was complete.

5.11.3 Item 2 – Final Thesis

Any recommended edits were applied, and this thesis was completed for submission.

5.12 Sprint 9

5.12.1 Goal

The main tasks for the sprint were:

- Video
- Final Presentation
- Gradshow

These tasks take place after submission. The first task will be a screencast of the application. The second task is a presentation of the project. Lastly the third task is participating in the GradShow.

5.13 Conclusion

The SCRUM methodology was used to manage this project. There were 9 sprints in total that were 2 weeks each. GitHub was used to manage the code of the project and Visual Studio was the IDE used during development. During every sprint there were set goals to achieve given by the project coordinator. The work done in each sprint was recorded in this chapter, any goals not achieved were to be done the following sprint. This was a successful method for managing the project.

6 Testing

6.1 Introduction

This chapter explains the application testing that has been done. Functional testing is done on the functional requirements of the web app by examining if the output for an input matches the expected output. For this project, the user testing was conducting the study as a final application would not be produced.

6.2 Functional Testing

Below are tables of the functional tests that were run on the app. Testing was done on the navigation and some components on the interactive form design.

6.2.1 Navigation

There is little navigation for the web app.

Test No	Description of test case	Input	Expected Output	Actual Output	Comment
1	Navbar	Click links	Links should link to the correct pages	Link to the correct pages	
2	Buttons on Home page	Click buttons	Buttons should link to the correct pages	Link to the correct pages	

6.2.2 Interactive Form

The interactive form required some testing as it had more functionality than the static version.

Test No	Description of test case	Input	Expected Output	Actual Output	Comment
1	Multi Step form	Press buttons to move between sections of the form	The form should have a next and ‘prev’ button that when clicked	As expected	

			should display the correct section of the form and the progress bar should update.		
2	Autocomplete	Fill in the text input	The address should appear and when clicked autofill the text input	As expected	
3	Display inputs when radio is selected	Click a radio button	Depending on the radio button selected further inputs should display or be hidden	As expected	

6.2.3 Discussion of Functional Testing Results

Each form works as planned. There is no functional error handling as the users are given inputs for the form and are more likely to fill it correctly.

During the study, some functional issues with the forms were noted:

- If the enter button is pressed the forms reset so all the fields are empty.
- Users found the date picker on the interactive design overly complicated.

6.3 User Testing

A Google form survey (see Appendix D) was created for users taking part in the study to complete. They first filled in some personal information e.g., Age range, gender, hobbies. After completing the first part of the survey they were given which form design they would be completing first. Users were given inputs to use on both forms to prevent putting them on the spot or using important personal information. Following the first forms completion they filled in the relevant part of the survey and then did the same for the second form design. They

answer some final questions on the survey then the writer inputted their times for each design.

This type of experiment is called a paired t-test, where the same participant tests both designs. This type of testing can supply a precise estimate of a difference between designs however, learning effects are likely to affect the results. (Department of Technology and Psychology, I.A.D.T. (2015)).

Once the results were collected the times were converted into seconds as the results would be used to calculate the test statistic.

User	Static Time Seconds	Interactive Time Seco	Difference	Difference Squared
1	162	104	58	3364
2	290	196	94	8836
3	202	183	19	361
4	163	213	-50	2500
5	146	142	4	16
6	92	112	-20	400
7	116	132	-16	256
8	140	180	-40	1600
		SUM:	49	17333

Figure 59 Time Results Note. Screenshot from Excel

Figure 59 shows the time the users took on each design in seconds. The results here suggest no difference in the time taken with half of the respondents completing the interactive form quicker with the other half completing it slower. To give more insight the test statistic can be calculated. Using Excel, the necessary calculations for the formulas were made.

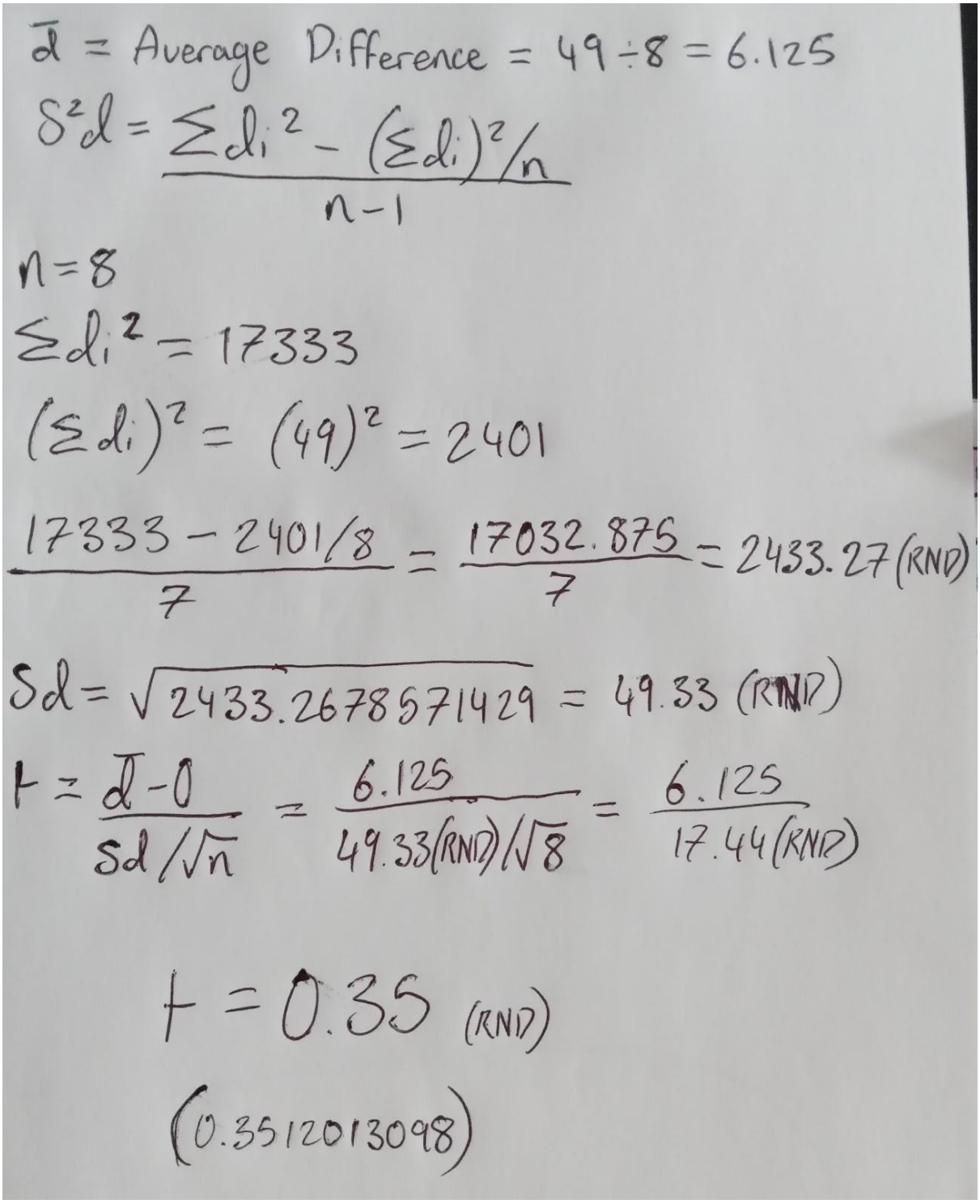


Figure 60 Work for Calculating Test Statistic

Figure 60 shows the work done to calculate the test statistic, referred to as 't'. By using the average difference, the number of users (n = 8) and the sum of the results the test statistic is calculated.

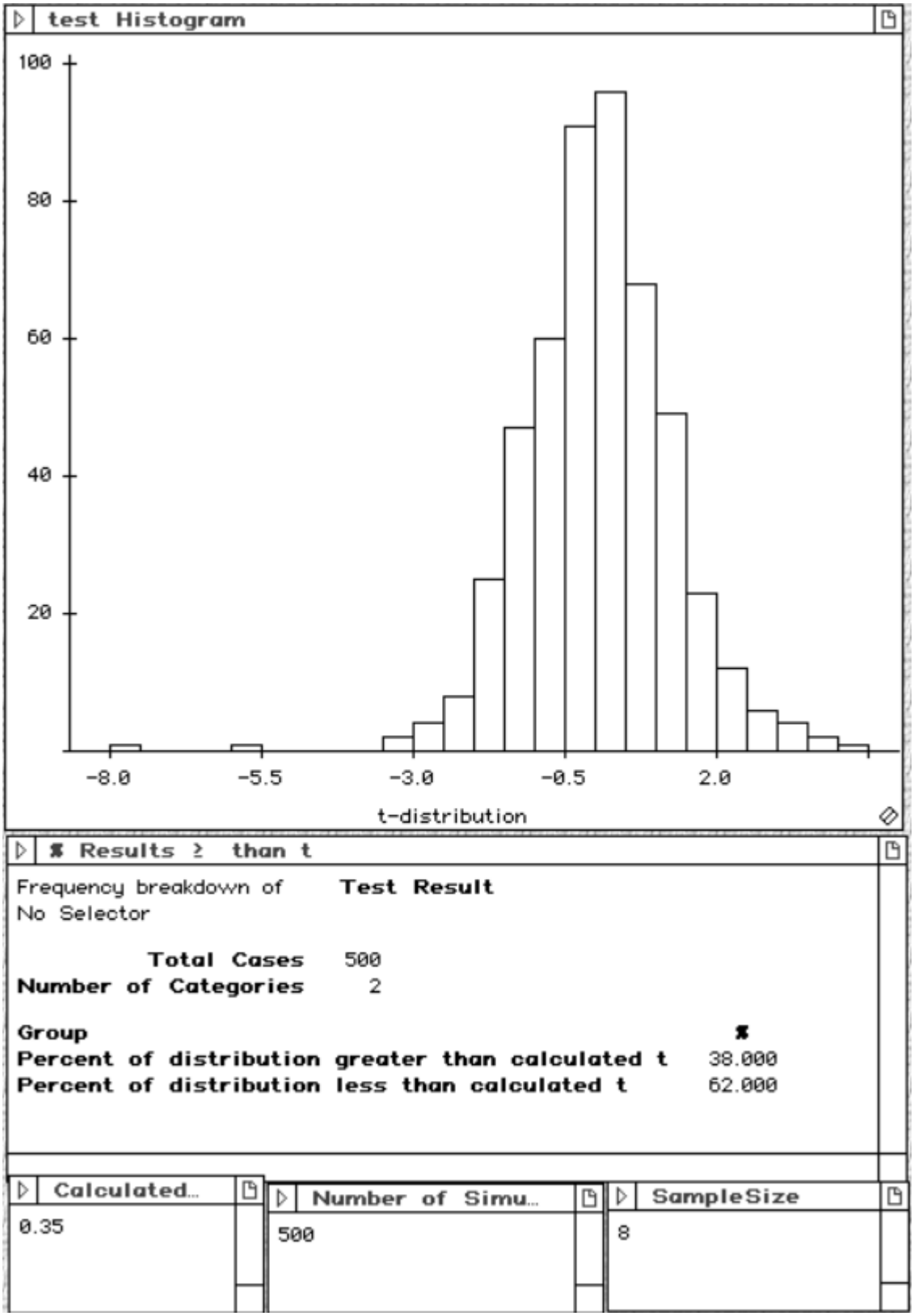


Figure 61 Screenshot of paired t-test

Using an application called Data Desk the result can be used to run a simulation to create a visual representation of the distribution of the test statistic. Figure 61 shows a screenshot from this application. The result has been put into the calculated input and 500 simulations have been ran. The result from the simulation shows no statistical difference in the time taken

to complete both form designs. Nevertheless, the sample size being small means the test might have not had enough participants to detect a difference.

Below are some charts created from the results of the study.

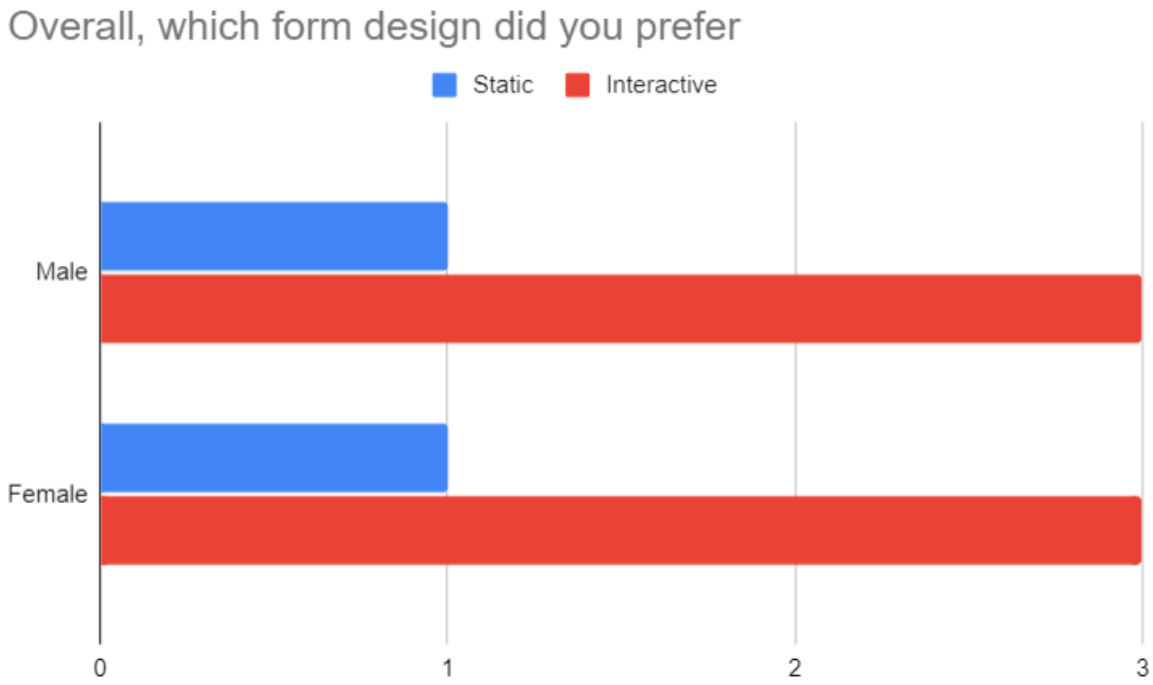


Figure 62 Gender based choices

Figure 62 shows that the ratio for preference over which design is equal between male and female.

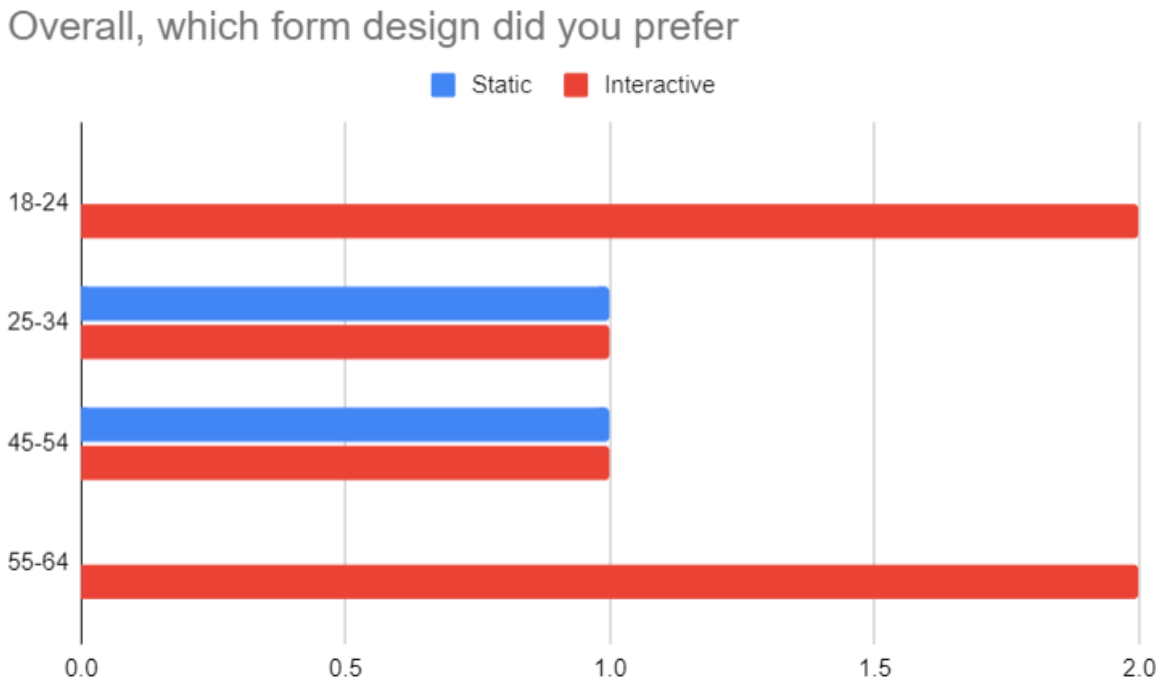


Figure 63 Age based choices

Figure 23 shows the preference based on age. 18-24 and 55-62 all prefer the interactive form while 25-34 and 45-54 are evenly split on the designs.

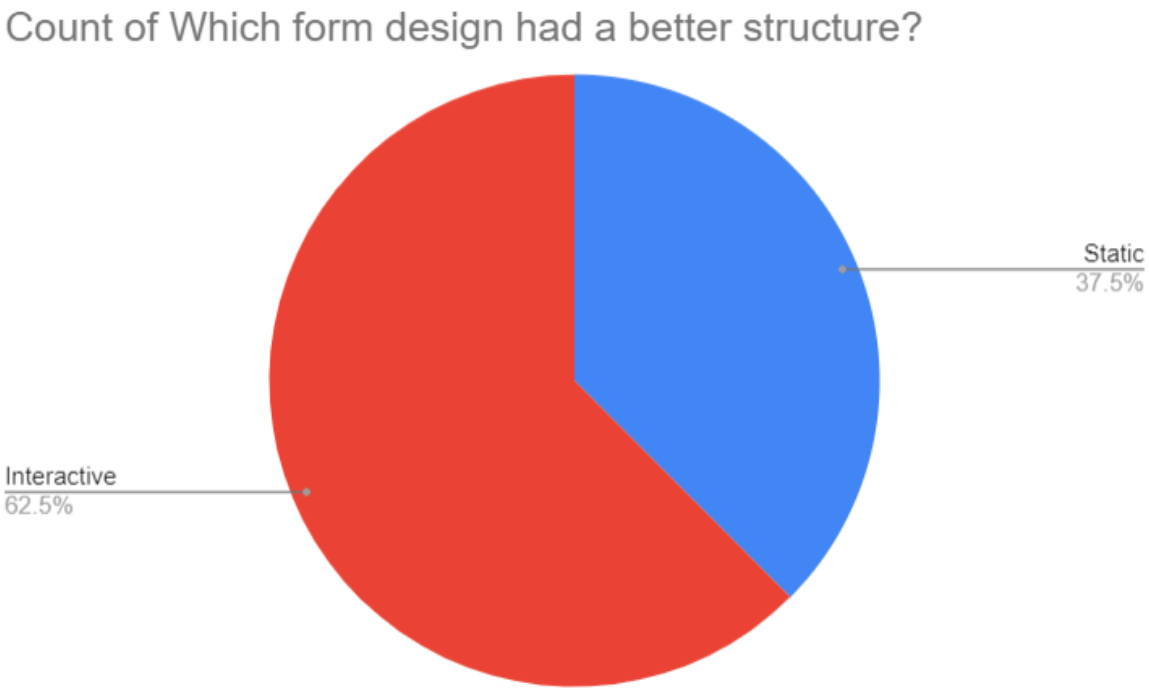


Figure 64 Structure

Figure 64 shows a pie chart for the results of which form design had better structure. The interactive design won the vote with 62.5%.

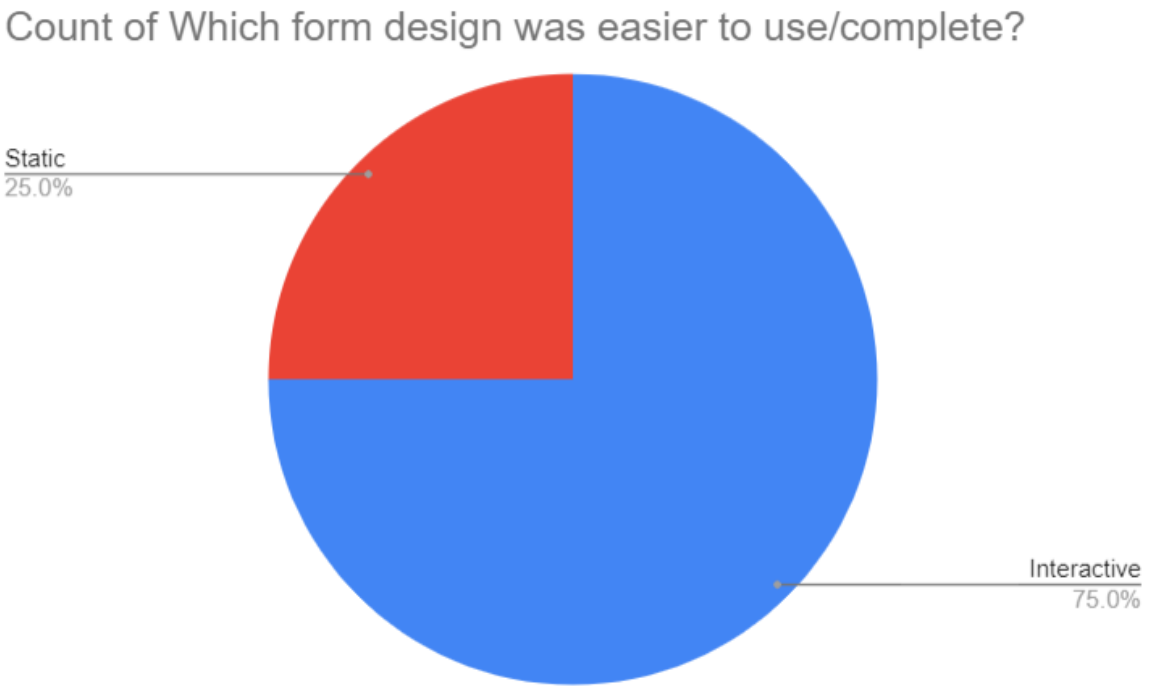


Figure 65 Easier

Figure 65 shows a pie chart for the results of which form design was easier to complete. The interactive design won the vote with 75%.

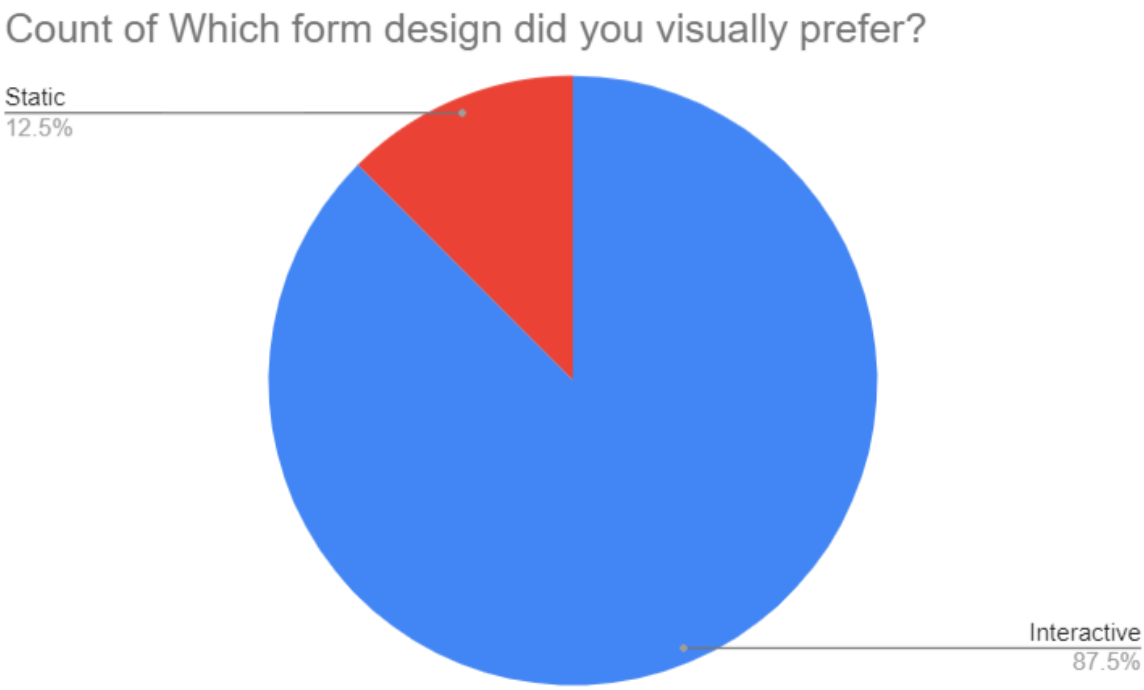


Figure 66 Visually prefer

Figure 66 shows a pie chart for the results of which form design the user visually preferred. The interactive design won the vote with 87.5%.

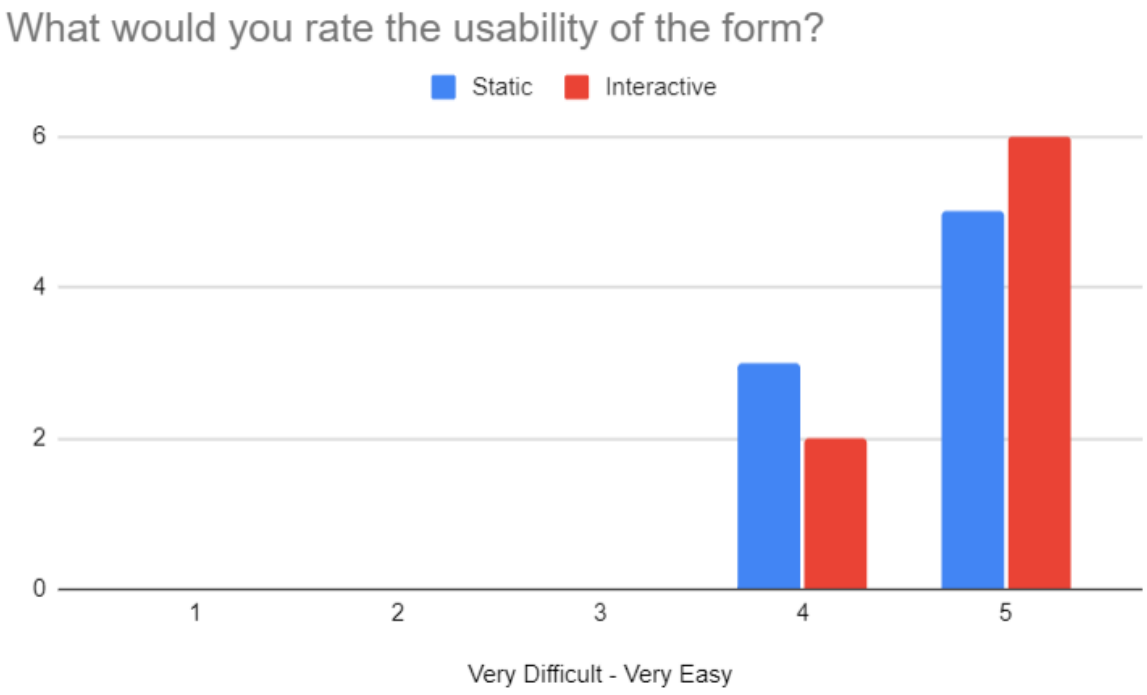


Figure 67 Usability

Figure 67 shows a chart of votes on a Likert scale for the usability of the form. The interactive design won with 6 votes of very easy.

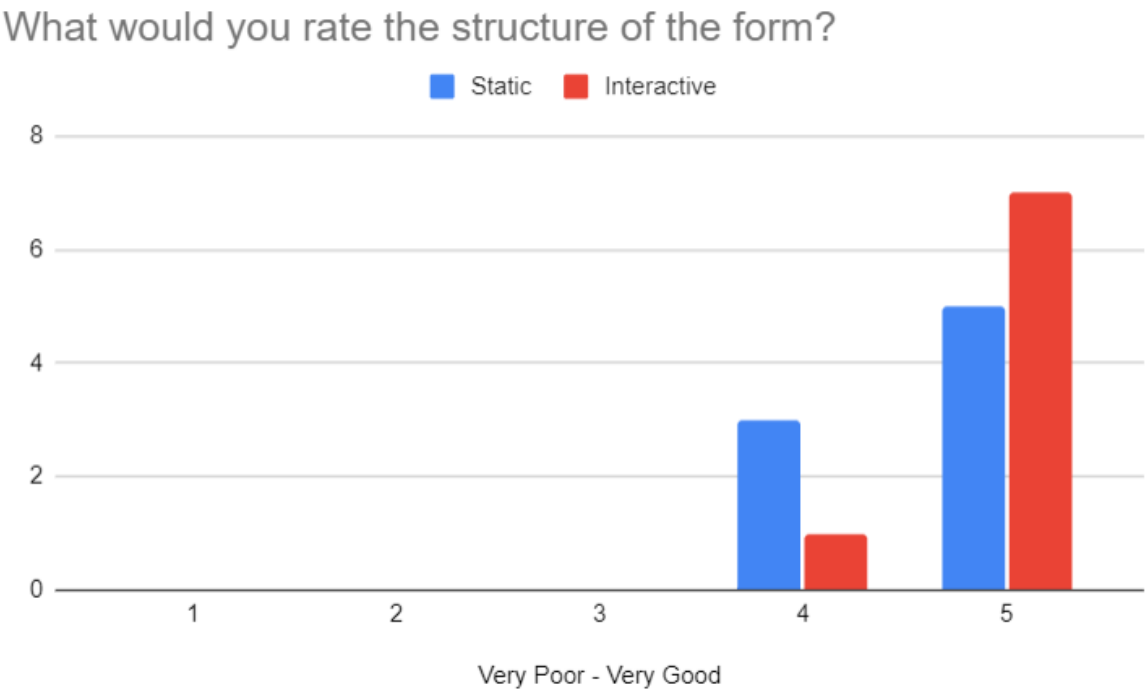


Figure 68 Structure

Figure 68 shows a chart of votes on a Likert scale for the structure of the form. The interactive design won with 7 votes of very good.

Figure 69 Overall Experience

Figure 69 shows a chart of votes on a Likert scale for the overall experience of the form. The results are equal.

From these results we can assume that users preferred the interactive design overall.

6.4 Conclusion

All functional testing worked as expected and without errors. There were some functionality issues that were found during the study. It was concluded that there is no statistical difference in the time taken to complete both form designs and that participants preferred the interactive design overall.

7 Project Management

7.1 Introduction

This chapter describes how the project was managed through the phases of the project.

7.2 Project Phases

7.2.1 Proposal

The proposal for this project was changed multiple times for throughout this project based on recommendations from the supervisor and other lecturers. The original idea for this project was more full stack based and eventually became a study that turned into a comparative analysis of static and interactive form design.

7.2.2 Requirements

When the requirements section of the project was started it was based on a different proposal. The work done based on this proposal was still used as requirements for the final project. Existing applications were examined, interviews were conducted, a survey was sent out, personas created, requirements decided, use case diagram drawn and the feasibility of the project discussed.

7.2.3 Design

The technologies that would be used during development were discussed and structure and design patterns explained. Diagrams of the application architecture and process design were created. Wireframes were drawn and prototypes were created, some of the UI design applies to the old proposal but were part of the process of finalising the project.

7.2.4 Implementation

Each sprint the implementation chapter was updated to have what was achieved during that sprint. Having a log of the commits made to the GitHub repository for the project helped greatly during writing. This chapter was used to track the progress of the project.

7.2.5 Testing

The testing chapter was where the results from the study were examined. The functional testing was completed first then the study was conducted. With the results of the study a simulation was ran to see if there was a statistical difference between the time taken on

each design. Results from the survey were charted and examined for which design the users preferred.

7.3 Project Management Tools

7.3.1 GitHub

A GitHub repository was used to store the code for this project. GitHub Classroom was used to make regular commits to the repository during development.

7.3.2 Sprint submissions

At the end of each sprint the completed chapters were sent to the supervisor to be examined and recommended changes were given at the start of the following sprint to be completed.

This was useful to stay on track and not fall behind on the thesis. It also gave the writer confidence in the work done as they were able to correct mistakes throughout the project instead of at the end.

7.4 Reflection

7.4.1 Your views on the project

This project has had many challenges. After the interim presentation, the whole project proposal was changed which meant a lot of earlier work had to be altered or removed. While at the time of this recommendation the writer was stressed, after a thorough discussion with the supervisor they got to work and had little stress by the end of the project as they had most of the thesis written and the code finished. This meant they could focus on the results of the study and felt that had a completed project.

Overall while this may have not been the original proposal by the writer and a new area for them, they enjoyed completing this project and have learnt from it.

7.4.2 Working with a supervisor

The supervisor for this project was an immense help. They kept the writer on track, offered help and recommendation where needed and taught the writer how to understand the results of the study.

7.4.3 Technical skills

- Further understanding of JavaScript
- Further understanding of ReactJS

- React Bootstrap
- Data Desk
- Analysis and interpretation of usability experiments

7.4.4 Further competencies and skills

- Project management
- Presentation
- Writing

7.5 Conclusion

The proposal for this project went through many changes. The requirements chapter set the foundation for the project. The design chapter decided the user interface and requirements for the web application. The implementation chapter keeps record of what was done during each sprint. The testing chapter shows the results of functional testing and the results of the study. The project went through many changes but was completed successfully with help from the supervisor. Many skills were learnt or developed during the project.

8 Conclusion

This project's aim was to conduct a comparative study on user experience on static and interactive form design.

The web application for this study was developed using ReactJS, a JavaScript library and React Bootstrap, a JavaScript framework built for React. The purpose of this study is to examine if interactive design improves user experience and time to complete a form.

The requirements chapter looked at existing applications which contributed to the components the form designs had. An interview and survey were conducted to test the study and to know what users would be taking part in. A use case diagram and personas were created, and the feasibility of the project was discussed.

The design chapter looked at the technologies being used to develop the forms for the study. The static and interactive form was designed using an existing form. How the study would be conducted was outlined.

The implementation chapter discussed the SCRUM methodology that was used to manage this project. What was achieved in each sprint was also recorded and was a successful way to manage the project.

The testing chapter showed the results of the functional testing and the study. This study concludes that there is no statistical difference between the time it takes to complete a static form and an interactive form. Although this result may be due to a small number of participants. From the survey it was surmised that users preferred the interactive form design over the static.

Further understanding of JavaScript and ReactJS was developed during this project. React Bootstrap and Data Desk were new technologies that were learnt during the project. The writer has a stronger understanding of the analysis and interpretation of usability experiments. Lastly presentation and writing skills were improved by completing the project.

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Appendix A

Introduction

The internet is so densely populated with sites that developers and companies find it difficult to stand out. Users tend to stick to sites they are familiar with and trust instead of exploring, or they are leaving older sites that haven't been updated to the latest standard. How do new sites get users? What do older sites do to keep them?

Interactive web apps are created to attract users and keep them engaged on the site. These web applications utilise interactive web design in order to improve the user experience. The objective of this literature review is to understand interactive web design, the terms associated with it, user engagement and to research a JavaScript framework that could be used to develop an interactive web application.

Interactive Web Application

When creating an interactive web application the interactive components are usually decided during the design. There should also be some consideration given to whether making the web app more interactive is advantageous for the type of users and the development team creating it.

What is Interactive Design?

According to Odugbesan (n.d.), an interactive web design is a layout for a website that makes use of various built-in programs, modules or features to encourage active participation from visitors in order to enhance their user experience (UX). (Odugbesan, n.d.).

The Advantages and Disadvantages

There are many advantages and some disadvantages to making a web app interactive. Mayer (2021) lists some of these pros and cons on interactive design. One of the advantages is that users are kept occupied and engaged by the site. It can enable a higher level of communication in which the user must do more than simply browse the website, this can make the experience more intimate. Websites that are interactive are great for learning, it can improve concentration and focus. Since Interactive sites offer customers more options it has also improved online shopping by making it much easier. (Mayer, 2021).

There are also some disadvantages. Creating interactive web apps takes a significant amount of time and effort and can be quite costly to produce. If users are able to input data in the site, it can cause errors if the design is not implemented correctly. Due to the amount of animations an interactive site can have it can cause a loading delay which could irritate users. (Mayer, 2021).

The Goal of an Interactive Design

Imran (2021) states that one of the most important components of any website is the user experience. The main goal of interactive web design is to attract users and provide them with an engaging experience. Interactive design allows companies to get the speed, reliability and high level of user engagement they want. By using cutting-edge features and contemporary software, companies can enhance the user experience on their websites. (Imran, 2021).

User Interface, User Experience and Interaction Design

There are three main terms to consider when creating an interactive web app; user interface, user experience and interaction design.

User Interface

The process that designers use to create user interfaces in software or devices with a focus on style is known as User Interface (UI) design. Interaction Design Foundation (2018) lists some things to consider when designing UI. They state that users evaluate designs quickly and prioritise usability. The best UIs are fine-tuned by understanding the contexts and task flows of the users. The design should aim to give users a more individualised and immersive experience by anticipating their needs. (Interaction Design Foundation, 2018).

User Experience

The method design teams employ to produce products that offer users meaningful and pertinent experiences is known as User Experience (UX) design. UX design includes aspects of branding, design, usability and function. UX designers think about the Why, What and How of products. The Why is the reason for a user interacting with the product, the What is the way the product functions and the How is the design of the product. User research, persona creation, designing wireframes and interactive prototypes, and testing designs are the typical tasks of a UX designer. (Interaction Design Foundation, 2019).

Interaction Design

Interaction Design (IxD) is the process of creating interactive services in which the designer considers not only the final product but also how users will interact with it. Interaction Design Foundation (2011) states that there are five dimensions involved in IxD; “words (1D), visual representations (2D), physical objects/space (3D), time (4D), and behaviour (5D)”. Words (1D) include text that helps users get the right amount of information. Graphical components like images, typography and icons are examples of visual representations (2D). Physical objects/space (3D) is the term used to describe the medium that users use to interact with a service, such as a laptop. Media that changes over time, like animation, is

referred to as time (4D). Behaviour (5D) focuses on how the first four dimensions establish the interactions a service allows and how it responds to user input. (Interaction Design Foundation, 2011).

What is the difference?

As shown below in the diagram fig 1, UI, IxD and UX all work together to deliver an interactive experience to the user. LeSuer (2022) discusses the differences between these terms and how they work together.

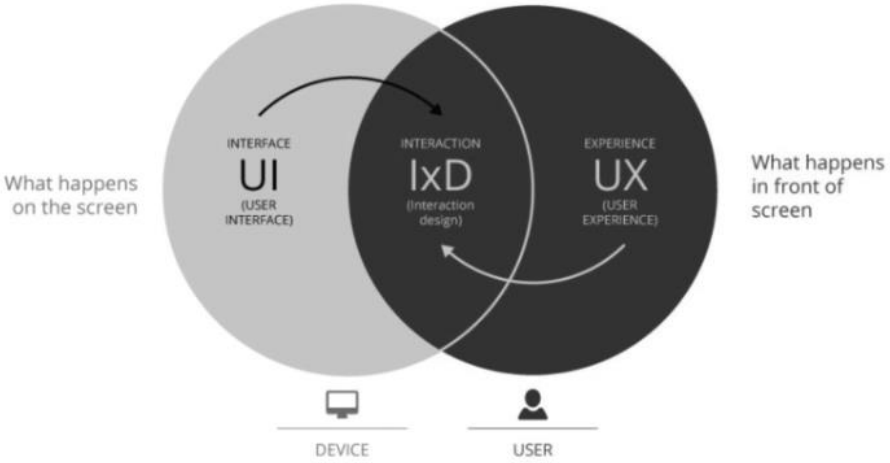

Figure 1 UI, IxD and UX Diagram. Note. Negative Recolour. Reprinted from Beginner's guide: What is interaction design?. Retrieved from https://www.qualtrics.com/uk/experience-management/customer/what-is-interaction-design/

There is a significant distinction between UX and UI. UX comprises components that have an impact on how the user feels when interacting with the product. UI refers to how a user interacts with a product, instructs it what to do and receives a response. UX makes a product more enjoyable while UI controls how it is used. Although they are extremely different, UI and UX both depend on many of the same principles to work. (LeSuer, 2022).

The difference between UX and IxD is subtle but distinct. The difference between IxD and UI is what happens when a user interacts with the features and content of a site and how the website is created to be more user-friendly and entertaining. IxD is one of the many elements that contribute to improving UX. (LeSuer, 2022).

User Engagement

While the main goal of an interactive design is to enhance the user's experience, it is often used with the intention to improve user engagement on a site. Attfield et al. (2011) explains what user engagement is and how to measure it.

What is User Engagement?

Attfield et al. (2011) defines user engagement as “the emotional, cognitive and behavioural connection that exists, at any point in time and possibly over time, between a user and a resource”.

User engagement characteristics expand on the concept of engagement across three broad dimensions which are defined as Emotional, Cognitive and Behavioural. Attfield et al. (2011) lists these characteristics and their meanings. The definition of Focused Attention is paying attention to one subject exclusively. The feelings felt during interaction are referred to as Positive Affect. The visual and sensory appeal of an interface is its Aesthetics. The ability to remember an experience and the readiness to repeat or promote it defines Endurability. Novel, startling, unusual or unexpected experiences is what Novelty refers to. Richness and Control are the levels of such. User’s global trust in a particular entity is the Reputation, Trust and Expectation characteristic. Lastly, the user’s motivation, incentives and benefit form the User Context. (Attfield et al., 2011).

How to Measure User Engagement

Metrics for evaluating the user experience can be categorised as either subjective or objective. Subjective measurements capture a user’s perception of the media at hand and is typically self-reported. A post-experience questionnaire can be used to quantify the subjective aspects of an interactive experience. The use of questionnaires and other subjective measurements has a variety of disadvantages. These include their reliance on the subjectivity of the user, post-hoc interpretation and vulnerability to the halo effect. Creating objective metrics that can accurately represent subjective experiences is a way to get around these problems. (Attfield et al., 2011).

Measurements that are objective are observable consequences, these can be metrics for the subjective sense of time, performance on subsequent tasks, physiological sensors, online behaviour and metrics for information retrieval. Asking a user to estimate how much time has passed during an activity is one way to measure the subjective sense of time. How well a user does on a separate task right after a period of engaged interaction is another possible measure of cognitive engagement. A wide variety of sensors connected to various cognitive states are capable of collecting physiological data. Eye trackers, mouse pressure, biosensors, oximeters and cameras are a few examples of sensors that can be used. The web analytics community has expressed interest in determining how users’ levels of engagement with a website may be measured. Three lines of research in Information Retrieval (IR) metrics are directly related to measuring user engagement. The first step will be to create metrics for interactive IR. This line has inspired the concept of simulated search scenarios, in which a subject has to follow a search scenario that details what, why, and in what context the user is browsing. The development of metrics that take enriched user interaction models into account is the second line of research. The final line of research connects user satisfaction to accepted IR effectiveness metrics. (Attfield et al., 2011).

Conclusion

Interactive web design may be the future, or current standard, of web applications. The amount of interactivity an application needs depends heavily on the type of user the web app plans to attract. It appears to be advantageous to making a web app interactive. UI, UX and IxD play big roles in creating an enjoyable interactive experience. Understanding user engagement and how to measure it is crucial to developing an interactive application.

Overall, this literature review explains the terms surrounding creating an interactive web application.

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Appendix B

1. Age Range? (18-24) (25-34) (35-44) (45-54) (55-64) (65 and over)
2. Occupation? (Employed) (Student) (Student and Employed) (Not Employed) (Prefer not to say)
3. Do you consider yourself ‘tech savvy’? (Yes) (No) (Partially) (Unsure)
   Definition: "well informed about or proficient in the use of modern technology, especially computers."

Task 1: Starting on the basic prototype homepage locate and complete the contact form.

(you will not be able to fill in the fields so just click submit)

(Time and navigation method/difficulties will be noted)

Task 2: Starting on the interactive prototype homepage locate and complete the contact form.

(you will not be able to fill in the fields so just click through until you click the submit button)

(Time and navigation method/difficulties will be noted)

1. After completing the tasks feel free to explore both designs while answering the following questions:
2. Overall, which version of the prototype are you likely to use?
3. Why?
4. Are there any components/features you can think of that you’d like to be tested like this?
   (example: the basic contact form vs. the interactive design contact form)

Appendix C

Comparative Analysis of Interactive Design

The survey will take approximately 5 minutes to complete.

For my fourth year project I am comparing an interactive design to a more basic design and seeing if making a site more interactive is truly better for user experience while also examining what interactive components users prefer, how it effects usability and which design different demographics prefer. Thank you for taking part.

* Required

1

Which age range do you fall into? *

- ◯ 18-24
- ◯ 25-34
- ◯ 35-44
- ◯ 45-54
- ◯ 55-64
- ◯ 65 and over

Figure 70 Requirements Survey

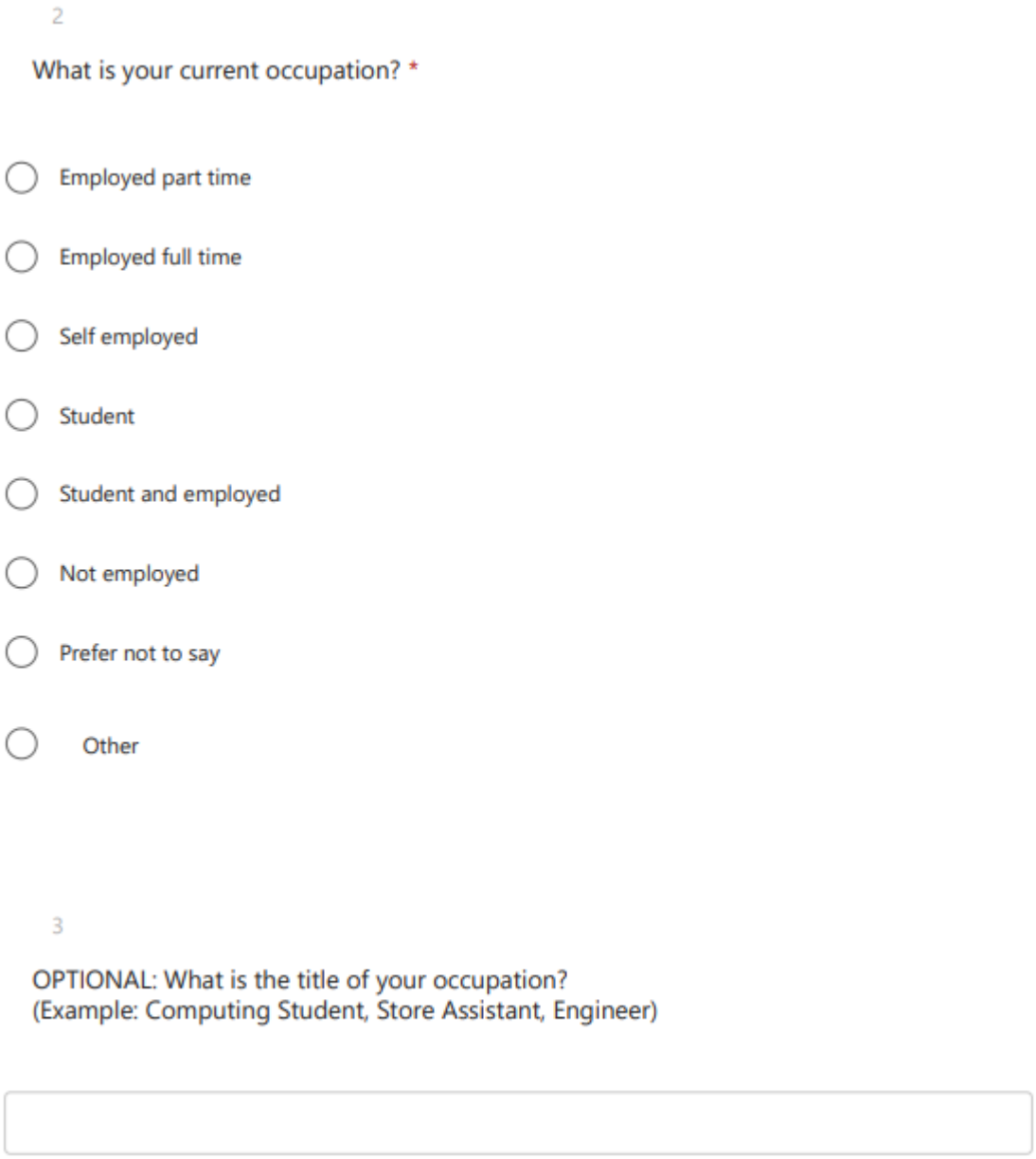

Figure 71 Requirements Survey

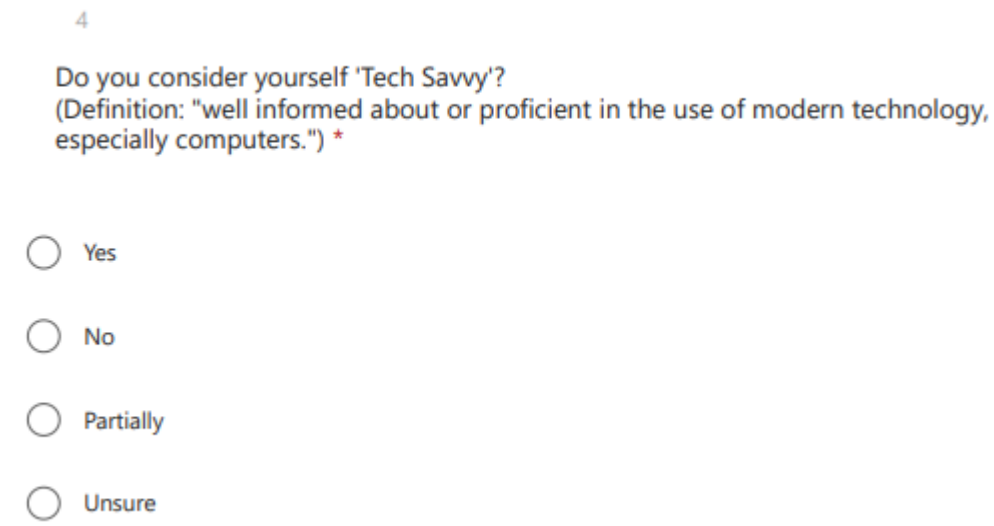

Figure 72 Requirements Survey

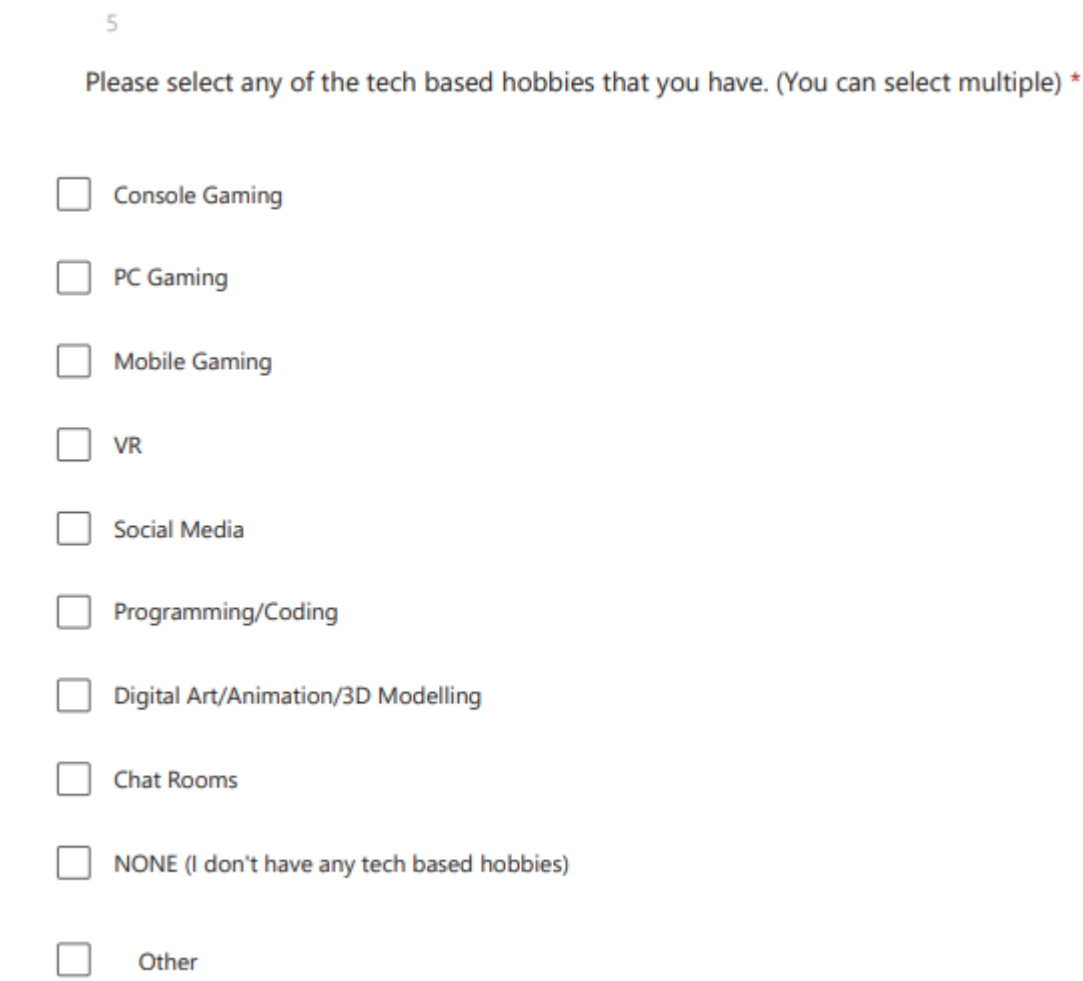

Figure 73 Requirements Survey

6

Examine the screenshot of the site then fill in the scale below based on the statements. Screenshot taken from https://www.exclusiveprs.info/home *

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
You could easily navigate this site.	○	○	○	○	○
Looking at this site makes you feel overwhelmed	○	○	○	○	○
You are likely to use this site based on its appearance (Ignoring purpose only based on its design).	○	○	○	○	○
You find the text on the site easy to read.	○	○	○	○	○
The purpose of the site is clear.	○	○	○	○	○

Figure 74 Requirements Survey

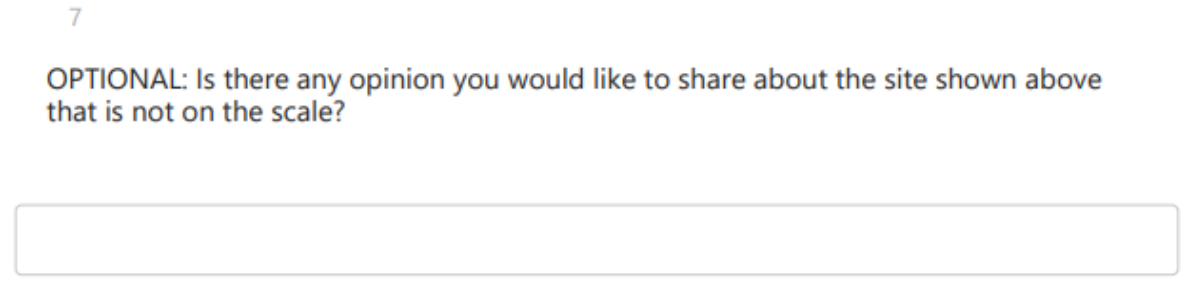

Figure 75 Requirements Survey

8

Examine the screenshot of the site then fill in the scale below based on the statements. Screenshot taken from https://www.fuzion.ie *

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
You could easily navigate this site.	○	○	○	○	○
Looking at this site makes you feel overwhelmed .	○	○	○	○	○
You are likely to use this site based on its appearance (Ignoring purpose only based on its design).	○	○	○	○	○
You find the text on the site easy to read.	○	○	○	○	○
The purpose of the site is clear.	○	○	○	○	○

Figure 76 Requirements Survey

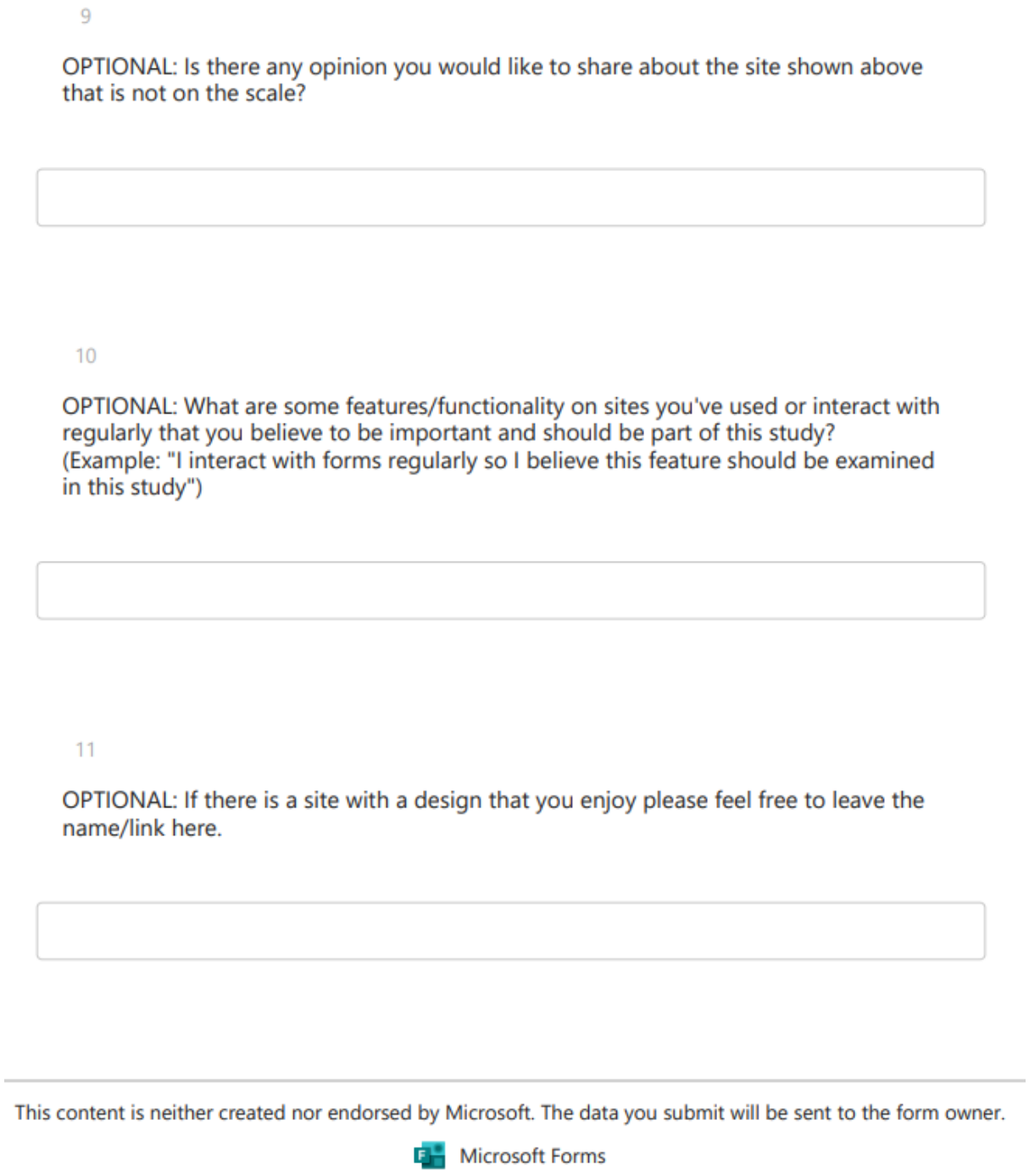

Figure 77 Requirements Survey

Appendix D

Comparative Analysis of Static and Interactive Form Design.

This survey is part of a study on user experience between static and interactive form design.

The information collected from you will remain anonymous and will be used in a final year project submitted to IADT. If you have any questions please feel free to ask.

Thank you for taking part in this study.

* Indicates required question

1. Which gender do you identify as? *

Mark only one oval.

- ◯ Male
- ◯ Female
- ◯ Non-Binary
- ◯ Prefer not to say

2. Which age range do you fall into? *

Mark only one oval.

- ◯ 18-24
- ◯ 25-34
- ◯ 35-44
- ◯ 45-54
- ◯ 55-64
- ◯ 65 and over

Figure 78 Study Survey

3. What is your current occupation? *

Mark only one oval.

- ◯ Employed part time *Skip to question 4*
- ◯ Employed full time *Skip to question 4*
- ◯ Self employed *Skip to question 4*
- ◯ Student *Skip to question 4*
- ◯ Student and employed *Skip to question 4*
- ◯ Not employed *Skip to question 5*
- ◯ Freelance *Skip to question 4*
- ◯ Prefer not to say *Skip to question 5*

Skip to question 5

Tech in occupation

4. Do you primarily use computers in your occupation? *

Mark only one oval.

- ◯ Yes
- ◯ No

Skip to question 5

Tech exposure and hobbies

5. Do you consider yourself 'Tech Savvy'? *

(Definition: "well informed about or proficient in the use of modern technology, especially computers.")

Mark only one oval.

- ◯ Yes
- ◯ No
- ◯ Partially

Figure 79 Study Survey

6. *

Please select any of the tech based hobbies that you have. (You can select multiple)

Check all that apply.

- [ ] Console Gaming
- [ ] PC Gaming
- [ ] Mobile Gaming
- [ ] VR
- [ ] Social Media
- [ ] Programming/Coding
- [ ] Digital Art/Animation/3D Modelling
- [ ] Music Production
- [ ] Chat Rooms
- [ ] NONE (I don't have any tech based hobbies)
- [ ] Other: _____

Static vs interactive form

7. Which form design did you fill out first? *

Mark only one oval.

- ◯ Static *Skip to question 8*
- ◯ Interactive *Skip to question 12*

Static Form

Figure 80 Study Survey

8. What would you rate the usability of the form? *

Mark only one oval.

Very difficult

1 ◯

2 ◯

3 ◯

4 ◯

5 ◯

Very easy

9. What would you rate the structure of the form? *
(Structure is the arrangement of the form)

Mark only one oval.

Very poor

1 ◯

2 ◯

3 ◯

4 ◯

5 ◯

Very good

Figure 81 Study Survey

10. How would you rate your overall experience of the form? *

Mark only one oval.

	Very poor
1	◯
2	◯
3	◯
4	◯
5	◯
	Very good

11. Have you filled out the interactive design form yet? *

Mark only one oval.

◯ Yes *Skip to question 16*

◯ No *Skip to question 12*

Interactive Form

Figure 82 Study Survey

12. What would you rate the usability of the form? *

Mark only one oval.

Very difficult

1 ◯

2 ◯

3 ◯

4 ◯

5 ◯

Very easy

13. What would you rate the structure of the form? *
(Structure is the arrangement of the form)

Mark only one oval.

Very poor

1 ◯

2 ◯

3 ◯

4 ◯

5 ◯

Very good

Figure 83 Study Survey

14. How would you rate your overall experience of the form? *

Mark only one oval.

Very poor

1 ◯

2 ◯

3 ◯

4 ◯

5 ◯

Very good

15. Have you filled out the static form yet? *

Mark only one oval.

◯ Yes *Skip to question 16*

◯ No *Skip to question 8*

Preference

Please answers the questions below in your opinion

16. Which form design did you visually prefer? *

Mark only one oval.

◯ Static

◯ Interactive

Figure 84 Study Survey

17. Which form design was easier to use/complete? *

Mark only one oval.

- ◯ Static
- ◯ Interactive

18. Which form design had a better structure? *
(Structure is the arrangement of the form)

Mark only one oval.

- ◯ Static
- ◯ Interactive

19. Overall, which form design did you prefer *

Mark only one oval.

- ◯ Static
- ◯ Interactive

Skip to question 20

Submit and Time

20. Time for Static *

_____

21. Time for Interactive *

_____

Figure 85 Study Survey