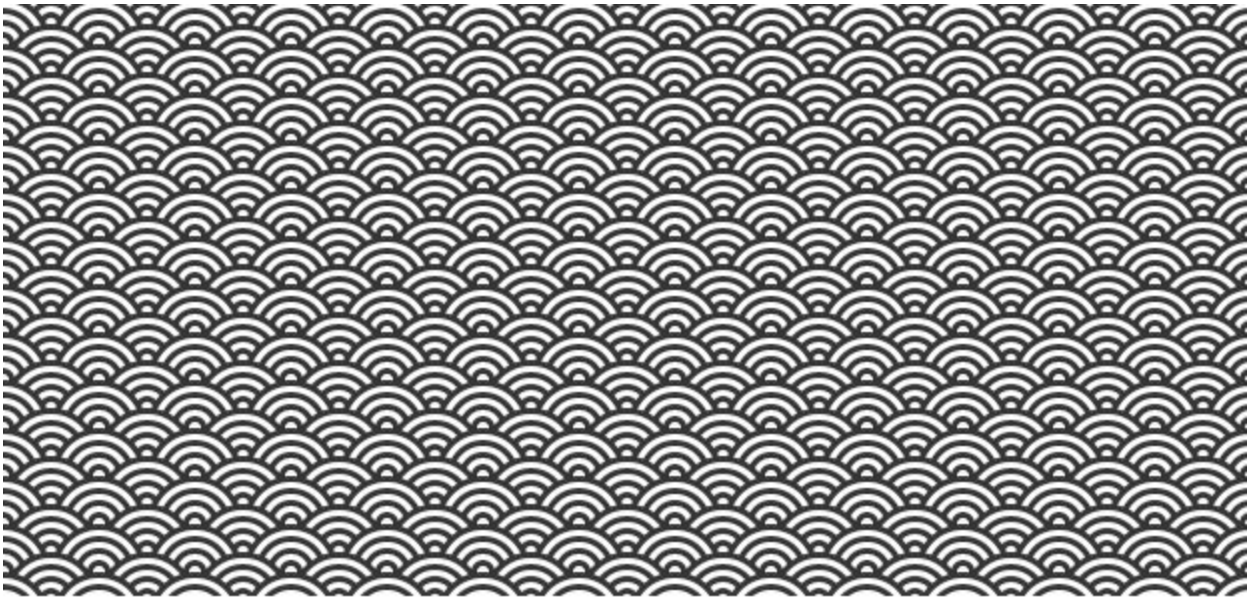

Roadmapp

Stage 3 Reports

Group 10 | Six String Development

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Application Design & Implementation

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1. Introduction

1.1. Purpose

This document intends to illustrate the design process for Roadmapp, the Careers Pathfinder System being developed by Six Strings Development. The report reflects on the application in its present state, just before delivery to the customer, in order to track our implementation against the requirements set out in the first stage.

Provided herein is both a high-level overview of the application and a detailed analysis of system components and design elements in their current form.

This report serves as a record of the design and implementation of Roadmapp, giving an overview of every aspect of the system. Therefore it will be vital as a reference point for any future maintenance or development.

This document may be relevant to several stakeholders, not limited to but including:

1. The software developers: to check whether the product meets the project requirements as set out in the requirements documentation.
2. Lockheed Martin and their appointed representatives: for the client to understand the development process of the system, if/how it is meeting the requirements agreed with the developers and to provide a general status update of the product development.

1.2. Scope

In this report you will explore the design process of Roadmapp, a web based application that will allow end-users to enter their career history to date and will subsequently assist them by means of graphical visualisations and autonomously generated user-specific content to aid them in achieving their desired future career or goal.

At the end of the initial development process, this document consists of design documentation and analysis of the decisions made so far. It is indicative of the system in a deliverable state, with room for further development and improvement in the future.

1.3. Overview

System design

In order to provide straightforward insight into how the development is going we have provided in Section 2 a brief overview of the product, the operating environment, an explanation of our design methodologies and a comparison of our progress against the functional and non-functional requirements established in 'Careers Pathfinder System: Requirements Document'.

Design rationale

Providing more insight into our decision making process and the technologies behind the system we take a look at the rationale behind various aspects of the application.

Architecture

This is followed by a look at the system architecture, both at the high and low-levels, in Sections 3 (overview) and 4 (in-depth analysis) respectively. It provides detail about our operating setup in terms of functions and how they interact with data. In cases where it is useful, we have provided some diagrams to better outline the structure of the application.

User interface and testing

Before concluding the report we provide a direct look at the public-facing graphical user interface, with annotated screenshots from the actual system as it appears on the web. We have provided some examples of testing and the data we used where relevant, in order to illustrate robustness and compliance with usability requirements.

1.4. Website links

Please find below the links to our websites:

- Company: http://sixstrings.rsws.co.uk/
- Roadmapp application: http://roadmapp.rsws.co.uk/
- Roadmapp forums: http://roadmappforum.rsws.co.uk/
- Roadmapp support portal: http://roadmappsupport.rsws.co.uk/

Note that the support and forums would ideally be deployed as subdomains.

The screenshots in this document are taken from a desktop browser perspective unless stated otherwise.

2. System design overview

2.1. Objectives

Our approach to development has adhered to some key principles that have helped to shape the application.

Ultimately, we sought to build a robust platform with the core features outlined in the requirements documents, with the flexibility to build upon the original product with improvements and features at a date if the customer wishes to do so.

The system has been developed in such as way that it is not tied to any particular operating platform, client browser or screen size.

2.2. System operating environment

The application is currently hosted using Microsoft Internet Information Services (IIS) 8.5, an installation which incorporates PHP and MySQL Community Edition. There are, however, no foreseeable limitations with regard to portability between this web server platform and Apache. The client therefore is free to deploy the application on any platform they see fit.

As we will highlight later in Section 4.4: Deployment environment, we have tried to avoid dependencies on server and client-specific functionalities and therefore most modern web browsing clients would be unlikely to experience difficulty displaying the web pages.

We have made use of the following technologies to create Roadmapp:

- HTML
- CSS
- PHP 5.4.24
    - CodeIgniter 3.0 application framework
    - Ion Auth authentication library by Ben Edmunds
- JavaScript (including but not limited to the following frameworks)
    - jQuery
    - AngularJS
    - JointJS
- MySQL Community Server

3. Design rationale

3.1. Architecture

The architecture as set out in the project specification is to be a web-based interface that will interact with server-side functions and data structures to deliver the career pathfinder experience. This is to ensure maximum accessibility as it is the most widely available computing experience, reachable from any device equipped with a modern web browser.

By minimising client-side dependencies we are also able to minimise the difficulty involved in interacting with the system as there is no local setup required beyond registration, fulfilling the principle that the system makes every effort to ensure users return to update their pathway.

3.2. Model view controller

After reviewing several possible options for the base of the system we have selected an MVC-based design pattern. Specifically, Roadmapp is built upon CodeIgniter, something we will discuss more in the next section.

The primary motivation for selecting an MVC is what is known as 'separation of concerns'. That is, the three components: Model, View and Controller are segregated into distinct categories on the server storage pool. This allows for a great deal of modularity and reusability as classes can be developed independently of each other, even by different people who have little knowledge of another part of the framework.

3.3. Framework

Roadmapp utilises CodeIgniter (CI), an open-source application framework that makes heavy use of PHP to deliver dynamic web content. There are several reasons why we have selected this particular framework, but here are some of the key points:

1. *Simple to deploy:* CI runs on any server with PHP (5.2.4) and requires no command line interaction to install, this allows us to begin development quickly and has the added benefit of minimising server dependencies.
2. *Documentation:* there is extensive official (and third-party) documentation available online for CI, which our team found easy to read versus the documentation of other frameworks such as Symfony. Since most of the team had never worked with MVC frameworks to this extent before it is essential that there is good reference material readily available.

3. *Built-in functions:* CI includes a large library of functions, particularly interesting to us are the database interaction tools and security features. Database utilities mean we can easily interact with the MySQL server and more importantly the security features provide protection from PHP-based attacks such as code injection.
4. *Third-party libraries:* in addition to the built-in functions CI has a wide array of third-party tools available, including Ion Auth (developed by Ben Edmunds) which provides site-wide user authentication and identification for the Roadmapp application.

Additionally, to further enhance the user experience the application incorporates several other Javascript frameworks as suited to producing the desired functionality:

1. *jQuery* allowed us to accompany user actions with intuitive animations, for example indicating successful form completion. With its succinct yet powerful nature and extensive online documentation, we were able to develop application features at rapid speed.
2. *JointJS* allowed us to begin building the interactive Journey diagram. With there being a range of open source libraries available online for this purpose, we have been testing several for our application's needs before fully committing; our initial choice was the popular data visualisation framework, d3.js but we found it did not adequately provide the interactive functionality and customisation we needed.
3. *AngularJS* has provided us with an excellent toolset for building a usable application at great speed. Particularly we utilised two-way data binding in components such as the Profile Builder; we will also make use of its client-side form validation features in the next stage, to improve the user experience (removing unnecessary page refreshes).
4. *Semantic UI* has been a very useful open source CSS/Javascript framework in the Roadmapp development; it allowed us to build for mobile from the ground up with its responsive classes and provided core functionality such as our mobile sidebar and search tabs.

3.4. Data model

A database model based on SQL (in this case we are using MySQL) makes most sense for the backend of the system for several reasons:

- The system is very data-heavy and will be reliant upon ever expanding datasets to receive and generate user content.
- We can use core browser technologies (PHP and JavaScript) to interact with data from the MySQL server without involving clumsy (and sometimes insecure) utilities such as Java Server.

- CodeIgniter and the extensions we are utilising are highly suited to SQL data structures.
- A core part of the application is the incorporation of external datasets into our application and many of these are provided in SQL format.

3.5. Development environment

The development team utilised two development environments: Coda (Mac only) and Atom. Both have fairly similar features and are suited to web development and allow GitHub integration. Furthermore, Coda was used for pushing commits to the live version of the site as it incorporates FTP and SSH connectivity.

4. System architecture: overview

4.1. Application architectural design

Roadmapp follows the MVC-based structure considered 'best practice' for the Codeigniter framework, although it does not require that you strictly follow the model in order for the site to function correctly. Therefore, in an ideal implementation, the interaction between the components would be as follows:

- The *controller* is responsible for handling user requests using the resources available to it (brown in Figure 4.1.1.) and can command and act as an intermediary for the model and view.
- The *model* is responsible solely for the representation of data, generally retrieved from databases at the request of the controller.
- The *view* is typically a web page that will be shown to the user. Users will send commands back to the application via the elements generated by the view.

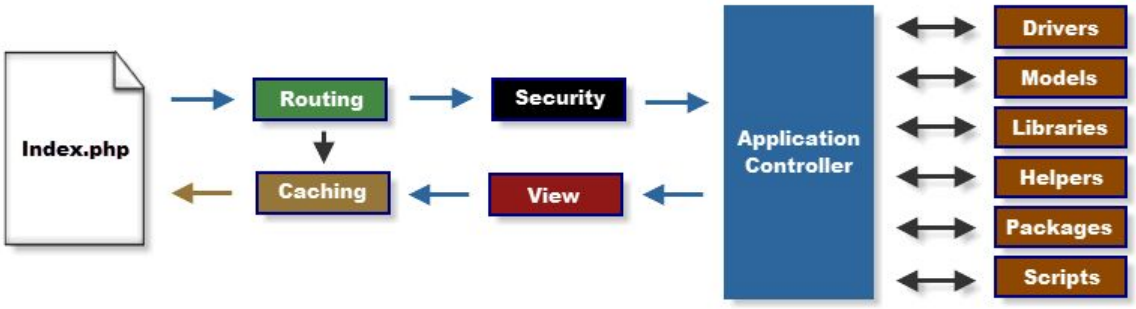


Figure 4.1.1. - Codeigniter application flowchart[1]

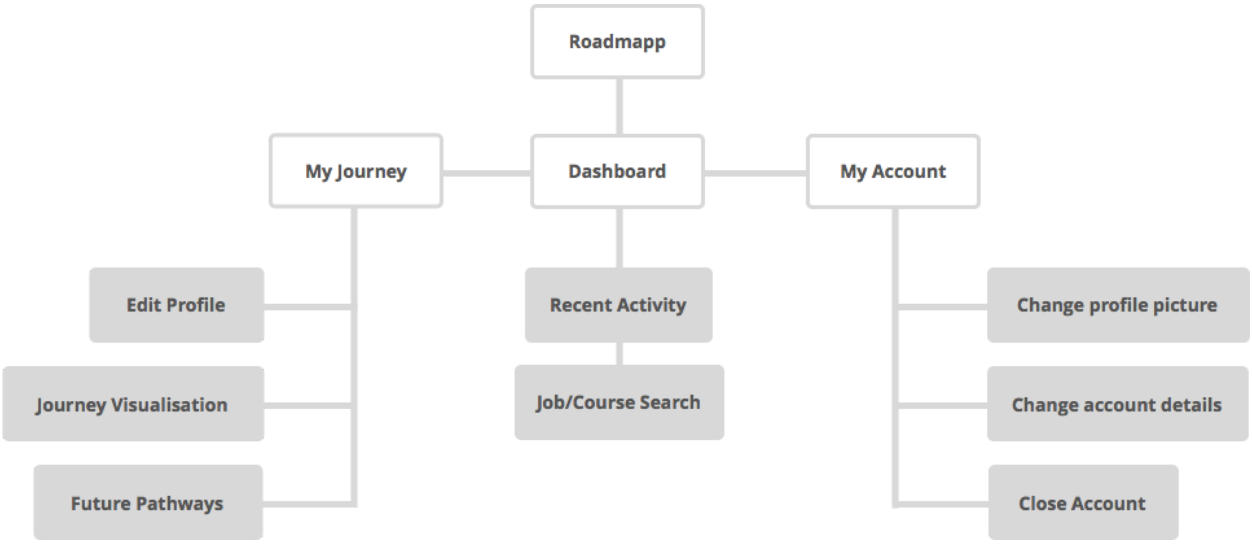
Some things to note about the particular model we have employed:

- The security component pre-screens input from the user before allowing the controller to handle the data. This goes a long way in protecting the application from common malicious PHP attacks such as cross-site scripting and code injection.
- The models are treated as just one of various resources, with the framework designed to accommodate packages and helpers either developed by ourselves or from third-parties whilst still closely following the MVC pattern.

[1] EllisLab. (2006-2014). *CodeIgniter User Guide Version 2.2.0: Application Flow Chart.* Available: https://ellislab.com/codeigniter/user-guide/overview/appflow.html.

4.2. Information architecture

The information architecture diagram below encompasses the structure we have planned for the application.



4.3. Deployment environment

Every effort has been made to minimize dependencies, using core technologies which are available on every modern web server and client browser wherever possible. CodeIgniter allows us to easily move the entire system between hosting architectures using universally defined base URLs and link styles.

In order to host the site the following server-side conditions must be met as a minimum:

- Apache HTTP Server 2.4.18 *OR* Microsoft Internet Information Services (IIS) 8.5
- PHP 5.4.24
- MySQL Community Edition 5.5.44

Clients will require a modern web browser that supports JavaScript and implements HTML5.

Supported Desktop Browsers	Supported Mobile Browsers
Google Chrome Internet Explorer 9+ Firefox 4+ Safari 5+ Microsoft Edge	Chrome for Android Mobile Safari (iOS 5.0+) Android Browser (1.5+)

5. System architecture: database design

5.1. Database tables

Table	Description
profile_basic	This table holds every user's full name, DOB and profile picture filename.
profile_education_courses	For users who have completed the Education section of the Profile Builder, this table holds details about their course: the course name, institution, period of study, level and grade achieved.
profile_education_institutions	For users who have completed the Education section of the Profile Builder, this table holds details about the institutions at which a user has studied.
profile_skills	For users who have completed the Skills section of the Profile Builder, this table holds details about their personal skills.
profile_jobs	For users who have completed the Work History section of the Profile Builder, this table holds details about previous employment: employer, job title, start and end date (optionally 'present' if they still work there).
scqf_courses	The official SQA bank of courses with details such as the course title, description, places of study and the range of qualification levels available.
scqf_parent_entities	The official SQA bank of locations at which courses from *scqf_courses* may be studied.
scqf_qualifications	The official SQA bank of qualifications types which may apply to a course in *scqf_courses*; multiple qualifications may be available for the same course.
scqf_subject_areas	The official SQA bank of subject areas in which courses from *scqf_courses* may be grouped.
users	This table holds key user account details including their email and password for authentication.

	For error reporting purposes and to counteract repeated (failed) login attempts, the user's most recent IP address is recorded. In future development, the application will also make use of the forgotten password and email activation fields.
users_groups	The table holds details of the groups that a user belongs to.
groups	This table stores the set of groups that a user may belong to; a user may belong to more than one, but a user always belongs to the 'user' group.
login_attempts	For security purposes, we have a table to record failed login attempts. This will be possibly utilised in future development to prevent unauthorised access to user accounts; if not, this information will not be collected and the table will be discarded.
ci_sessions	For bookkeeping purposes and to maintain a consistent experience, we store the user's session ID, their IP address and a timestamp. This allows us to provide the "remember me" feature among others.
unistats_joblist	This table holds data of what job opportunities arise from different degrees
unistats_kiscourse	This table holds the general information about the course, such as ID, course title, etc.
unistats_institution	The table which holds information on which university courses are based
unistats_kisaim	Stores information on the level and class of the degree.
qualifications	Simple list of SQA qualifications with their next level of qualification are stored on this table.

5.2. EER diagram

Included below and available at the following URL: https://i.imgsafe.org/219d685.png

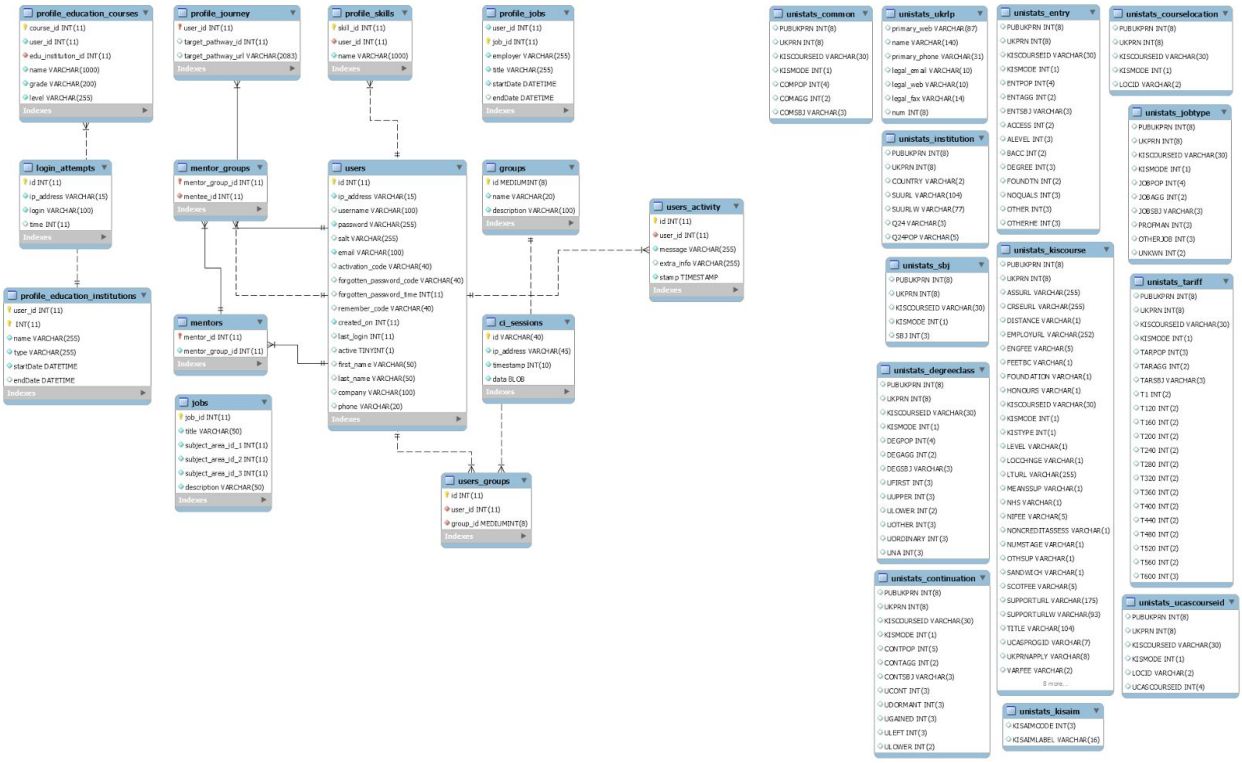


Figure 5.1.2. - Roadmapp SQL EER diagram

6. Software interface design

The user interface accommodates four types of users, as specified in the requirements document. These are: guest, registered user, mentor and administrator.

Guests will simply be able to see pages designed to advertise the services and encourage them to sign up for an account. They are not able to utilise any features of the career pathway system.

Registered users are the primary account type which anyone over the age of thirteen can sign up for. They will be able to utilise the core features of the site to build a profile of their career history, view a personal journey and browse for future opportunities.

Mentors are a minor modification of a registered user, and as such have all the same features as a base with the addition of an area to their dashboard where they can see a list of people they mentor, search for users to invite into the mentorship and click through to a mentees journey.

Administrators have the highest level of access possible on the front-end of the system. Like a mentor they will have their own user profile with some additions, namely the administrator panel.

6.1. Site map

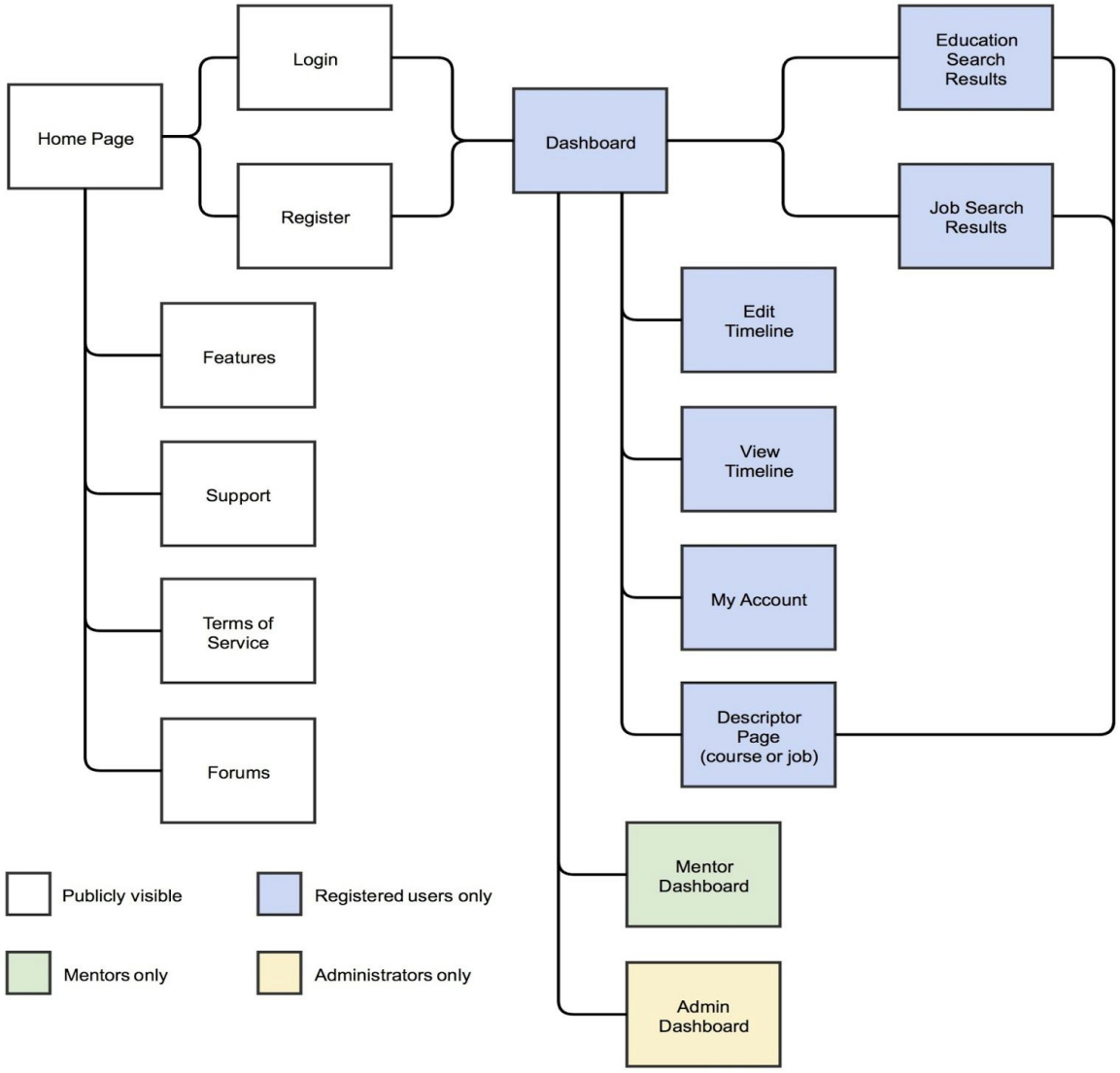


Figure 6.1.1. - Site map with access levels

The site map gives an overview of the application structure, with the user access levels highlighted. Administrators and mentors also inherit all registered user permissions and so can access pages shown in blue. Publicly visible pages are also accessible to registered users, with the exception of the home page which is replaced with the dashboard once logged in.

Due to the dashboard-based design for the system, we have incorporated what would usually be separate pages into one dynamic view. For example, the administrator dashboard incorporates inline graphs, tables and user management pane. This significantly reduces the number of pages required to provide mentor and administrator functionality.

6.2. Responsive design elements

Roadmapp has been designed on the basis that end users will be accessing the service from a variety of devices and screen sizes. Therefore, we have implemented responsive web design practices across the application.

For example, below is a comparison of the navigation pane on desktop vs. mobile/tablet perspectives.

Figure 6.2.1. - Header navigation on Desktop browsers

Figure 6.2.2. - Header navigation on mobile and many tablet screens

Essentially every element is contained in such a way that they can wrap under each other, with grid widths up to three on larger screens and a single column on smaller screens. See the dashboard page as displayed on two different screen sizes as an example, on the next page.

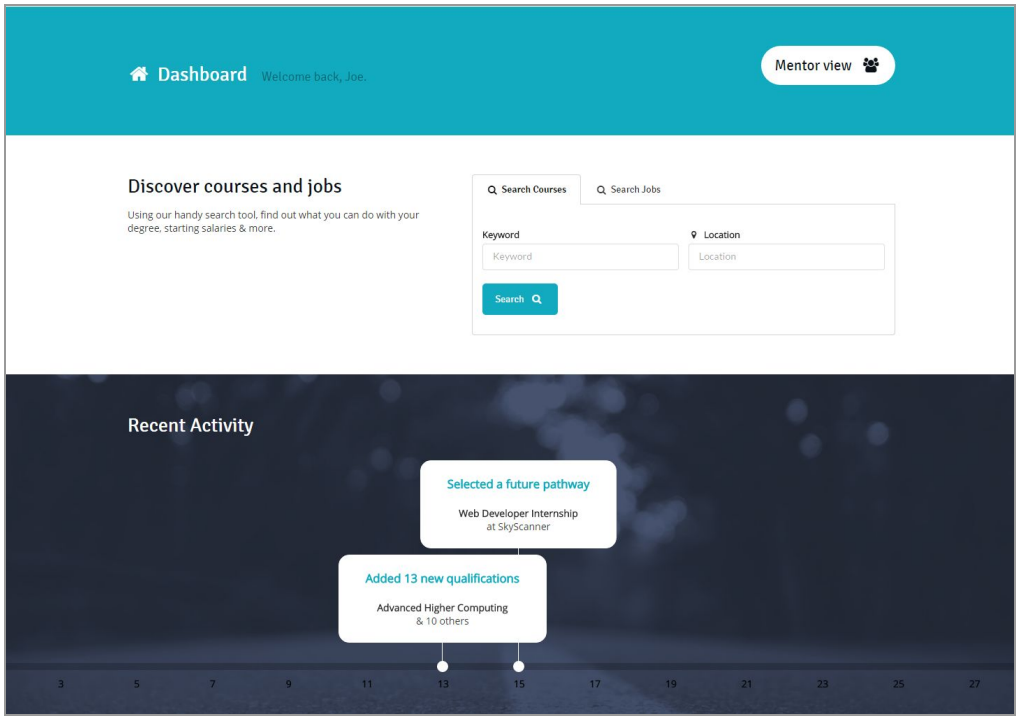


Figure 6.2.3. - Dashboard as seen at 1440pt wide using Chrome

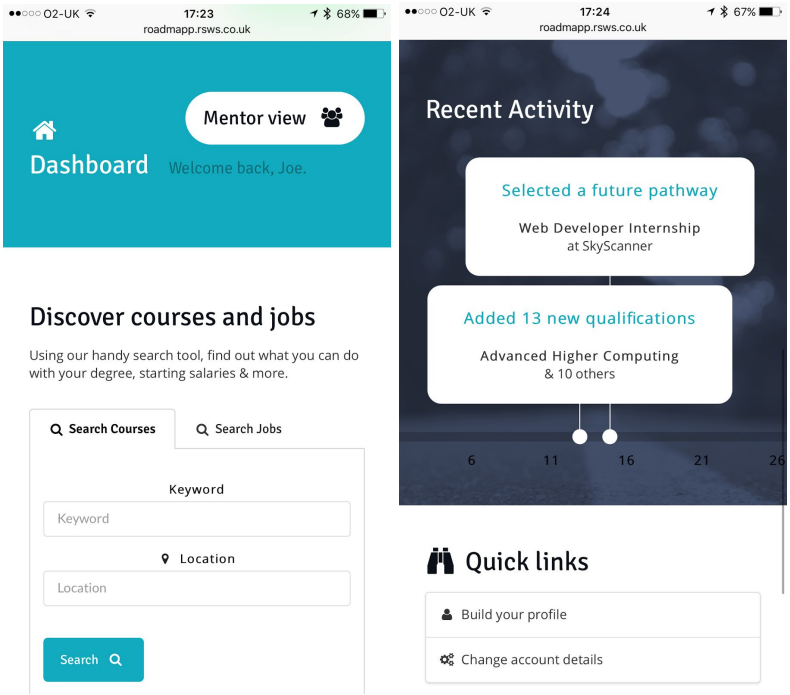


Figure 6.2.4. - Dashboard as seen with Mobile Safari reporting as 414pt wide

6.3. Design decisions and observations

6.3.1 Overview

We thought carefully about how users would use the application in order to decide which elements should have the most weight, in terms of design. Beginning from intial design wireframes of the UI in Sketch, the coded equivalent was produced using a wide array of technologies. Custom graphics, such as the speedometer, wheel and rocket on the homepage were drawn and created by our designer to complement this brand and achieve the appropriate atmosphere of a friendly system.

6.3.2. Colour scheme

Figure 6.3.1. Roadmapp primary colour scheme, in descending prominence

Roadmapp required a colour scheme that would:

- Appeal to the widest possible audience
- Create a calm, friendly and fun atmosphere
- Give weight to the appropriate page elements

Ultimately we settled on a white base with the bright blue colour you see above as a primary highlight. The uses of these colours are covered in more detail in the rest of this section.

6.3.3. Negative space

Throughout the Roadmapp site you will notice a liberal amount of negative space, much of which is white. The motivation behind this is twofold: avoid overwhelming the user with content, and to create a clear content focus and hierarchy.

The most obvious use of whitespace in Roadmapp is surrounding the top navigation area where there is a lot of breathing room around the elements. This greatly improves legibility of the navigation bar, as each link is well defined. See Figure 6.2.1. for examples.

Individual sections are also heavily padded in most cases to create clear separation of content. For example see the ‘Discover courses and jobs’ element seen in Figure 6.2.3. and 6.2.4. The vertical separation of this element makes it the purpose of this area of the page quite apparent, as there is no clutter or overlap from other elements.

6.3.4. Title and footer bars

On the majority of pages throughout Roadmapp you will see a blue bar across the page, near the top that appears similar to this:

Figure 6.3.3.1. - Title bar as it appears on the user dashboard

The primary function of this area is to define the purpose of the page with a bold title describing the page, with room for subtext when needed. Its position on the page also makes it a separator between the header/navigation area and the content.

A secondary feature is the option to enable the large navigation button as seen above. These are generally only used in instances where there is a need to enhance the navigation flow, prompting a user towards a particular action.

Since some pages have the user spend as much time towards the bottom of the page as they do at the top, we have added a navigation bar at the foot of the page:

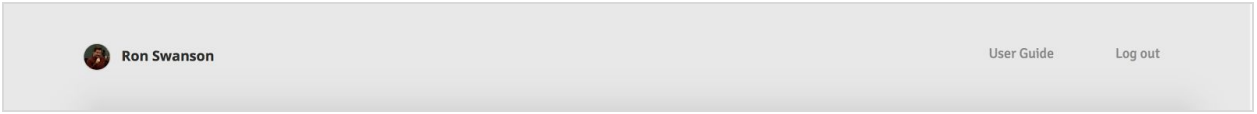


Figure 6.3.3.2. - Footer navigation bar

It provides quick access to the user guide and to logging out. A possible future feature would be the addition of a ‘return to top’ link which would get the user back to the top of the page quickly when at the bottom of a long page.

6.3.5. User interaction elements

Roadmapp also incorporates Semantic UI, a highly customisable user interface framework. It contains a plethora of elements such as buttons, forms, labels, search and many more seen across the application.

The benefit of using a standard framework is that all of our developers can easily assemble content using a broad catalog of defined elements, whilst maintaining commonality with the theming.

A notable example of customizability is buttons. There are three types of action:

	Positive		Neutral		Caution

These colours are used throughout the UI to make connections between the action and outcomes. Actions which have a positive impact (i.e. add or save) are green, actions which neither create or remove data are neutral and actions which may corrode data are marked in red to connote with a sense of caution.

6.4. Screenshots and analysis

6.4.1. Landing page (home for non-registered visitors)

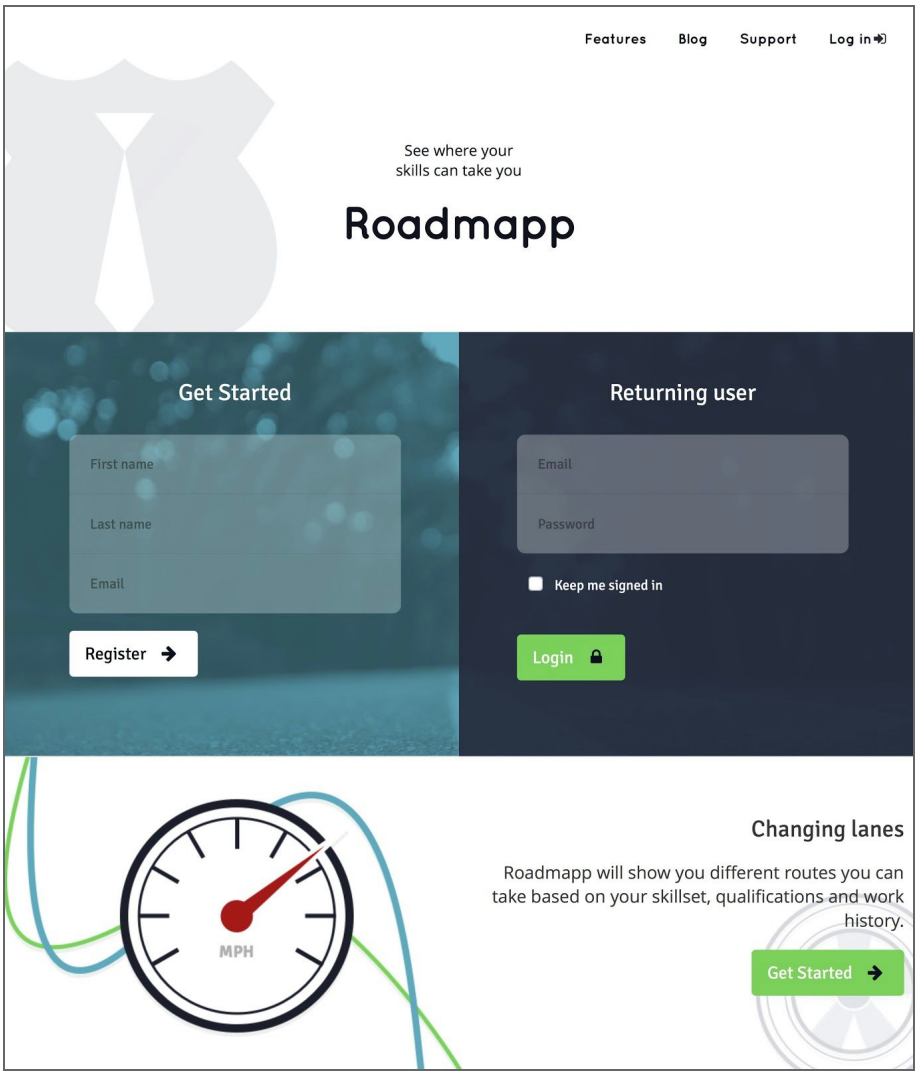


Figure 6.4.1. - Public-facing home page at http://roadmapp.rsws.co.uk/ (guest)

This is the first page a user sees when navigating to Roadmapp's web address. It has a clear focus on letting a user register or login to the service with several panes of information about what the site offers. Users can get more information about what Roadmapp offers by clicking the 'Features' or 'Blog' links at the top right of the page.

A footer is displayed site-wide containing basic useful links to pages such as support, legal documentation, and provides accessible contact information.

6.4.3. User registration

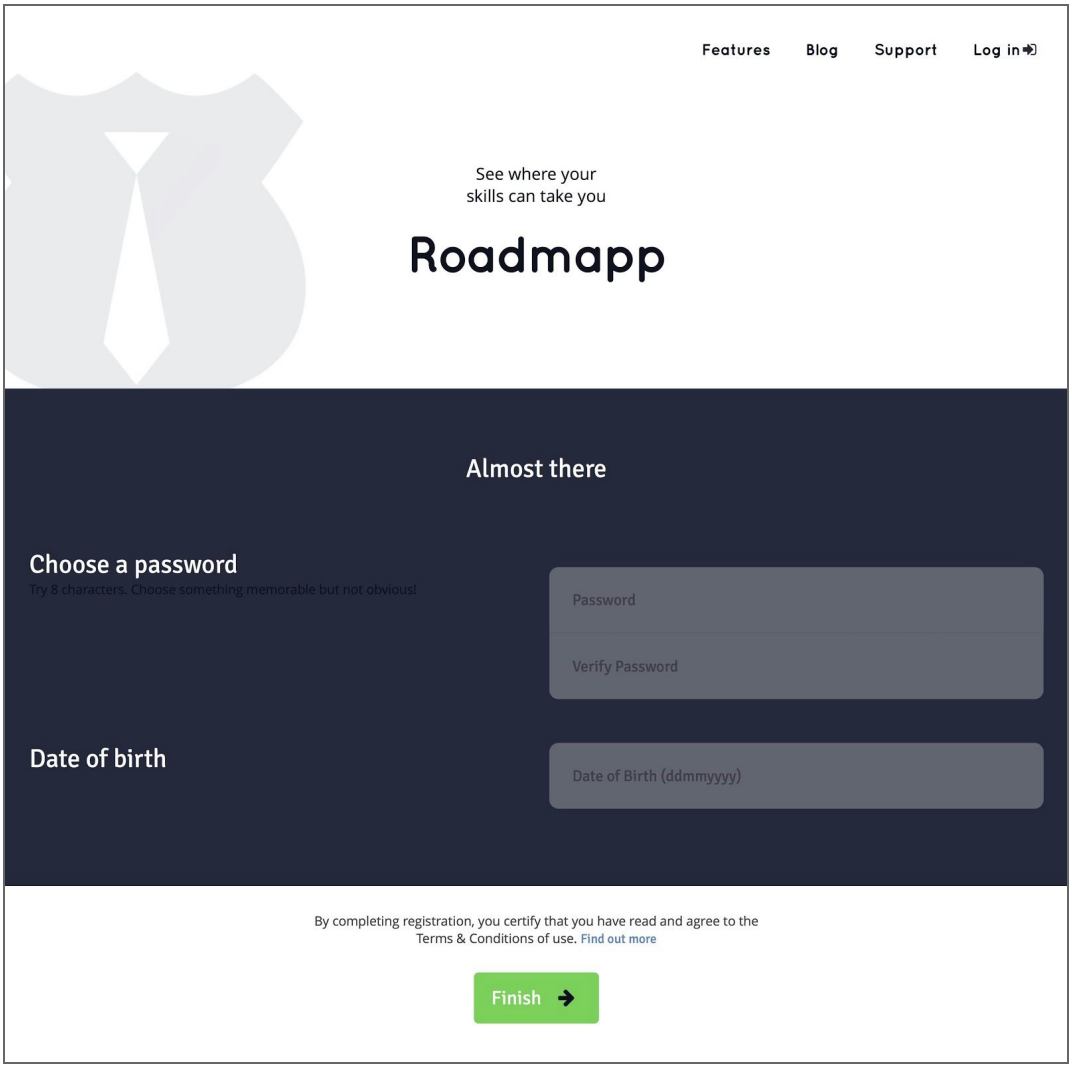


Figure 6.4.3. - Secondary user registration form at http://roadmap.rsws.co.uk/index.php/register

This page in fact represents *secondary* registration, with the user entering their basic details to get started directly on the landing page. From here we can allow a user to set and verify a password, as well as provide their date of birth so that we can:

- Check that they meet the minimum age requirement for registration (13) as per the terms and conditions.
- Provide more appropriate opportunity suggestions.

6.4.4. Dashboard

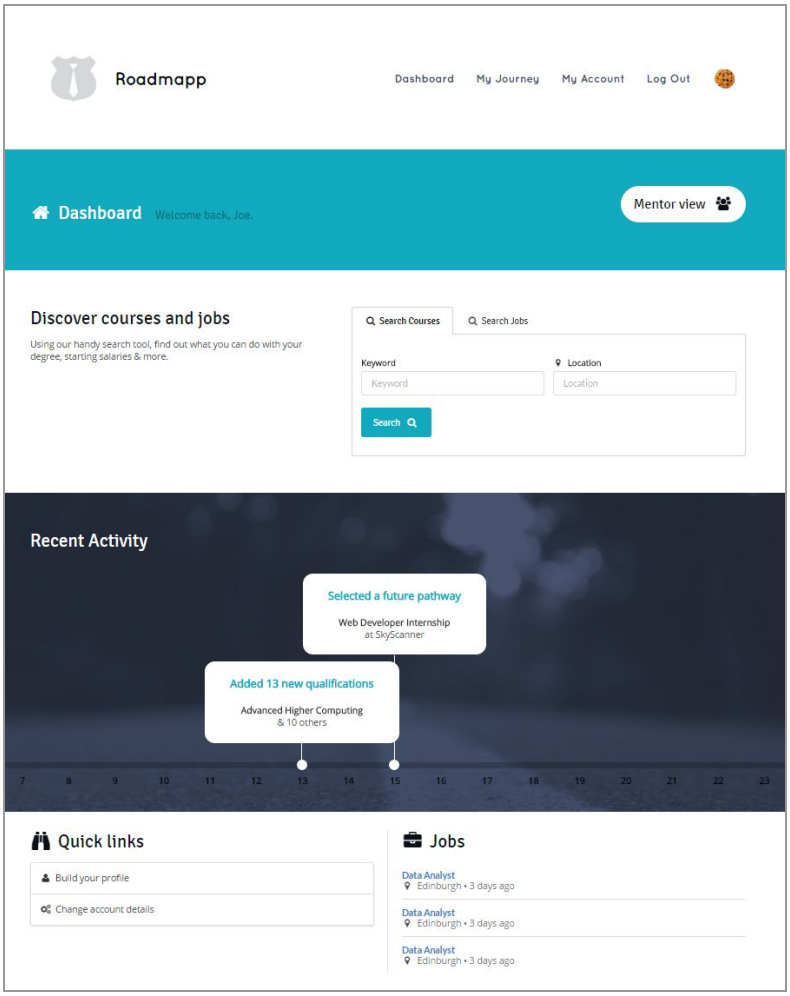


Figure 6.4.4. - Dashboard for a registered user
http://roadmap.rsws.co.uk/ (logged in)

In an effort to improve the usability of the Roadmapp system, logged in users will automatically default to the dashboard when they visit the root link of our website. By shortcutting a user straight to the most essential tools and information needed to make the most of our service, we hope this will:

- Make using Roadmapp a hassle free process, encouraging users to return often.
- Allow a user to take full advantages of the utilities we offer, without having to trawl through the navigation menus.
- Give administrators/mentors an integrated experience with easy access to their respective dashboards when they need it.

The 'Recent Activity' timeline across the centre of the page plots a user's activity on the site against the date it occurred, allowing a user (and their mentor if they have one) to easily see the last changes they made to their profile.

6.4.5. ‘My Account’

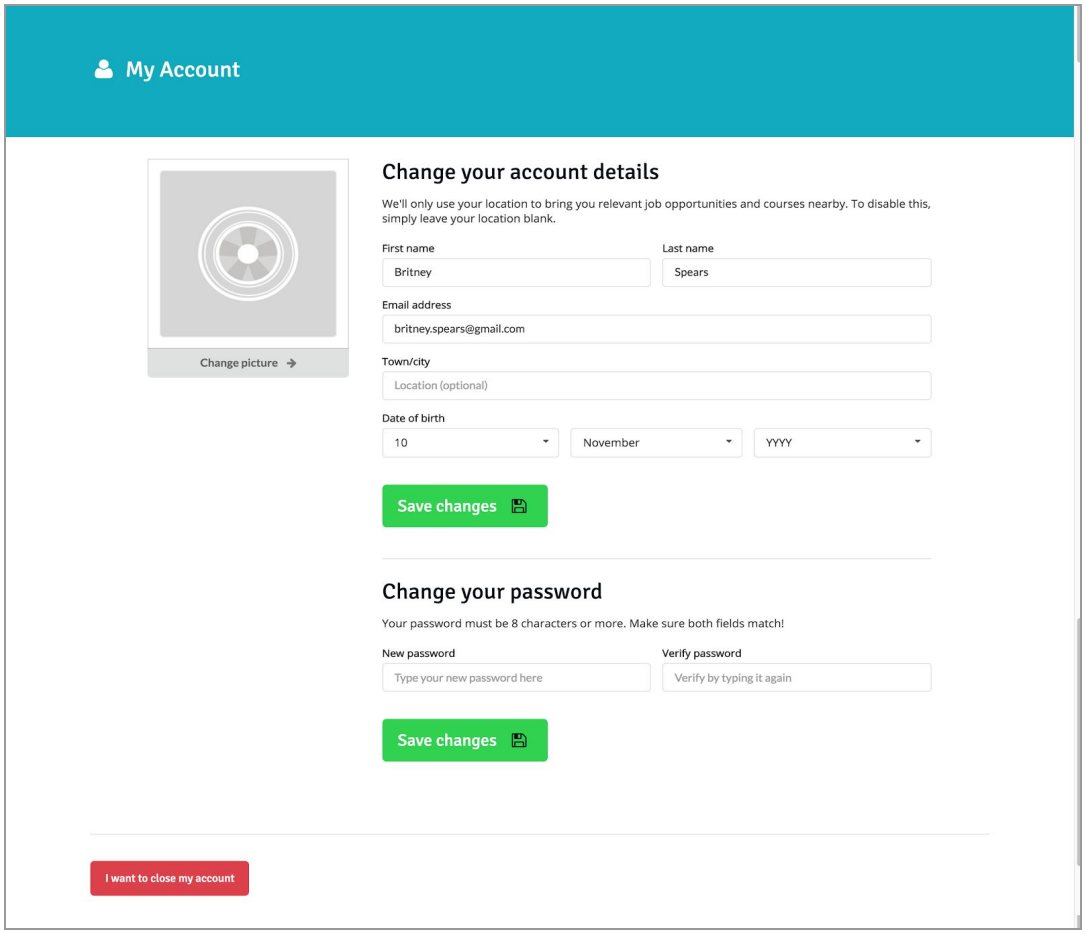


Figure 6.4.5. - An account page for a registered user
http://roadmapp.rsws.co.uk/index.php/myAccount

This page is where a user will manage their personal records that they maintain with us. It is separate from the ‘Journey’ profile in that changes made here do not appear on the recent activity timeline and are not shared with mentors.

Additionally this page provides two other key features:

- Registered users may upload and change their sitewide profile picture at any time using the facility provided on this page.
- A user may opt to close their account at any time. They will be asked to confirm their decision before continuing. In the European Union, under Article 17 of the draft Regulation, it is required that data will be erased when “no longer necessary in relation to the purposes for which they were collected or otherwise processed.” We will therefore not hold user data once they have expressedly requested that their account be closed.

6.4.6. ‘Profile page’

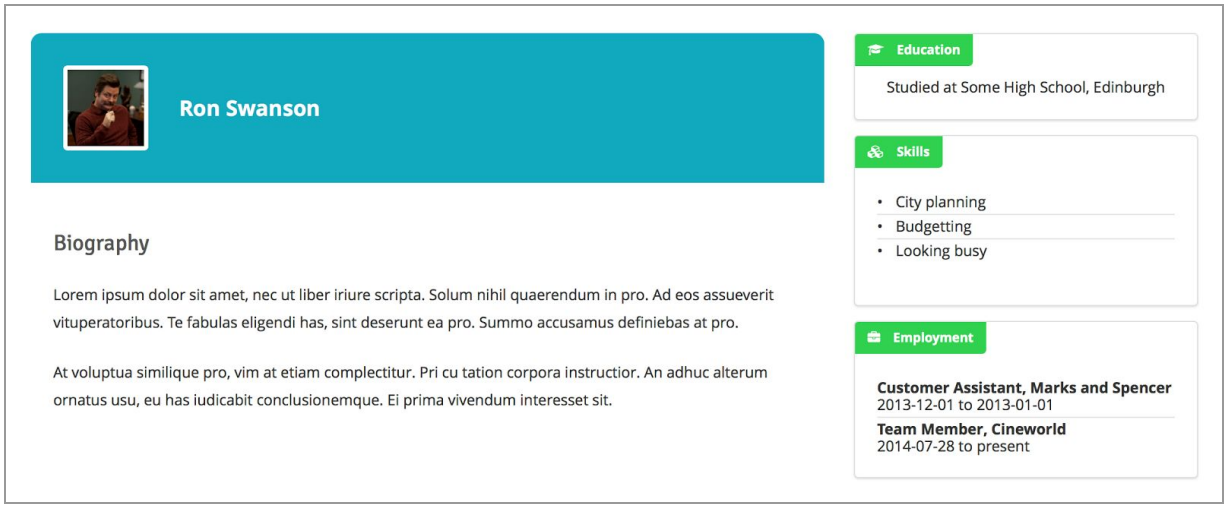


Figure 6.4.6. A user profile page
http://roadmapp.rsws.co.uk/index.php/my_profile

The profile pages have been designed to provide a single place to represent their information in a simple format, without visualisations such as the user Journey. Although underutilised at this point, the intention of this page is to create an outward-facing profile social-media style.

The design therefore intends to incorporate various elements of user data:

- Personal: name, location and biography
- Career: education history, work history and personal skills
- Recent activity on Roadmapp
- A profile picture

Although not all of these elements are currently on the profile page (e.g. biography, for which there is currently no way to add such information) the intention is clear. This page would allow other users to take a look at other profiles and would also provide a core part of the mentor functionality in terms of allowing mentors to find potential mentees and view their data.

6.4.7. ‘My Journey’

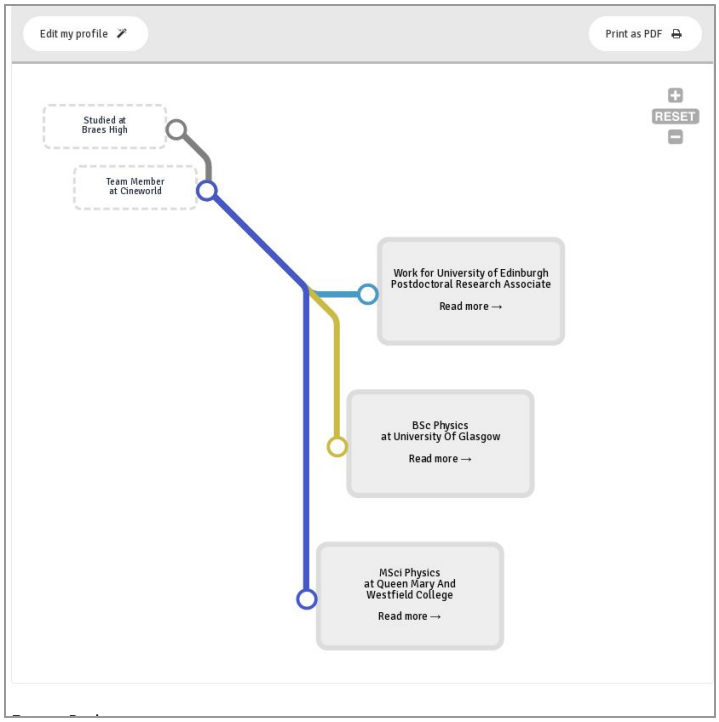


Figure 6.4.6. - Sample journey of a user, suggestions are in green
http://roadmapp.rsws.co.uk/index.php/myjourney

‘My Journey’ is a focal point of the Roadmapp application. It provides a complete timeline representation of an individual's achievements and career to date, combined with semi-automatically generated future prospects.

This particular graphical representation is presented, as specified in Section 2.2, using JointJS.

The information seen towards the bottom of the page is further details of the green nodes appearing on the visualisation. These nodes are future prospects and as such users will need easy access to as much detail as possible.

6.4.8. Profile Builder

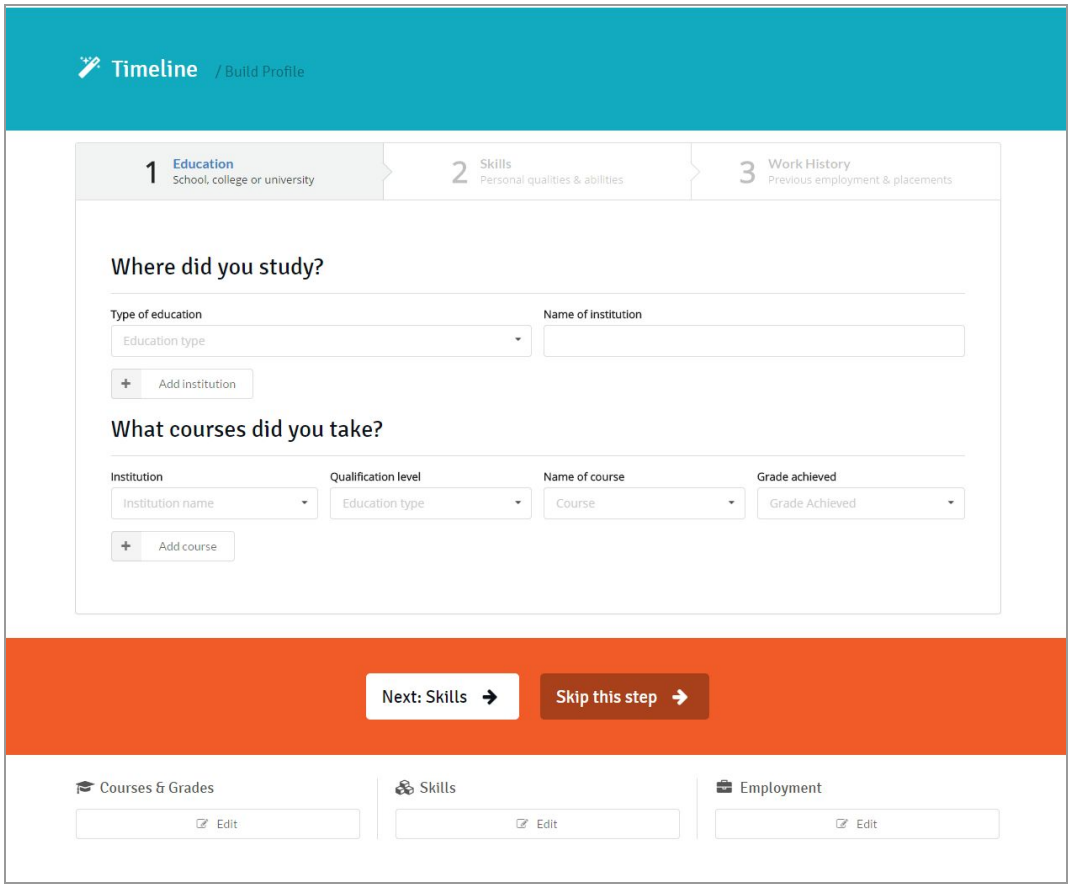


Figure 6.4.7. - The 'Edit My Journey' page is where users build their pathway
http://roadmapp.rsws.co.uk/index.php/build_profile

The 'Profile Builder' aspect of the system provides a key part of the specified functionality, allowing us to plot a user's career on a timeline as their 'Journey'. Registration leads directly to this page, giving a clearly defined flow to the signup process, however, it is also conveniently accessible directly from 'My Journey' so that an individual can keep their profile up to date.

We store career history in three forms:

- *Education:* where and the qualifications gained there
- *Skills:* user selects from predefined bank of skills
- *Work history:* manual input of employer and time spent in the job

Our intentions with this approach is that details are saved as a user goes through the process, with each new addition appearing in the bottom section of added items.

6.4.9. Administrator dashboard

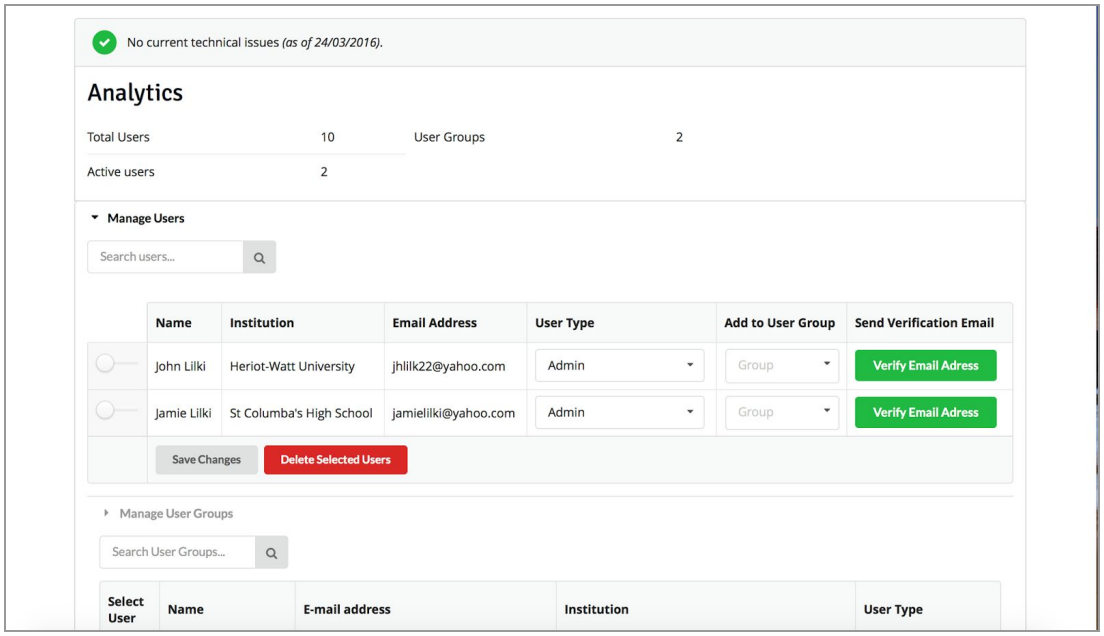


Figure 6.4.9. The administrator dashboard
http://roadmapp.rsws.co.uk/index.php/admin_dashboard

As with the user Dashboard, the Administrator Dashboard takes a modular approach to design.

Each individual function is neatly contained within a dropdown element, allowing an administrator to pick and choose which elements are visible to them. Whilst the panel is not particularly cluttered at the moment, the more functionality added in future would make the collapsibility key to usability of the dashboard.

The theming from the front-end of the application continues into the administrator areas, with well defined colours and interactive elements to ensure ease of use and navigability.

6.4.10. Mentor dashboard

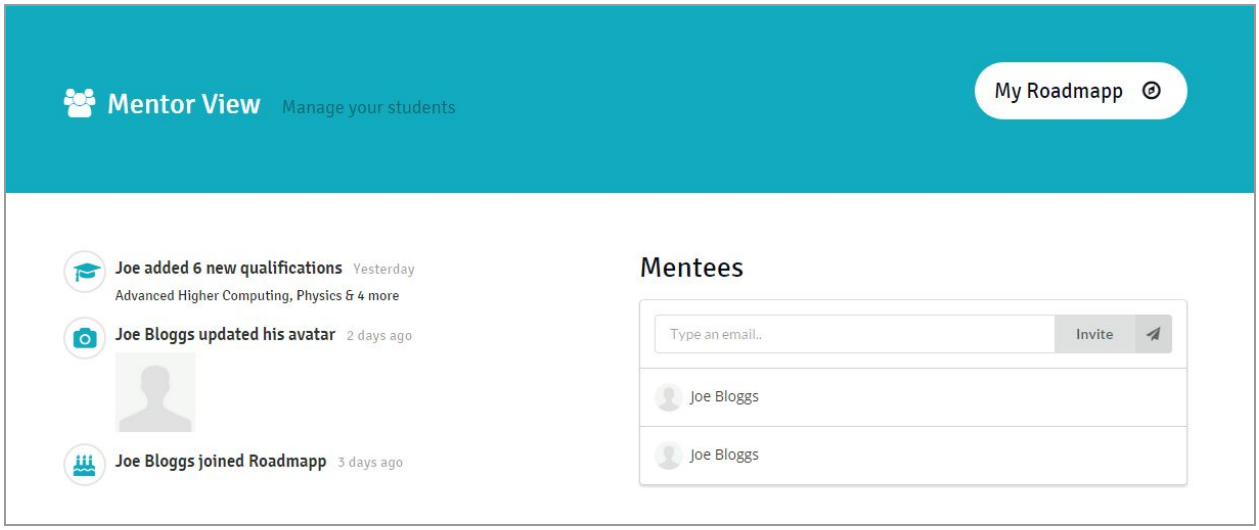


Figure 6.4.11. - Our first iteration of the GUI for the Mentor dashboard
http://roadmapp.rsws.co.uk/index.php/mentor_dashboard

The mentor dashboard is accessible only to those who have opted to join the programme during registration or from their account management page.

The intention of this page is to display useful content for someone looking to assist a group of individuals using Roadmapp or to (with consent) monitor the activities of other people. On the left hand side we have a unified timeline of activity from all mentees of the logged in user. Directly adjacent to this, we have a utility that allows a mentor to invite another user by email to become his or her mentee, with said user having to accept their invitation before being added to the mentor's group of mentees.

As discussed at several points in the evaluation report, the mentor functionality is not complete and as such it remains more of a concept than anything else.

Example use cases for the mentor facility include: high school teacher helping a class of students find out their future prospects or a recruitment agency looking to provide additional support to their clients.

6.4.11. Forums

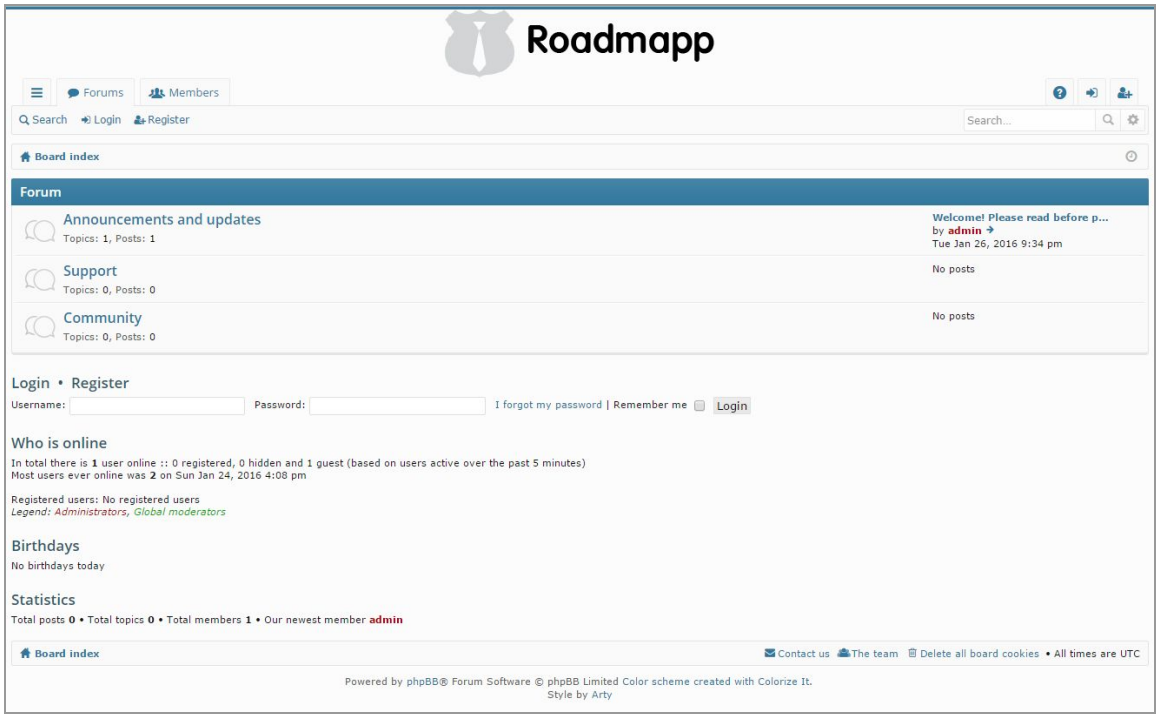


Figure 6.4.11. - Roadmapp community and support forums
http://roadmappforums.rsws.co.uk/

As an additional benefit to users, we have provisioned forum capabilities so that members of the site can interact directly with each other and with Roadmapp support staff.

At a later stage we expect to have a universal link to the forums from the main navigation menu and fully integrate some of its functionality.

6.4.12. User documentation

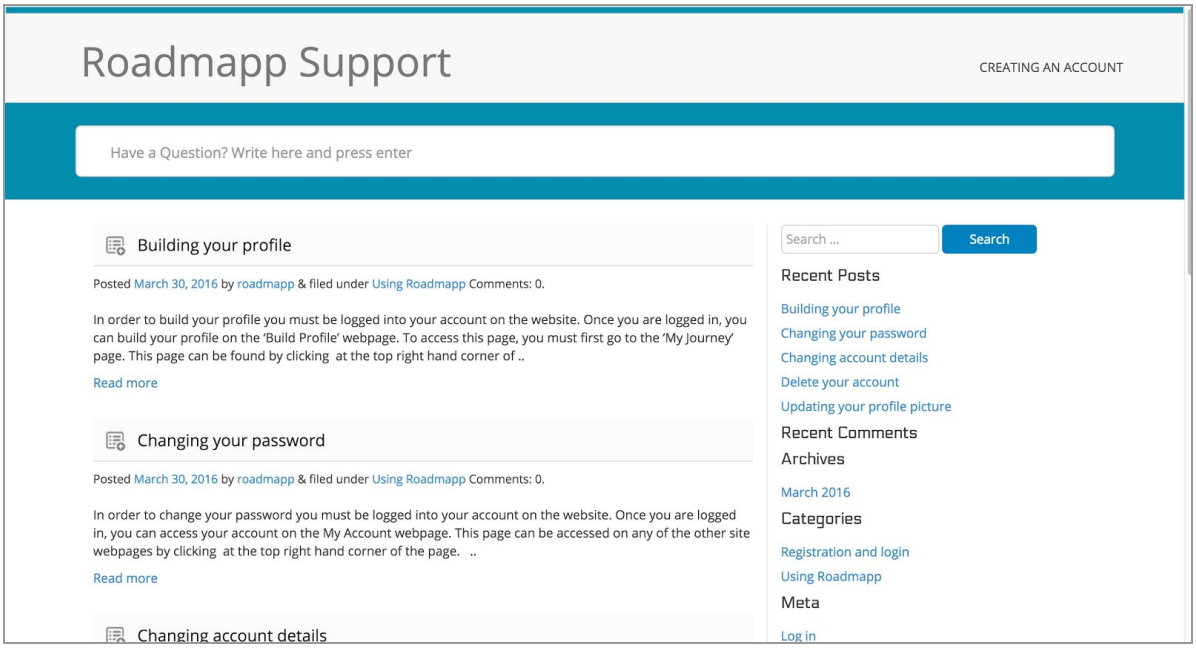


Figure 6.4.12. - Roadmapp user documentation portal
http://roadmapp.rsws.co.uk/docs/

Roadmapp's user documentation is provided via a dedicated documentation portal. It provides user help in a familiar format, using the 'searchable wiki' style used widely across the internet.

On the right hand side there are quick access links for the most common topics, arranged by category. Additionally a prominently placed search function allows users to search for support topics as they would on any search engine.

6.4.13. Welcome carousel

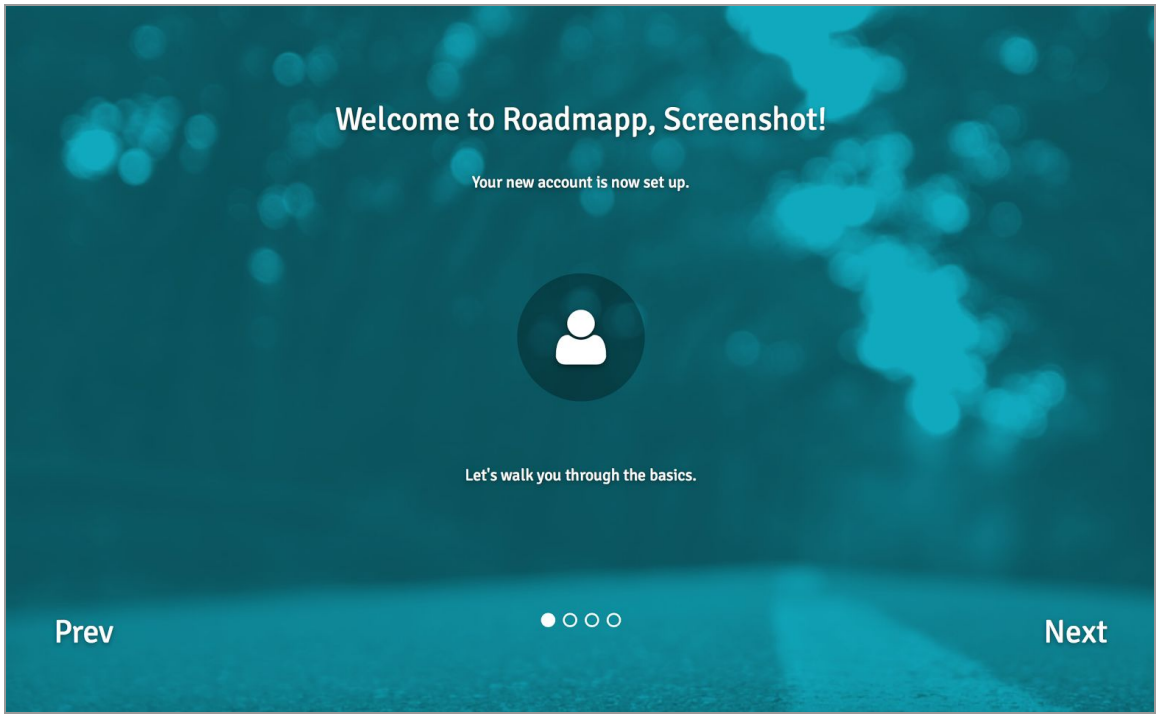


Figure 6.4.13. - Roadmapp 'Welcome Carousel' displayed to newly registered users
http://roadmapp.rsws.co.uk/index.php/welcome

The welcome carousel is an introduction to the site that is displayed to a user once they have registered an account. This feature is used to inform the users of the setting up process of a profile and also the main site features which can be accessed when once a profile has been fully set up.

The carousel is made up of four segments which can be navigated by the user using the onscreen buttons. On the final segment the user can exit the carousel to reach the profile building section of the site.

6.4.14. Miscellaneous static pages

There are a number of static pages accessible from the Roadmapp landing page, such as the features pages, which may provide useful information to guests. These pages are not a functional priority and as such may be lacking in content.

7. Technical correctness and testing

7.1. Application testing

To access our complete testing data visit this link:

https://docs.google.com/spreadsheets/d/16SNbhbnYvVFAwbBQndHAdKdDSkRDe2MsFDmZmej6N6U/edit?usp=sharing

7.2. Test Case Strategy

While functionality was tested on an informal need-by-need basis as the application was developed, further and more documented testing was done to ensure the application works as intended, at least as far as the implemented functionality will allow prior to submission. For example, features such as searching directly for education courses and having forgotten passwords emailed to an address were not fully implemented and therefore could not be tested appropriately.

For the general application testing, test cases with appropriate data were created. The approach to developing test cases included loosely grouping them together to focus on a general area of functionality. Testing was also done across a variety of web browsers, in particular Google Chrome, Mozilla Firefox, Internet Explorer and Edge. The general approach to testing was to use a set of test data and a test process, and then comparing the expected result (i.e, whether it would succeed or fail) and then noting the actual result. Any useful notes from the test instance were also recorded. We also made attempts to test site performance, such as load time for various pages.

Groups of test cases were devised as follows:

Group 1 - Login and Account creation
In addition to testing typical sets of input data, we also tested that the site would protect against basic SQL Injection. In addition, we also tested out the Mentor functionality, although at time of testing, users could only enrol as mentors, without being able to access a working dashboard or invite other users to be their mentee.

Group 2 - Changing Profile/Account elements
Mainly focused on checking the ability to change different elements of your account such as profile picture and password, and change aspects such as First and Last names.

Group 3 - Edit Journey functionality
Testing was changing and removing qualifications, work history and skills.

Group 4 - Admin tools
The amount of testing we could do for this section was limited due to the limited

implementation of the administrative tools. Mainly, testing was focused on testing the implemented feature of flushing the database of unused avatar pictures.

Group 5 - Misc.
This covered testing for basic functions of the site, such as validation functions for entered dates, and checking that the input for emails matched an email format such as "[address]@[domain].[suffix]"

Group 6 - Page load times
Testing was focused on pages and processes expected to have a high load time, such as logging in and loading the Journey page.

Group 7 - Search tools
Testing was mostly focused on the Job search functionality rather than searching for courses, as the course search functions were only partially implemented at the time of testing.

7.3. Results from Application Testing

In general, testing found the web application to behave more or less as expected. In a few instances, new bugs or faults were found, such as the profile picture of accounts not being updated successfully and throwing error messages. Many of the bugs found during testing were corrected quickly. Notes on bugs and errors found can be seen in the test case spreadsheet.

We also made sure to test that the site would protect against basic SQL injection, by testing whether the site would process the entered SQL Query as an executable query or not. The site's implemented protection was enough to prevent the query being executed, although the query would still be taken as a valid string for use as the first name, last name etc.

Several "logic" flaws were also observed when trying to test editing the profile in terms of using the profile builder - there is currently no apparent way for a user to delete their Education, Skills or Work History from their profile. The application also does not check the logic for conflicting dates or for where a user is enrolled for education. However, this is not necessarily a programming fault and more likely simply a design oversight.

7.4. Performance testing

For the performance testing carried out, it was generally found that each page would load in under three seconds, meeting the non-functional requirements. However, it should be noted that loading time testing was performed on a limited selection of platforms and networks and can still vary based on other factors.

Average login time was 2.43 seconds (meeting requirement).

Average time to load "My Journey" was 2.35 seconds (meeting requirement).

Average time to use the Job Search was 2.36 seconds (meeting requirement).

For bulk testing, i.e, testing the application's ability to deal with significant amounts of data as specified by non-functional requirements, there is very little that could be done. This is due to various factors, including the relatively rough and unfinished state of the application, and lack of suitable tools, which would have required us to devote additional resources to develop our own scale testing tools, which would not have been viable.

8. Conclusion

We believe that the version of Roadmapp we are delivering today is a fair realisation of our initial goals and requirements. The system has pulled together information from various sources to create a single destination for individuals seeking to track and develop their career.

Our usability study results are promising in confirming that the premise of the application and its user experience is appealing and has the potential to be a useful tool.

Although we have not been able to implement all the features we had originally hoped to, we have demonstrated our vision where possible for the future extensibility of Roadmapp as a platform.

Appendix I

Definitions and abbreviations

A1.1. Abbreviations

HTML	Hyper Text Markup Language
CSS	Cascading Style Sheet
JS	JavaScript
IIS	Internet Information Services
FTP	File Transfer Protocol
SSL	Secure Socket Layer
HTTP (HTTPS)	Hypertext Transfer Protocol (Secure)
CI	Codeigniter
MVC	Model View Controller
PHP	PHP: Hypertext Preprocessor

Usability Evaluation

Table of Contents

1. Introduction

1.1. Aims and objectives

Included in this document is a detailed plan for carrying out the final usability assessment and the analysis of the results gathered from it.

This report intends to inform the final stage of development of Roadmapp before delivery with data gathered from end-user testing and surveying. This data should highlight errors and flaws in the design of the system which otherwise may have made it into the final product.

This document may be relevant to several stakeholders, not limited to but including:

1. The software developers: to ensure the product meets the project requirements such that the intended users can understand and interact with the system easily.
2. Lockheed Martin and their appointed representatives: for the client to understand the steps being taken to ensure the final product meets its core requirement of user-friendliness and simplicity.

1.2. Scope

There is one System - Roadmapp (formerly known as Career Pathfinder System)

The System will be a public-facing website that is interacted with solely via its browser-based GUI. In order to reach as many customers as possible it is important that the program will work seamlessly across various platforms and browsers: Chrome, Firefox, Internet Explorer and Safari on desktop in addition to Android and iOS mobile browsers on smartphones and tablets.

Users will have their own unique profile which can be accessed via the online interface. They will be able to manage their personal career history (education, training, employment, etc.) and utilise the System's data sources (further education, placements and employment opportunities) to work towards a career of their choice.

The System depends heavily on content visualisations, rather than displaying pages of pure text. This is to:

1. Ensure content and data is presented in an easy to understand manner - suitable for all ages and levels of education.
2. Create an enjoyable user experience so that a user maintains a positive relationship with the website and will want to continue using it over the long-term.

1.3. Overview

Test Plan

A detailed explanation of how the system will be tested: methodologies used, the type of data we expect to collect and from whom, what we aims to achieve with this data and how it will assist in the development of the project.

Test Protocol

The protocol is the flow of events we will be asking the usability test participant to undertake in order to evaluate the software from the perspective of a real-world situation. How successful testers are at completing the predefined goals will provide qualitative data that can inform changes to be made to the user interface before deployment.

Usability results

Analysis accompanied by excerpts directly from user feedbacks will be given to summarise the general consensus from our test subjects on how usable the system is. Complete demographics and datasets will be given where it is possible to do so, such as the quantitative data recovered from Likert scales in the survey.

Conclusions

In closing this report we will outline the key points to be taken away from this usability test and any changes that will be made to the product as a result.

Appendices

Any additional documentation generated by this process will be provided for reference at the end of the document. Complete listings of appendices are available on the contents page.

2. Test plan

2.1. Objectives

The test should focus predominantly on assessing the subject's ability to utilise the mock-up prototype, with particular focus on its ability to be used easily to perform given tasks regarding core functionality by a subject group with varying levels of computer literacy.

The hope is that feedback gained can be used to recognise areas of improvement, and gather potential changes to consider for implementation.

The aims of this study are to:

- Test run the application with an individual who forms part of our target market.
- Gather quantitative and qualitative data via various forms of user-based feedback.
- Determine any issues with the usability of the application.

2.2. Participants

An ideal participant group would be 8-10 individuals over 16 years of age who are:

A. Recent school leavers looking for long-term employment or further education opportunities towards a particular line of work.
B. People currently unemployed looking to put their skills and qualifications to good use.
C. People currently employed with the intention of changing career through education or employment elsewhere.
D. Persons in general who wish to undertake education or employment in order to further their career.

Varying levels of "computer literacy" and skill using internet-based technology between subjects would be further ideal for feedback across a range of potential end users. Ideally, subjects would be recruited from a range of backgrounds and disciplines.

For the purposes of availability, subjects will likely be acquaintances known to members of the development team.

The participants will be asked to attempt to complete a series of tasks as effectively as possible on a live version of the website, as well as answer standardised questions during the study. Participants will also be asked to complete a questionnaire upon completion of the tasks. The participants will be expected to provide honest feedback regarding the usability and functionality of the website design.

2.3. Task Scenarios

Question	Requirement	Description
1. Landing page		General usability and interface assessment
2. Registration	F-UR1-1.1 F-UR1-1.2 F-UR1-1.3 F-UR1-5 F-UR1-7	Career history input interface Gather additional profile information Email verification Account age restriction Single email, single user registration
3. Profile builder	F-UR2-1 F-UR2-2	Career history input interface Gather additional profile information
4. Dashboard	F-UR4-1 F-UR4-2 F-UR6-1.1	Data from multiple sources Data from SQL dump
5. Pathway ('journey')	F-UR3-1 F-UR3-2 F-UR6-1.1 F-UR6-1.2 F-UR6-2.1 F-UR6-2.2 F-UR6-2.3	Timeline representation of a user pathway Edit timeline Display potential opportunities Filter potential opportunities Provide a pathway to selected career destination Link user to possible relevant institutions Link to possible employers
6. My account	F-UR1-8 F-UR2-3	Account deletion Edit profile information
7. Administrator dashboard	F-UR5-1 F-UR5-2	Usage analytics Statistical reporting

Test scenarios will be assigned one of three values:

- *Success - Subject completed task without any prompts from investigator.*
- *Required prompt from supervisor - Subject required assistance from the investigator to complete the task.*
- *Unsuccessful - Subject was unable to complete the task.*

The classification system for each scenario completion will allow us to observe user performance over various scenarios; if a particular scenario garners a large amount of 'Unsuccessful' or 'Required prompt from supervisor' values, it can indicate design issues. It will also allow us to establish an overall idea of the website's usability in key areas.

The scenario will be considered ‘complete’ when the subject indicates that the task requirements have been met, or when the subject has received enough help to consider the completion unsuccessful.

The investigator should also attempt to take note of the subject’s path for completing a task; recurring deviations from the simplest path (success-critical or not) could indicate poor or un-intuitive design.

Subjective feedback will also be gathered through a questionnaire at the end of the main test, with the goal of collecting more (typically qualitative) data. The questionnaire is composed of likert scale questions regarding aspects of the website such as design, usability and usefulness.

2.4. Metrics

Useful metrics to measure and examine in the intended context of the usability study; others may be measured/observed as a by-product but main points for assessment:

- Values from subject feedback scales (i.e, likert). - *Patterns may indicate strong or poor design, and outliers can be assessed for particular issues.*
- Rate of completion. - *If a task has a rate of completion below an acceptable threshold, we can assume fault lies with poor design.*
- Required assistance rates - *If a high number of subjects require assistance to perform a task, this could be an indicator of design issues.*

3. Testing protocol

To be completed by supervisor

Testing supervisor: _____ **Date:** _____

Participant No. _____ **Location:** _____

Aim of this session

Today you will be trying out an application designed to assist you in tracking your career history and with obtaining a particular career in your chosen industry by making recommendations on education, placements and employment opportunities. The application is in the final stage of development and your feedback will be used to improve the features of the site and the way in which it interacts with users.

Introduction

I will be ask you to interact with various elements of the user interface in a particular order (or 'flow'). You should then describe what you think each page is presenting and/or prompting you to do before completing some simple tasks. I will be taking notes throughout in order to record your actions taken and any verbal feedback you may provide at any point during the test. Any data or feedback collected from you will be anonymised and cannot be traced back to you.

After the test is complete I would be grateful if you would take a few minutes to complete an anonymous questionnaire to collect further feedback on the website.

There are no right or wrong answers. Understanding your interpretation of the way the system is presented will aid us in improving its design.

You may stop this test at any time. If you wish to do so, please inform the test supervisor.

Notes to test supervisors:

1. The page descriptions are for your reference and should not be read verbatim to the participants prior to them answering the questions for that page
2. Text in square brackets ("[...]") denotes prompts for the test supervisor
3. Traffic light indicators should be circled following observation of tester completing the action

1. Home page

This is the 'landing page', the entry point for guests to the site and has two purposes: to allow new users to gain an understanding of what the service is and to register, and for existing users to easily login to their personal dashboard.

http://roadmapp.rsws.co.uk/ (logged out only)

a) Can you describe this screen?

b) Who do you think the intended audience is for this site?

c) How does the colour scheme and general appearance of this site make you feel?

d) Using the facility on this page, please begin the registration process for Roadmapp.

◉ *Success* ◉ *Required prompt from supervisor* ◉ *Unsuccessful*

2. User registration

This is the primary user registration page where users can provide additional information before completing the process of signing up.

http://roadmapp.rsws.co.uk/index.php/register

a) Is it apparent what you need to do on this page? If not, is there anything in particular you feel would be useful for a user to know?

b) Please now complete the form on the page and complete registration.

◉ *Success* ◉ *Required prompt from supervisor* ◉ *Unsuccessful*

c) You should now be presented with an interactive element that highlights the basics of using Roadmapp. Please navigate through the slides using the onscreen navigation.

◉ *Success* ◉ *Required prompt from supervisor* ◉ *Unsuccessful*

d) How useful do you feel the information you just saw would be to a new user?
[Please note the number and any additional comments offered by the tester.]

Not useful at all **Highly useful**

1	2	3	4	5

e) Please proceed to the profile builder using the 'Build your profile!' icon on the final slide.

◉ *Success* ◉ *Required prompt from supervisor* ◉ *Unsuccessful*

3. Profile builder

Before a user can take advantage of all the features Roadmapp has to offer they must first complete their profile, which constitutes their education and work history. On this page we have created a three stage process to collect such information.

http://roadmapp.rsws.co.uk/index.php/build_profile

Specific observations

1. Total time to complete all three stages of the profile builder: :
2. Number of work history elements added:

---

a) Follow the onscreen prompts to add your secondary school and three qualifications of your choice to your profile. Once you are done, click 'Next'.

[Supervisor should begin timing immediately following this instruction.]

◉ *Success* ◉ *Required prompt from supervisor* ◉ *Unsuccessful*

b) Add five skills of your choice and then proceed by clicking 'Next'.

◉ *Success* ◉ *Required prompt from supervisor* ◉ *Unsuccessful*

c) Add up to three instances of prior or current employment and click 'Next'. If you have nothing to add in this section please click 'Skip this step' instead.

◉ *Success* ◉ *Required prompt from supervisor* ◉ *Unsuccessful*

[Supervisor should stop the timer following completion of this task.]

d) Having now completed building your profile, how easy did you find the 'Profile Builder' to use overall?

Very easy to use **Very hard to use**

1	2	3	4	5

4. User dashboard

The user dashboard is the home page for logged in users. It provides easy access to the most useful features of the site, including: job and course searches, the recent activity timeline, a handful of suggested opportunities, as well as quick access links to 'My Journey' and account management pages.

http://roadmapp.rsws.co.uk/index.php/dashboard

Specific observations

1. Did the user make use the 'location' search refinement option:

---

a) Please give me your initial impressions about the layout of this page and what you think of the colors, graphics, photos, etc.

b) Please express what you think the content under 'Recent Activity' is trying to illustrate.

◉ *Success* ◉ *Required prompt from supervisor* ◉ *Unsuccessful*

c) Use the course search facility to search for a course of your choice. From the search results page navigate back to the dashboard to continue.

◉ *Success* ◉ *Required prompt from supervisor* ◉ *Unsuccessful*

d) Use the job search facility to search for a job of your choice. From the search results page navigate back to the dashboard to continue.

◉ *Success* ◉ *Required prompt from supervisor* ◉ *Unsuccessful*

e) If you could change one thing about this page what would it be?

5. My journey

A cornerstone of Roadmapp's functionality, the 'My Journey' page is where the application renders the graphical timeline representation of an individual's career history collected via the profile builder. It also provides access to automatically generated 'future pathways.'

http://roadmapp.rsws.co.uk/index.php/my_journey

a) The focal point of this page is the interactive visualisation of your career pathway, or your 'journey'. Take a few moments to explore this element using your mouse and the onscreen controls.

◉ *Correct* ◉ *Required prompt from supervisor* ◉ *Unsuccessful*

b) Do you believe this representation of your career would be helpful in planning your future career choices?

c) What improvements would you make to the design of the interactive timeline?

d) Looking at the future pathways section towards the bottom of the page, how relevant are they to you based on the details you provided to the application previously.

Completely unrelated **Highly relevant**

1	2	3	4	5

6. My account

This page provides a place for a user to manage their account, with facilities to edit details and close their account.

http://roadmapp.rsws.co.uk/index.php/my_account

a) Add your town/city to your profile and save the changes.

◉ *Correct* ◉ *Required prompt from supervisor* ◉ *Unsuccessful*

b) How important is it to you that you are able delete your user account and associated data from Roadmapp?

Not important at all				**Highly important**
1	**2**	**3**	**4**	**5**

7. Administrator dashboard

The administrator dashboard provides useful at-a-glance information for system administrators in addition to user management facilities.

http://roadmapp.rsws.co.uk/index.php/admin_dashboard

[Supervisor should at this point log the user out of the application and sign them back in using an administrator account in order to reach the administrator dashboard.]

a) What do you think the purpose of this area of the application is?

b) Without clicking on anything yet, please describe the options on this page and what you think they do.

c) Imagine you are an administrator for this website. Your task is to promote a user, 'Ann Perkins', to the position of site administrator. You will then need to create a new user group called 'Admins' and add this user to the group.

◉ *Correct* ◉ *Required prompt from supervisor* ◉ *Unsuccessful*

8. Complete test

a) Please complete this test by logging out of the system.

◉ *Correct* ◉ *Required prompt from supervisor* ◉ *Unsuccessful*

4. Usability test results

4.1. Test subject demographics

Gender	
Male	8
Female	4

Age	
16 - 18	0
18 - 24	8
25 - 34	0
35 - 44	2
45 - 64	2
65 +	0

Primary Occupation	
School Student	0
College Student	0
University Student	8
Apprentice	0
Employed	3
Unemployed and seeking work	1
Unemployed	0
Retired	0

4.2. Usability results

4.2.1. Landing page

First impressions and appearance | Question 1A and C

The overwhelming response to Roadmapp in first impressions is a positive one. Most appreciated the aesthetics and felt it was welcome to both new and returning users.

One user noted the design of the page as well as realising what the service will provide:

"It's very modern. Nice and colourful... Gives the impression that it will help me to something different."

Since this summarises the overall tone of the feedback in this instance we are satisfied that the guest landing page serves its purpose to greet new and existing users alike, whilst also giving a feel for what the service is.

Taking a closer look at design specifically, feedback continued to be positive on the whole. Here are a few examples of what the testers had to say when asked how the appearance makes them feel:

"Design gives a sense of importance. It's intriguing."
"Quite neutral, similar to what most businessy application go for."

This is encourage as Roadmapp seeks to be non-offensive whilst at the same time stand out enough so people take time to see what features it offers. The only notable concern from this part is that several users believed the design to be too liberal with negative space:

"A bit too much white at the top. Pushes more interesting content off the page."

Intended audience | Question 1B

Some testers specifically highlighted variations of 'people leaving education' and 'people looking to change jobs. Most importantly however, was the high rate of people expressing that the service was for 'anyone' or 'everyone' as this is indeed a requirement of the application.

Task: beginning the registration process | Question 1D

No users had difficulty identifying the registration element on the page.

Success	Required assistance	Unsuccessful
12	0	0

Suggested changes based on feedback

1. None

4.2.2. Registration completion

Is it clear what needs to be done on this page?

It was overwhelmingly the case that users knew what had to be done for the second part of the registration. The supervisors themselves noted some minor issues, however, with the Welcome Carousel and as such we have made some recommendations for future changes.

Task: completing the registration process | Question 2B

Completed in all cases without issue.

Success	Required assistance	Unsuccessful
12	0	0

Task: using the Welcome Carousel | Question 2C

All users were successfully able to navigate the Welcome Carousel and expressed how friendly it came across.

Success	Required assistance	Unsuccessful
12	0	0

Rate: how useful is the Welcome Carousel? | Question 2D

As is indicated on the scale below, most users indeed found this feature useful for themselves or for any new user more generally.

Not useful at all **Highly useful**

1	2	3	4	5
0	0	1	6	5

Task: beginning the registration process | Question 2E

The vast majority of users completed this with ease, only one instance where the user was further down the page and so didn't realise where to enter details.

Success	Required assistance	Unsuccessful
11	1	0

Suggested changes based on feedback

1. Various participants have tried to interact with the picture on Slide 2 of the Welcome Carousel, perhaps the appearance of this element could be changed to make it more apparent that you do not need to do anything with it.
2. Disable the 'Next' button on the final slide of the Welcome Carousel as it has proven to be confusing.

4.2.3. Profile builder

Specific observations

Average time taken to complete profile builder: 3:50

Time taken to complete the profile seemed to be divided between those who completed it with ease in only a few moments, whilst a few took considerably longer to become accustomed to the interface.

Task: adding school and three qualifications to profile | Question 3A

In this task and in the two that follow there was an issue where some users did not immediately recognise that they had to click the 'add' button after filling out a field, as they thought this meant 'add a new instance' rather than saving the current one. Other than this most users followed the onscreen through each stage.

Success	Required assistance	Unsuccessful
10	2	0

Task: adding five skills to profile | Question 3B

Essentially no issues encountered here, however one user did suggest that being able to hit the 'return' key would be more useful when entering an item than manually clicking 'add'.

Success	Required assistance	Unsuccessful
11	1	0

Task: adding three instances of employment | Question 3C

All participants completed this task and saved their profile data successfully.

Success	Required assistance	Unsuccessful
12	0	0

Rate: how easy did you find the profile builder was to use? | Question 3D

Comment

Very easy to use				**Very hard to use**
1	**2**	**3**	**4**	**5**
1	7	2	2	0

Suggested changes based on feedback

1. Possibility of changing ‘add’ to ‘save’ should be seriously considered, perhaps also making the icon green inline with other elements across the site that save data.
2. Make it possible to submit data using the return key, after which the cursor should refocus in the textbox the user would need to use next.

4.2.4. User dashboard

Specific observations

Number of users who made use of 'location' to refine searches? 8

Most users did in fact use the location refinement option. This is a positive sign as the design of the element leads you to filling in the data before hitting return. Some individuals may simply not wish to refine their search further.

Additionally, please note that the course search facility was not functioning during the usability study and so was not assessed despite its appearance on the protocol.

First impressions of the design and layout of the page | Question 4A

The majority of our testers responded positively to the Dashboard in terms of its design and features. Some examples of these responses are as follows:

"Simple. Easy to see what everything does."
"Smart, simple and effective."

Most users feel positively towards the GUI of Roadmapp in general with little to no concerns expressed in most cases. In some instances however, some testers did take issue with some elements of the design:

"Quite boxy. No particular element stands out."

Whilst this user has posed no element standing out, this is in many ways a pursuit of the Dashboard design. The intention is to provide a place where all items have almost equal importance, providing a single place to access important features and information at a glance. In terms of design it is not always possible to please everyone, but we feel this design is not too far from doing so.

Task: explain what content under 'Recent Activity' represents | Question 4B

An issue discovered in earlier stages of development was that users faced a degree of confusion over the presence of two 'timelines': one being this activity element (rendered against a timescale) and the timeline of an individual's career history. Following such feedback we have rebranded the career history timeline as 'My Journey', creating further distinction between the two. Most testers therefore successfully indicated that the 'Recent Activity' is their activity within the application only and is not their 'pathway'.

Success	Required assistance	Unsuccessful
12	0	0

Task: using the job search facility | Question 4D

In all but two cases testers easily spotted the 'Job search' tab, which is not the selected option by default (courses is the active tab on page load). In those two cases where assistance was required it was due to the fact that the tester either attempted to search using the course search facility instead.

Success	Required assistance	Unsuccessful
10	2	0

If you could change one thing about this page, what would it be? | Question 4E

Reassuringly, the majority of testers declined to suggest any improvement for this page. Those that did respond offered some helpful suggestions as to what would improve the user experience with the Dashboard:

- Don't stack today's activity
- Add option to refine Job search by industry
- Improve distinction between course search and job search
- Move the Dashboard banner (blue bar across screen) further up the page

Limitations of the timelines framework make it cumbersome to handle activity for any single day any way other than vertical stacking. Some points have been considered for our change recommendations, which are reflected below.

Suggested changes based on feedback

1. Make it clearer which search tab is active by using coloured tabs rather than white, which blends in with the search element container.
2. Add more refinement options to the job search. The API supports refinement by various means (location, posting date, sector, etc.) and so this would be straightforward to implement.

4.2.5. My Journey

Task: exploring the interactive pathway | Question 5A

Users were able to interact with the timeline and soon realised the basic controls. For example, some did not immediately notice that the scroll wheel would zoom in and out around the cursor but soon got the hang of it.

Success	Required assistance	Unsuccessful
12	0	0

Is the Journey timeline useful? | Question 5B

Whilst not every user felt that the timeline was useful for them personally, no one went so far as saying that it would not be useful conceptually for other people. Responses generally therefore were positive in nature:

"It's useful to see it all laid out this way."
"The most useful application [of this] would be for schools, [it's] not as important for people who already have detailed CVs."

Clearly the usefulness of this feature of Roadmapp is dependent on the user's personal experience with career development. Testers from every demographic responded favourably to the Journey in most cases, reaffirming Roadmapp's ability to appeal to a wide audience.

What improvements would the user make? | Question 5C

Besides two mentions that the timeline elements could do with more colour - which has been remedied at this point - there was a single comment that stood out:

"Would be useful to consider interests also, since people changing careers might not want it based solely on the past."

This is interesting for us as we feel although the system takes on board a user's skills that may fall outwith their current industry, having the ability to specify interests would greatly enhance the 'changing lanes' element of our brand by allowing the algorithm to add a higher degree of aspiration to its recommendations.

Rate: how relevant were the future pathways to you? | Question 5D

There were no explicitly negative responses in this instances. This is to be expected as even in situations where an individual has little or no background it attempts to find something at least relevant to their high school courses or skills using a keyword search. These results are unlikely to be completely irrelevant except in situations where the keyword picked by the application has more than one application.

Completely unrelated **Highly relevant**

1	2	3	4	5
0	0	2	8	2

Suggested changes based on feedback

1. None

4.2.6. My account

Task: adding town/city to account details | Question 6A

Every tester was able to easily spot the relevant field and press the corresponding 'save' button to update their profile.

Success	Required assistance	Unsuccessful
12	0	0

Rate: how important is it that you can delete your account/data? | Question 6B

Most users were happy to see the close account facility. Respondents feel that their data should be fully within their control and this option allows for that.

Not important at all				Highly important
1	2	3	4	5
1	0	1	3	7

Suggested changes based on feedback

1. None

4.2.7. Administrator dashboard

Assessing the purpose of this area of the application | Question 7A

There was no trouble for users identifying the purpose of the Administrator Dashboard, with every user realising it is to provide site management tools to administrators:

> *"For the site admins to manage users, and [for] general site management."*

Users realised that this area is not intended for general accounts and that it was aimed towards the people running the website.

Describing the options on the page | Question 7B

Elements on the page are fairly well labelled and as such users were on the whole clear about what each collapsible section was for.

Task: administrative tasks | Question 7C

Three quarters of testers were able to navigate the administrator panel sufficiently to carry out a series of small tasks. There was some confusion caused by the fact that you can create a group and add a users at the same time and also create a group then manually add users later. A couple of users seemed to be confused by the accordion style menus, however we do not see this being an issue for administrators after a (very) brief tutorial.

Success	Required assistance	Unsuccessful
9	3	0

4.2.8. Logging out

Task: Complete the test by logging out of the system | Question 8A

Every respondent completed without issue.

Success	Required assistance	Unsuccessful
12	0	0

4.3. Questionnaire results

4.3.1. Summary of responses

Below is the scale used to assess the users attitudes towards the system.

1	2	3	4	5
strongly disagree	somewhat disagree	neither agree nor disagree	somewhat agree	strongly agree

**Coloured boxes represent highest values.*

Question	1	2	3	4	5
I found this website easy to use	0	0	1	4	7
The website is suited for people of all ages and backgrounds	1	0	2	5	4
I feel confident using this website	0	0	1	4	7
I found the various functions of the website were well integrated	0	0	2	5	5
There is a clear flow to the layout of this website	0	2	1	3	6
The website is visually appealing	0	1	2	3	6
I thought there was too much inconsistency in this system	2	7	1	2	0
Some aspects of the website were overly complicated	5	2	3	1	1
I feel that I would need training and/or assistance to use this website	6	5	1	0	0
The website provides a service that may be of use to me or people I know	1	0	2	5	4

4.3.2. Observations from questionnaire results

User friendliness and easy of use

All but a single tester found that the site was at least ‘somewhat easy’ to use. This is reflected when asking testers whether they think they would need training to use the site. Once again, all but one tester followed the positive path of at least ‘somewhat’ disagreeing with the statement.

Two users indicated that they believed the system to contained too many inconsistencies. This is a slight increase from the previous usability study where no one made such an indication. This may be due to the added functionalities of the website, which in reality are not particularly refined at this point. On the other hand, there were no explicitly negative responses to the statement that Roadmapp’s features were well integrated, with the majority at least ‘somewhat agreeing’.

The fact that the majority of users felt there was a clear flow to the website would help explain the success of the feature integration as the flow ensures users experience the application in a predefined way, that way all of the prerequisite steps are taken care of for features such as the Journey and Dashboard to be useful.

The majority of respondents supported the statement that the website is able to appeal to users of all ages and backgrounds. This is a positive indication a core goal of Roadmapp is to achieve as wide an audience as possible.

Layout and visual impression

When asked if the application is visually appealing, only one respondent expressed a negative view. As was the case in the usability study, we know that the majority think the design to be simple and non-offensive. We are confident therefore that it is suited to appealing to a wide variety of individuals, whilst we accept that it is not possible to please everyone all of the time.

Is the service actually useful?

Most users (75%) responded positively to the notion that the service offered by Roadmapp would be useful to either themselves or someone they know. As Roadmapp is entering a relatively niche product market area it is important that we would be able to effectively market our product to as many people as possible. This result indicates that there may in fact be a sizable portion of people for whom Roadmapp would be useful.

5. Conclusion

Through the usability study we have been able to evaluate the entire Roadmapp experience prior to presenting the application to the customer. By taking on board the feedback received we can further develop our vision for the future of the application, giving assurance to the customer that we care about making this product work.

Compared to the last study people seem to understand better what the application seeks to achieve. Now that they have had the chance to interact directly with the live system the feedback has mostly been positive about the application as it is just now, as well as towards the potential of the site in the future.

It is generally the case amongst testers that they believe the system is not targeted towards any specific set of individuals. This is an improvement over the previous tests where many thought it to be specifically geared towards school leaves.

The product has received, on the whole, mostly positive feedback. Through Roadmapp we have gone a good way towards achieving the requirements, although we acknowledge more can be done in the future to ensure a fully polished user experience.

Appendix I

Participant consent form

Career Pathfinder System
Heriot-Watt University

Consent to Act as a Subject in an Experimental Study

Principal Investigator: Mark Askew, Mark Auld, Mark Goldberg, Paul Young, Ronnie Smith, Tomasz Bishara

Description: The purpose of this study is to gain an insight into the usability – ease of use and user friendliness – of a web based application designed to assist individuals by mapping their education and career history in order to aid them with their future career choice, whether that be through finding further education, placements or employment positions.

There are minimal risks for you to participate in this study. All personal information will be kept confidential in a secure filing cabinet or in password-protected computer directories. Your participation will not affect how well you do in your courses (if you are a student) or affect your relationship with the university in any way

You are free to decline to participate in this study. Should you decide to participate, you are free to end your participation at any time. Such a decision by you will not adversely affect or alter your status with the university in any way.

Voluntary consent: I certify that I have read the preceding and that I understand its contents. Any questions I have pertaining to the research have been and will be answered by the team. My signature below means that I have freely agreed to participate in this study, and that I agree to the publication of the results for scientific purposes and to the distribution of the recordings and transcripts of the sessions for research purposes so long as my identity is not revealed.

_____	_____	_____
Date	Subject Signature	Inv. Initials

Investigator's certification: I certify that I have explained to the above individual the nature and purpose, the potential benefits, and possible risks associated with participation in this research study, have answered any questions that have been raised, and have witnessed the above signature.

_____ _____

Date Investigator Signature

Appendix II

Copy of user survey

Usability questionnaire

Please indicate the extent to which you agree with the following statements by circling the relevant answer.

Q1) I found this website easy to use

strongly disagree	somewhat disagree	neither agree nor disagree	somewhat agree	strongly agree

Q2) The website is suited for people of all ages and backgrounds

strongly disagree	somewhat disagree	neither agree nor disagree	somewhat agree	strongly agree

Q3) I feel confident using this website

strongly disagree	somewhat disagree	neither agree nor disagree	somewhat agree	strongly agree

Q4) I found the various functions of the system were well integrated

strongly disagree	somewhat disagree	neither agree nor disagree	somewhat agree	strongly agree

Q5) There is a clear flow to the layout of this website

strongly disagree	somewhat disagree	neither agree nor disagree	somewhat agree	strongly agree

Q6) The website is visually appealing

strongly disagree	somewhat disagree	neither agree nor disagree	somewhat agree	strongly agree

Q7) I thought there was too much inconsistency in this system

strongly disagree	somewhat disagree	neither agree nor disagree	somewhat agree	strongly agree

Q8) Some aspects of the website were overly complicated

strongly disagree	somewhat disagree	neither agree nor disagree	somewhat agree	strongly agree

Q9) I feel that I would need training and/or assistance to use this website

strongly disagree	somewhat disagree	neither agree nor disagree	somewhat agree	strongly agree

Q10) The website provides a service that may be of use to me or people I know

strongly disagree	somewhat disagree	neither agree nor disagree	somewhat agree	strongly agree

Appendix III

Definitions, abbreviations and changelog

A4.1. Abbreviations

GUI	Graphical User Interface
F-URX	Functional User Requirement X
NF-URX	Non-Functional User Requirement X
HTML	Hyper Text Markup Language
CSS	Cascading Style Sheet

Operations & Maintenance Guide

Table of Contents

1. Installing and configuring the system

1.1. Setting up the system databases

https://drive.google.com/file/d/0B19ynAluF0xgWUhWUE8wekZ3bG8/view?usp=sharing

1. Download the above SQL dump file provided
2. Log into phpMyAdmin with credentials
3. Click on the **Import** tab

4. Click **Browse** then select the SQL dump file
5. Click **Go** at the bottom.
    a. This will create a new database called *roadmapp* with all of the necessary tables and data. ***Note that any tables with the same name as those provided will be dropped.***

1.2 Configuring the CodeIgniter application

The steps below are taken from
http://www.codeigniter.com/user_guide/installation/index.html.

1. Unzip the package.
2. Upload the CodeIgniter folders and files to your server. Normally the index.php file will be at your root.
3. Open the application/config/config.php file with a text editor and set your base URL. If you intend to use encryption or sessions, set your encryption key.
4. If you intend to use a database, open the application/config/database.php file with a text editor and set your database settings.

2. Routine operations required by IT staff

2.1 Backing up site files

The application's folder should be backed up on a regular basis. Generally this would be done as part of routine server maintenance and not specifically for the application.

Ideally, the application would be stored on a RAID 1 hot-swappable array, which would make it highly unlikely that the data would ever be lost bar a complete system failure.

2.2 Backing up databases

In order to prevent data loss in the database, you must configure scheduled backups to occur at regular intervals. The recommended ways to do this are given below for Windows and Linux based systems.

For Windows with MySQL Community or Enterprise Editions:

1. Create a file named "roadmapp_backup.bat"
2. Modify the following code to reflect the database password and path to the backup folder:

```
mysqldump.exe --user=roadmapp --password=(PASSWORD) --host=localhost --port=3306
--result-file="(path to backup
folder)\backup.%date:~10,4%%date:~7,2%%date:~4,2%.sql"
--default-character-set=utf8 --single-transaction=TRUE --databases "roadmapp"
```

3. Add the .bat file to the Windows Task Scheduler, and have it execute it at least once per day

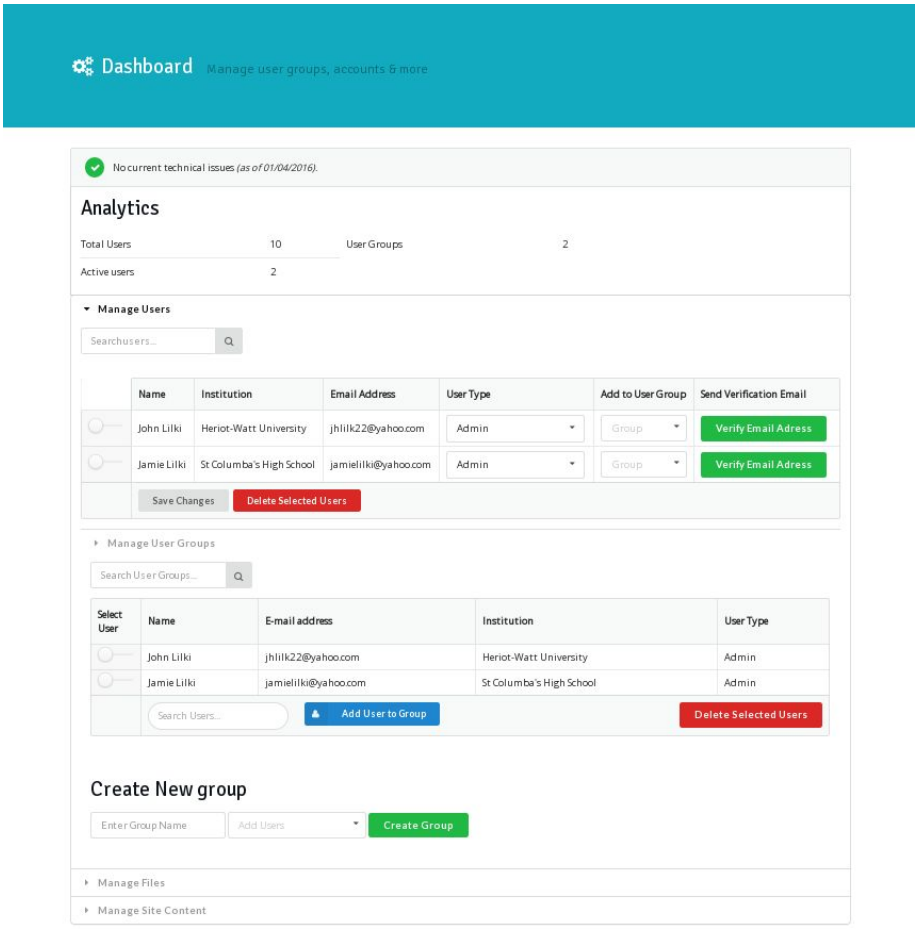
For Linux-based systems with MySQL Community or Enterprise Editions you should follow the instructions from Linux Brigade at the link below, modifying the variables in the script to suit your MySQL server details.

http://www.linuxbrigade.com/back-up-all-of-your-mysql-databases-nightly/

2.3 Administrator dashboard features

The administration dashboard is a page which allows site administrators to carry out general maintenance on the site. The admins can make changes to users accounts as well as alter the groups which users can be put into. The administrator dashboard is an accordion widget which allows for clear separation of concerns. Sections of the page layout may be collapsed or expanded by the admins. Specifically, admins can view site

and user analytics which allow a clear overview. Additionally, they may control and manage the file system by removing unused avatar files; this can save significant disk space. Any technical errors with the site will displayed to admins in the technical issue bar at the top of the dashboard. This bar will be regularly updated by the site and will include the date and time of when its contents were last updated.



2.3.1 Sending a verification email to a user

To resend a verification email, you must first navigate to the 'Manage Users' section of the admin dashboard. Search for the user you want to send the verification email to, using the 'Search users' box at the top left hand corner of the section. Once you have entered the user's name into the box, click the search button and the user you have searched for will appear in the table below along with their basic account details.

To send the verification email simply click the green 'Verify Email Address' button which can be found at the right hand side of the user's account details. Once this button has been clicked, a verification email will be sent to the email address of the user.

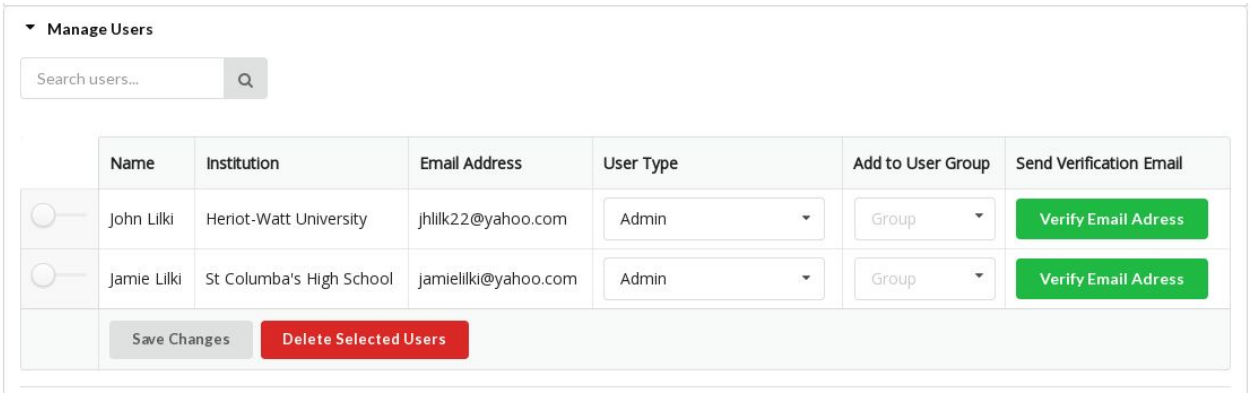


Figure 2.3.1 - Manage user section of the admin dashboard

2.3.2 Change the account type of a user

To change the account type of a user, you must also navigate through to the 'Manage Users' section of the admin dashboard. The user account you wish to change can be searched using the search function. When you find your user, you can click on the user type that the user is currently set to, and a list of options will drop down. To change the user type, click on the one you wish for the user to be, and then hit the 'Save Changes' button at the bottom left of the table.

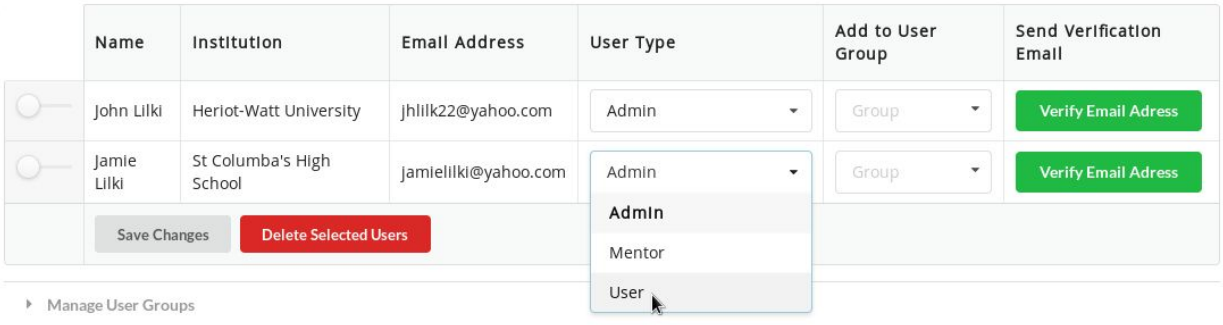


Figure 2.3.2 - Changing account type of a user

2.3.3 Add an account to a user group using the ‘Manage Users’ section

To add an account to a user group on the ‘Manage Users’ section, you must navigate to the ‘Manage Users’ section of the admin page. Following this, you can search for the user of your choice using the search function, typing in the name of the user and pressing the search button. The users will then be brought up on the table. On this table there is then the column titled ‘Add to User Group’. You must click on this and choose from the drop down list below to choose which group to add your chosen user to.

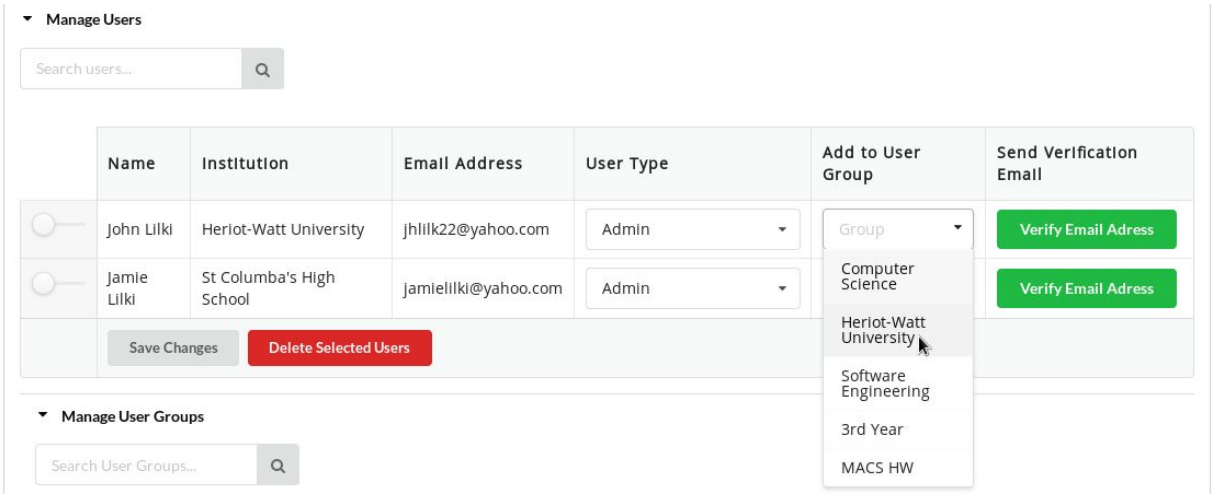


Figure 2.3.3 - Adding an account to a user group

2.3.4 Delete a user account

To delete an account, you must navigate to the ‘Manage Users’ section of the dashboard. Following this, you can search for the user of your choice by typing the name into the search bar, and then pressing the search button to return the results. To delete, you must firstly select the users which can be done by using the slider underneath the ‘Select User’ section of the table. Once selecting the user(s) of your choice, press the red ‘Delete Selected Users’ button to delete them.

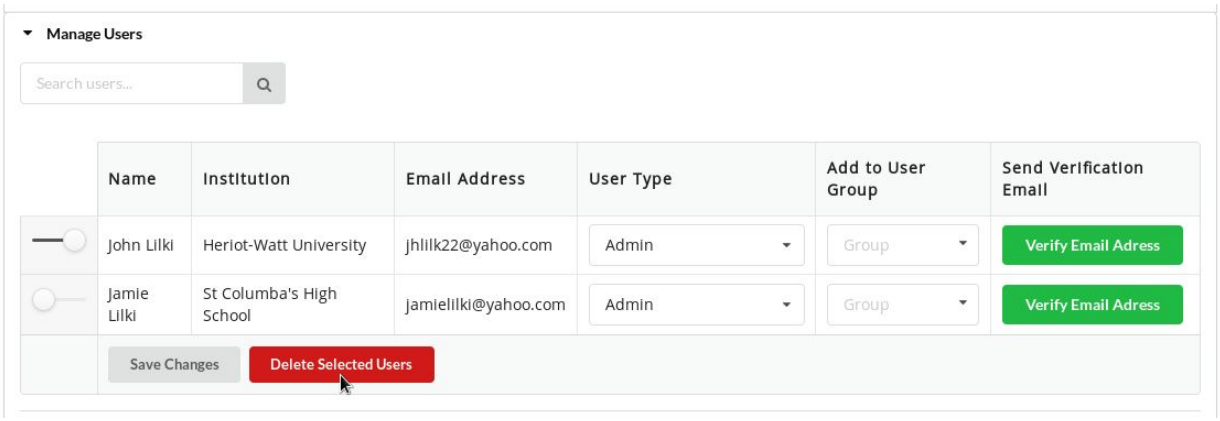


Figure 2.3.4 - Deleting a user account

2.3.5 Add an account to a user group(using the Manage User Groups section)

To add an account to a user group through the 'Manage User Groups' section , you must navigate this section of the dashboard. Following this, you can search for the user of your choice using the search function, typing in the name of the user and pressing the search button. From there, you can click on the left hand side 'Select User' slider, which will select one or more of users to be added. Then click on the 'Add User to Group' button which located underneath the table in the colour blue.

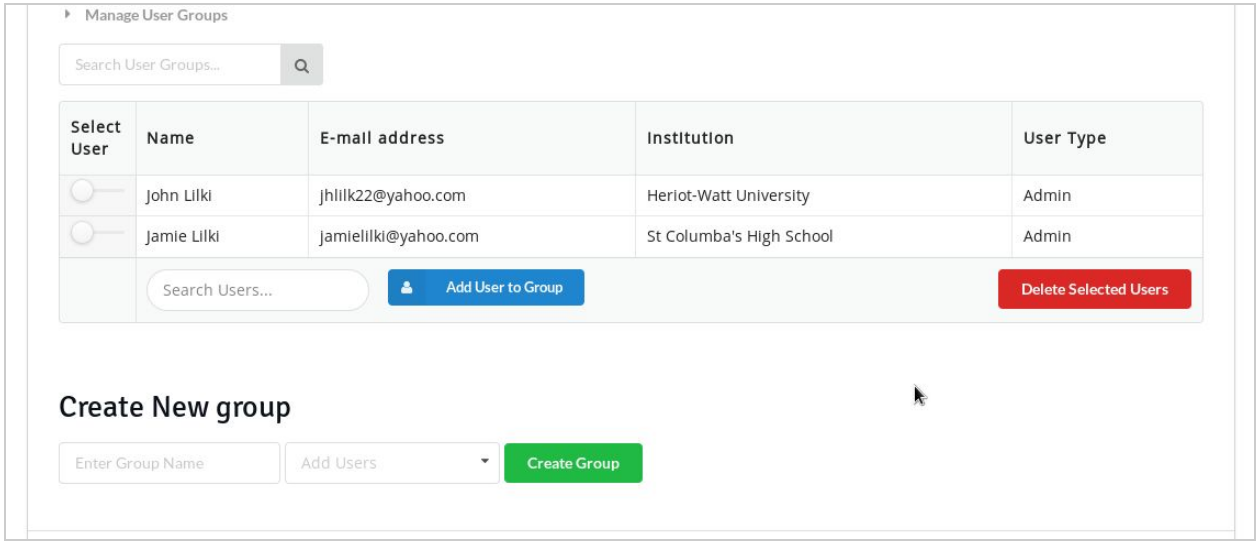


Figure 2.3.5 - Adding an account to a user group using the 'Manage User Groups' section

2.3.6 Remove an account from a user group

To remove an account from a user group, go to the 'Manage User Group' section (See figure 2.3.5) and type in the user group in the 'Search User Group box' that you wish to remove an account from. Once the user group has been searched for, all of its members should appear inside the table. Simply select the user, using the checkbox at the left hand side of the table and then click the red 'Delete selected Users' button at the bottom right of the table.

2.3.7 Create a new user group

To create a new user group through the 'Create New Group', you must navigate to the 'Manage User Group' section of the dashboard. Following this, you can enter the name of the group you wish to create in the 'Enter Group Name' field, if that name is not already in use. Then, you can add users by searching in the 'Add Users' input box next to the 'Enter Group Name' field and entering one or more users to be added. Then click on the

'Create Group' button which is again located to the right in the colour green.
See Figure in section 2.3.5

2.3.8 Manually flush the avatar folder

A script that has been set up in order to remove any unused profile pictures which may be stored on the system. In order for this script to the work, the profile pictures of the users must be stored inside the assets folder which can be found in the root directory.

To manually flush the avatar folder, you must navigate to the 'Manage Files' section of the folder. Following this, you should click on the red button labelled 'Manually flush avatar folder'.

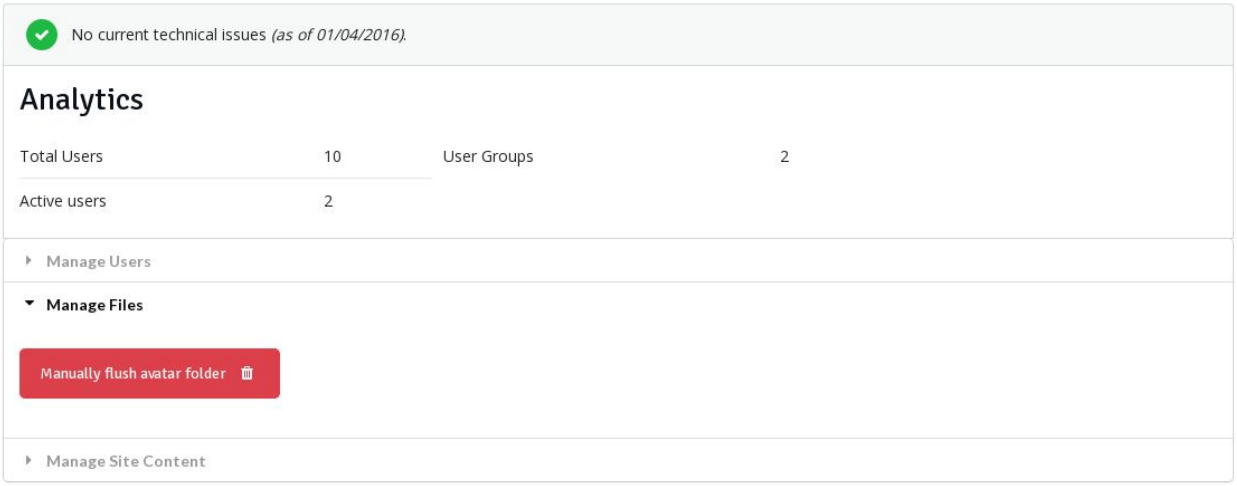


Figure 2.3.8 - The 'Manage Files' section

2.3.9 Technical Error Notifications

The website features a small readout bar located at the top of the dashboard. Any technical errors with the site will displayed to the site admins via this bar. This bar will be regularly updated by the site and will include the date and time of when its contents were last updated.

Figure 2.4 - Technical Error Notification Bar

Marketing Evaluation

Table of Contents

1. Introduction

1.1 Executive summary

Marketing is an essential function of any business. Within this function, a marketing plan is created in order to create awareness for a product or service. By tailoring marketing objectives together in the development of a plan, businesses are able to capture the attention of particular targets and help to grow their brand through the selling of their product or service as a result.

The aim of this marketing plan is to illustrate the main marketing objectives and goals for the Roadmapp application, taking into account the current marketing environment and competitors within the market, and also show how we will use the 4Ps of the marketing mix to help us reach our marketing targets.

1.2 Application background

Lockheed Martin has tasked Six Strings Development to create an application for the use of school leavers, helping them to create a path towards a career goal or to study a particular course at university. Six Strings Development therefore created the Roadmapp system, a career pathway finder system which can help to visually illustrate the potential career path of a student.

2. Market Analysis

When entering a product into a market, it is vital to study the marketplace as it stands. This is done by looking into the current, similar products on the market who can be seen as competitors to the Roadmapp system. These competitors may have many similarities to the Roadmapp system, but it is vitally important to also look at what Roadmapp does differently to its competitors.

2.1 Location

Six Strings Development decided to penetrate the Scottish market for many different reasons. Firstly, from a logistics point of view, it was an ideal place to run the project. This is because Heriot Watt University have allowed the business to operate within their campus, using the various high quality facilities that they offer. With each of out staff members based in Scotland, having also been schooled here, it made sense to then target the Scottish market, and the different schools within the country.

From a market point of view, Scotland had 364 high-schools as of 2013, with thousands of potential customers to target as a result (Gov.uk, 2013). Importantly, we will be starting off working predominantly in Edinburgh due to being based at Heriot Watt University. There are 23 high schools to target in Scotland's capital city which makes it an ideal place to start (Edinburgh.Gov, 2016), although Roadmapp can be accessed by anybody as it is on the web. Despite the marketing strategy being for Edinburgh predominantly, any school in Scotland will be able to therefore access the application.

2.2 Competitors

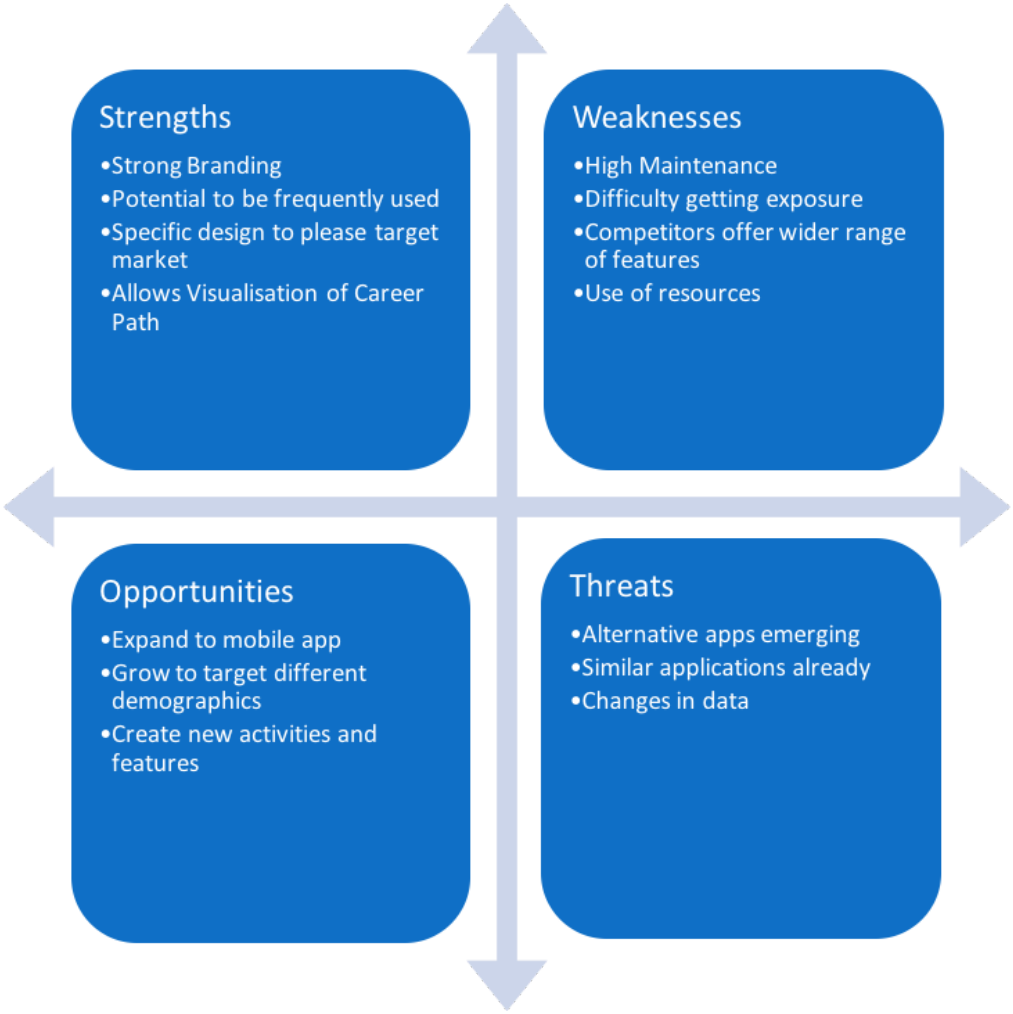
PlanIt Plus is one of the main competitors for Roadmapp. It offers its customers different services to help them choose career paths and jobs such as a career quiz, which filters out what sort of career a customer may be interested in pursuing. The website also provides information on different courses and links to see more information. Planit Plus also provides help on creating a CV (Planit Plus, 2016).

Skills Development Scotland is another competitor recognised by Roadmapp. Skills Development Scotland is a Scottish based company which runs a few different websites which can be seen as competitors. One of their main websites - My World of Work - is a search engine devised for finding careers for customers, and similarly, they run a website called Apprenticeships.scot, for searching different apprenticeships available (Skills Development Scotland, 2016).

3. SWOT Analysis

Within a market strategy, analysis must be carried out for the Roadmapp system which will identify the strengths of the system, the weaknesses as well as different opportunities that could arise from the application and the potential threats to the system. This is done in the form of SWOT Analysis framework, which is a simple yet effective way of evaluating the potential of a product or service and allowing the business to focus on how the product can be improved upon.

3.1 SWOT Diagram



Below are four tables for the SWOT analysis, exemplifying the strengths, weaknesses, opportunities and threats of the Roadmapp system which are further explained below.

3.2 SWOT Analysis in detail

3.2.1 Strengths

- The product has a strong brand which can help the product grow. The colour scheme and logo of Roadmapp in particular can help our customers and even potential customers to recognise the brand. This is a great way of helping the product become more popular and will be an important aspect as the service grows.
- The idea of having the illustration of a career path is a huge strength as it is something that gives a competitive advantage over competitors on the market. There is currently no competitor which allows a pathway to be visualised and so including this in the service is a strength of Roadmapp.
- The knock-on effect from having the visualisation feature is that the product will then be used consistently over a long period of time. If customers can see their goals and how to reach them, they can use Roadmapp to refer back to how to meet their targets and so this helps make Roadmapp a system which can retain its users.
- The program itself has been designed to specifically written and styled to please our target market. This is particularly evident in the more laid-back style that the application is written in, with much of the application having a more relaxed feel to it. This is also shown in the brighter colours used as a theme, which is more pleasing on the eye for our target market.

3.2.2 Weaknesses

- With every service, as time passes, users may find different problems with the software. This could be in the form of glitches and bugs. To keep on top of these issues, regular maintenance of Roadmapp would be essential. Maintenance for software is always a weakness as the bugs may be very difficult to fix or be timely to solve.
- As Six Strings Development are just a new organisation, the difficulty in getting our name out their may hinder the growth of the software. Getting exposure is difficult for new businesses as it can take time to become known, and to gain trust of potential customers.
- Although Roadmapp offers the visualisation of a career pathway, which is a unique and exclusive feature, competitors do have a wide range of different

activities and features to offer which Roadmapp does not. The idea that there are different things to do on other systems can therefore be seen as a weakness on Roadmapp's part.

3.2.3 Opportunities

- Currently, Roadmapp is only available on the world wide web, and so there is a big opportunity for it to then grow by expanding to different platforms, mainly mobile applications. The system is simple enough to be effective as an application and so in the future it is possible for the mobile application to be made which in turn can also bring in revenue from adverts on the app.
- At the moment, the application is only set to target school leavers. This allows us to look at who else Roadmapp could potentially target in the future. The opportunity is there to target other demographics, such as people looking to change their career, or people at university. This will then help the application grow by allowing it to be used by more than one market, all helping them to visualise their own career paths.
- The weakness identified about competitors having a lot more features can also be used as an opportunity. To expand on the main feature Roadmapp already offers, Six Strings Development may look into developing different activities within the application to help the system grow and be used for more than just the visualisation of a career path.

3.2.4 Threats

- There is always a threat of being imitated with any successful product or service, and so if Roadmapp's visualisation feature proves to be a hit, there may be alternative applications to be released with the same sort of features.
- This would only add to the fact there are alternatives already, albeit the current applications do not offer the same as Roadmapp, they are still targeting the same target market, with very similar goals – to help school leavers plan for their futures.
- Data and information is constantly changing, and so a thread that has to be considered is that there could be important information that may be altered once the application is released. Six Strings Development must be on-top of these changes in data to ensure that there are no inconsistencies. For example, courses may be dropped by universities, and so it is vital that Roadmapp will also keep this data consistent so that customers are not confused.

4. Pestle Analysis

Another analysis tool used for the Roadmapp system is the PESTLE Analysis. PESTLE analysis is the examination of factors such as the political, economical, social, technological, legal and environmental issues surrounding the release of a new product or service onto the marketplace. For any new product or service being released, it is important to take into account the different issues outwith the market itself that may have an affect the product or service.

4.1 Political

Political issues are similar to the legal issues as different legislation is a political factor. Therefore, much like the legal issues discussed below, the data protection act of 1998 is one which must be abided by. Different issues surrounding the world of politics must also be looked into, such as the different laws that may be put into place in the future.

4.2 Economic

Economical factors that may have an effect on Roadmapp must also be considered. If a recession like that of 2008 occurs again, businesses may be looking at ways to save money as opposed to spending. This may affect Roadmapp in terms of both making money, as different companies who may want to pay for adverts may now save money instead. Roadmapp may also need to save money and have to make redundancies or find other ways to save funds.

4.3 Social

One of the main social aspects is the growth of interest in going to university. As interest in university grows, the number of users will also grow. This is a social factor that may have a positive effect on Roadmapp, as the more users there are, the more likely companies will wish to advertise on the website, bringing in revenue as a result.

4.4 Technological

Technology itself is constantly changing and improving with many different possibilities for accessing the application coming out in the future. It is important to therefore be aware of different changes and improvements in technology to make sure Roadmapp also keeps up with the times and improve as a result. Also, in the future, people may become more competent when it comes to using technology, allowing the target market to grow as a result. Children are now growing up with technology and learning as they go, meaning they will be able to even start using the system earlier on in their school years.

4.5 Legal

There are different legal implications that could have an effect on Roadmapp. One of the main areas to think about is how Roadmapp will abide to the data protection act of 1998, which will ensure that customer data is used correctly and safely, providing privacy where necessary. It is vital that the application will conform with different legislations such as the data protection act in order to ensure it is abiding to the law. It is also important to be aware of future legislations that may be introduced in time.

4.6 Environmental

As Roadmapp is based online, there are not so many environmental concerns as with other products or services. Despite this, there are still issues that Six Strings Development must note, such as the simple tasks of ensuring electricity is saved and computers are not left on when they are not in use. Small changes such as recycling paper in the workplace can also ensure that the company image is kept in a positive light as it runs the business.

5. Target Market

The target market for the system is school leavers. Students coming to the end of their school years and looking to plan for the future are ideal for the Roadmapp system, as the application is made to tailor a career path suited to them specifically. The application fits perfectly to the curriculum of final year students, who will be planning for their futures. Despite targeting school leavers specifically, our mentoring system can also be used by teachers, and though the actual purpose of Roadmapp may be for the use of school leavers, it is important that teachers know they can become mentors and help to track the progress of their pupils. It is also important to note that school leavers are the target for our market strategy, but the application may be used by anybody, such as university students wishing to change course, unemployed individuals looking to create a plan for their future and many more demographics. The end users may be more than just the target market.

6. Stakeholders

When releasing Roadmapp onto the market, many different stakeholders will be affected, and also need to be communicated with. Stakeholders of a business can be categorised into four different different groups: Employees, Financial Group's, Customers and Organisations & Communities (Fill, 2006). Roadmapp must cater to these stakeholders to ensure the service is well received and successful. This section will identify each of the stakeholders associated with Roadmapp, and evaluate how they will be communicated with.

6.1 School Leavers

Category: Customers

School leavers are ultimately the main target market and so the users of the Roadmapp system, making them our customers. It is important to constantly be in communication with them by catering to their needs. The software is essentially for their use to help them to plan for their career and life ahead.

6.2 Teachers

Category: Customers

Teachers are also an important stakeholder. They are our customers in the sense that we have implemented a mentoring system which allows teachers to guide pupils through the system and be there for any issues that they may have as they create their pathway. Teachers are also important as they are the ones who may introduce pupils to Roadmapp in class, and so it is vital that we are in communication with the, and able to help them understand the system.

6.3 Lockheed Martin

Category: Employees

Lockheed Martin are a stakeholder that must be considered as Six Strings Development are working with them to create the Roadmapp application. Therefore, constant communication with Lockheed Martin is important to make sure that they are happy with the program, and any issues are ironed out to make sure they are satisfied.

6.4 Heriot Watt University

Category: Financial Group

Heriot Watt University have been the funding behind the Roadmapp project, helping Six Strings Development to get started on the project financially by funding some of the systems used such as their computers and meeting space. Heriot Watt University also helped to inform Six Strings Development about the opportunity to work with Lockheed Martin for the task.

6.5 UCAS

Category: Organisations & Communities

UCAS are an important stakeholder as they hold a lot of the information about courses, universities, courses and vitally pre-requisites which are required to get to different courses. It is important to keep up to date with UCAS in case there are any changes in data. Any changes such as dropping courses or bringing in new subjects at school will cause a knock-on effect, therefore it is vitally important to make sure UCAS are constantly communicated with to ensure the data in the application is correct.

7. Marketing Goals

7.1 Provide a quality and helpful service

One of the main goals set by Six Strings Development when starting to create Roadmapp was to ensure that the end result is both of a high quality, and is actually helpful. We are aiming to aid school leavers, and anybody who may wish to make use of the service by offering them helpful features such as the visualisation of their career path. If the system is useful for our customers and can guide them to successful careers and lives, then Roadmapp will have served a very important purpose.

7.2 Expand the application

Whenever a new system comes onto the market-place, they will look at first making sure it can survive for the first stage of its life-span. Once an established tool in schools or for the general public, Roadmapp will look to expand and grow, becoming a dominant market-leader in the process. After time, if successful, our aim is to start to offer new features, and also different platforms for the application to be used, such as on mobile devices by creating an app that can be downloaded by all the top marketplaces. This will ensure that the product reach and exposure will be much greater and there will be many more users using Roadmapp for guidance about their career prospects.

7.3 Gaining More Exposure

The final goal of our marketing campaign is to gain exposure and become a recognisable brand. By gaining exposure, we will be able to expand our target market, and any future features could be created to whole new demographics. As our name becomes more popular, so too will our product, and this will help us venture into new fields, add new features and cater to many more areas, even venturing to different countries to expand the product further. Exposure and the application growth may therefore go hand in hand, but both will be a result of Roadmapp being of a high quality, and doing its job, helping people plan for their future.

8. Marketing Mix

The Marketing Mix looks at the 'four Ps' which ensure that a product is meeting a demand, that it can be found at the correct place, is available for the right price and promoted in the correct manner. This section will look at each of the 4 Ps in detail.

8.1 Product

Every product or service released must have some demand and need. Roadmapp is a service which is required for school leavers to help them plan for their future and aid them in some of the difficult decisions they must make along the way. The Roadmapp system differs from competitors by providing a visualisation of a pupil's potential pathway from school to a university course or career. This area of the service takes Roadmapp beyond competitors and will allow the system to be used consistently over time as pupils will always be able to look back on their pathway which will assist them as they try to reach their targets and goals.

The design of the product has also been purposely created to match the target market of school leavers. As our target market will predominantly be at the ages of 17 or 18, some of the words and phrases used are more lighthearted to suit them, such as the terms & conditions, privacy policy and disclaimer pages being put under the heading of "Boring Stuff". This creates a more lighthearted tone to appeal to our target market.

8.2 Place

The location of the service is another important area of the marketing mix. The service itself is purely online based. The Roadmapp system can be found on the world wide web at the address http://Roadmapp.rsws.co.uk. The internet is growing at a fast pace and so it is important for the service to be a part of that. Seeing as our target market will all have access to the internet, at home, school or even on the go, they will always be able to access the application and so the decision to make it an online application was an easy one to make. By putting it online as well, Roadmapp can be found on different search engines such as Google, and so having this strong online presence will ensure that the service can be found and used effectively.

8.3 Price

Choosing from a range of pricing strategies is vital when releasing the Roadmapp system. The price must be one which is considered fair, and one which will entice customers to use the system. Competitors, such as Planit-plus have made their services free, and so the pricing strategy for the Roadmapp system has to take this into account. As similar services do not charge, Roadmapp will also be free to use in order to stay competitive in the market. This pricing strategy is called 'Competitive Pricing' and will allow the product to stay on terms with the competition as opposed to pricing ourselves out of the market, being expensive for customers which will cause them to go elsewhere.

8.4 Promotion

The promotion of the system is important as it is essential to get the Roadmapp system out there for potential customers to see. There are many ways this can be done. Six Strings Development plans on promoting the application online, directly to the target market of Scottish school leavers. This will be done with adverts specifically being shown on social media websites being used by our target market. This will allow the brand to be seen and have a strong online presence which is a positive marketing advantage for any product or service. The use of advertising on platforms such as Facebook is huge, as adverts can be sent out and filtered to be seen by specific groups of people. Six Strings Development will ensure that the target market is therefore being exposed to the adverts by use of advertising on social media.

Another way of promoting the product is to organise presentations within schools to communicate with our target market directly. Running workshops on how to use the service will give a taster of our features to the pupils. Also it allows the teachers to see how the product can guide pupils first hand, potentially getting their backing as a result. This will be done around the Edinburgh schools to get started in the market, and give Roadmapp a large catchment of area for customers to work with primarily, before expanding on promotional work across the country.

9. Unique Selling Point

When creating a market strategy, it is crucial to have a unique selling point which distinguishes the new product or service from the current competitors operating on the market. The Roadmapp system is no different in this regard. After analysing the current competitors on the market, we are able to pinpoint the unique selling point of the service.

The idea of visualising a pathway from school to a potential university course or career is what makes Roadmapp different from all other competitors. Services such as Planit-Plus let you search for courses and jobs to plan for the future, but there is no tool which displays the pathway to that career from start to finish. Roadmapp lets its users see the different paths that can be taken. The ability to see different pre-requisites for a particular career can aid a customer's planning which is a very helpful tool and a positive selling point.

10. Revenue Model

A revenue model is a framework which looks into how the product will actually make money.

One main way of making money from Roadmapp would be the use of advertisements around the website. This will involve a certain amount of space being given to third-party companies to place an advert on the site. These companies will pay for their space which will bring in money for the system. This form of revenue may be difficult if many users are using programs such as ad-blocker as they will end up not being exposed to the adverts, and so it may be difficult to entice different businesses to want to advertise on the site. Therefore, Roadmapp will also look into other ways of bringing money in.

The idea of increasing visibility on the site will be one which universities and different companies will wish to pursue. To bring in money, Roadmapp will offer these parties the chance to buy their way to being more visible on the site, ensuring that their jobs or courses are seen higher up the list than their competitors. This is much like the way businesses are able to pay for increased visibility on everyday search engines such as Google, and so has been proven to make money in the past.

11. Branding

Creating a strong brand is a way of helping to make a product recognisable for potential customers, and this can also help to create a competitive advantage. Brands such as Coca Cola are instantly recognisable by consumers and the packaging can draw customers to the product when, at times, many of them may not be able to distinguish its taste with competitors. Another strong brand is McDonald's, which has the golden arches as a logo which consumers can recognise from miles away. By becoming instantly identifiable by customers, these brands are able to ensure that they are seen as market leaders.

Six Strings Development have also tried to create a strong brand with the Roadmapp system, and this area of the market strategy will evaluate how this has been done.

11.1 Brand image

Six Strings Development has made sure that Roadmapp has a recognisable look and feel to it for users. The design of the system itself is purposely colourful in order to be seen as bright and recognisable. This colourful design has been put in place to attract customers but also to ensure they continually use the service by having it look aesthetically pleasing as opposed to being seen as bland and boring.

The Roadmapp system also has a custom logo which has been created. This was thought of as a way of helping consumers identify with the system as opposed to with competitors. The simple design has an American style road badge which refers to the system's theme of being like a map, and also has a tie in the centre of the badge, which links back to the educational, more professional themes of the application as the system is designed to help customers to reach their career goals. This logo is both recognisable and unique and so consumers will be able to associate it with the system.

Figures 1 shows the Plan-it Plus logo and Figure 2 shows the Roadmapp logo:

[Figure 1 – Planit Plus logo]

[Figure 2 – Roadmapp logo]

The simplicity of the logo helps to create a recognisable and identifiable brand for the product, which can help the service grow. Planit Plus have also got a logo as shown which does not have the same distinguishable look to it as the Roadmapp logo. The logo itself was purposely given a modern style, making it simple enough to be used as an icon on the website, but also in the future, to be the icon that could be used to open the application on mobile devices.

12. Market Testing

12.1 From The Usability Study

During our usability studies, we were able to ask questions directly to participants from our target market. These questions included many about the aesthetics of Roadmapp as well as how easy it was to use. This was important not only for a test of the usability of Roadmapp but also in marketing, as we were able to take the opinions of these participants and improve on the product by listening to what was being said. Below are questions relating to marketing that were asked in the usability study, along with what we learned about our service by analysing the answers.

Note: The usability study was taken by 12 subjects.

Question 1B: Who do you think the intended audience is for the site? [When on the home screen]

Response: Many specified that the website targets school leavers and/or people who are looking for a job. Many also believed that the style of the application would suit any demographic.

Question 1C: How does the colour scheme and general appearance of this site make you feel?

Response: Most subjects felt that the site was aesthetically pleasing, welcoming and some even suggested it had a sense of importance about it.

Question 2D: How useful do you feel the information you just saw would be to a new user? [When shown the introductory features page after first registering to the system]

Response: This was recorded on a Rickert scale with 1 being not useful at all and 5 being very useful. Most subjects believed the information and features were either extremely useful, or moderately useful to new users.

Question 5B: Do you believe this representation of your career path would be helpful in planning your future career choices?

Response: Every subject believed that it would be useful to see their pathways displayed in such a way.

12.2 Analysis of Test Results

The Usability Study proved to be a useful way of firstly seeing how easy it would be for different subjects to use. It also proved to be a valuable tool for our marketing. We learned that the illustration of a career pathway was going to be a very useful tool for our customers, and therefore we decided to invest a lot of time and effort into making it function correctly, and make it look aesthetically pleasing. The illustration of user's career path is therefore Roadmapp system's main feature and was seen as the unique selling point, and the focal point of promoting our app in the market.

Another learning point to take from the study was that the colour scheme and layout was one that could be used to please our target market. This is shown by the fact that many of our subjects were able to point out that our application was set to target school leavers, but importantly, our subjects also made it clear that the application can be used by any demographic, which is vital as we look to grow and expand Roadmapp.

Project Evaluation

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1. Organisation

1.1. Online Tools

1.1.1. Facebook messenger

The choice to use Facebook group messenger for one form of communication was an easy decision to make, as everyone in the team already had a Facebook account. We used the group chat feature to get in touch with each other casually, making it the perfect platform for sorting out any quick issues with regards to meetings. In addition, everyone in group already uses Facebook at least daily, or gets instant notification on their phone, which allowed quick response if anyone had any problems or there were any issues that needed solved quickly.

1.1.2. Slack

Slack was a useful tool for the solving of different problems in the three stages of the project. Facebook messenger alone can get too cluttered for larger issues that might take longer to solve. In Slack we were able to create channels for different parts of the project like; database, timeline, usability study, and so on. This allowed us to easily navigate through different channels so every member can see everything that has been said about a particular part of the project and put in their own input on the different issues. This made Slack more of a formal platform for discussion, and one we used in a more professional manner, even involving our manage. We found slack very helpful in order to have clear discussion about multiple issues that arose within the project, as slack allowed every issue to have its own discussion board (channel). This made it simple for everyone to get a good understanding of the problems that were occurring, making it easier for everyone to get involved in solving the issue.

1.1.3. Google Drive

Google Drive provided us with a great space for us to store, share and edit all of the documentation for each stage of the project. We separated the space into 5 main folders with many subfolders being added inside. The main 5 folders were meetings, stage 1, stage 2, stage 3 and marketing. We found that it was important to have meetings in the root folder in order for everyone to easily access meeting notes so that the members of the group who could not make it to a meeting could check up on what was covered and also so that members could remind themselves of what they have to do by looking at the “To Do” part of the meeting notes. This was where we would assign parts of the project that needed to be done until the next meeting. For the documentation of each stage of the project we would create a folder in which Ronnie would create template documents with headings, which we would then assign headings to group members, so everyone

has a clear idea what they have to do. We basically followed this model at each stage as it was simple and worked well for our group. One of the advantages of Google Drive is that all group members are able to access the same document at the same time and see changes made in real-time. Furthermore, everyone was able to help each other, for example if someone noticed a mistake in another member's work they could leave a note next to the sentence explaining why they thought this should be done differently. Whilst acknowledging that this method could create some conflict at times, we made sure that our group was on the same page at all times, helping each other where necessary. This helped people to constructively criticise areas of the work, helping it to be improved.

1.1.4. GitHub

See Section 2.3. on version control for more information on how we used GitHub.

1.2. Meetings

At the start of the project we tried to have meetings weekly, but throughout the project this was continued loosely as the online tools we used allowed any issues to be resolved out-with meeting times. Meetings therefore may not have happened once every week. We found this to be the best way to approach this project as everyone in our group was from different courses and we all had different timetables from each other. On top of that we all had different deadlines for coursework and exams, therefore we thought it was best to set deadlines every few weeks so each individual in the group could plan their own time themselves as long as they finish work they had been assigned. Meetings to discuss progress gradually became less frequent, as we stored everything on shared space; documents on google drive and the 'Roadmapp' on GitHub were visible to all group members, so everyone was able to see progress at all times.

This method proved to be successful as everyone always finished work they had been assigned on time. Furthermore, being able to contact group members at any time of the day to clarify issues or to solve problems proved to be a better for us than waiting until the next meeting.

Many of the design decisions were made back in the first deliverable, meaning every member of the team was aware of our vision and approach right through to the third deliverable.

See Appendix 3 for project meeting notes.

2. Implementation

2.1. Planning Approach

In stage one, a detailed plan was created to aid the development process involving SCRUM methodology. This plan was used as a backbone to the project but as timetables differed for different students, we decided to approach the project in a more agile method. This involved setting more realistic and achievable deadlines, using the original project plan as a guide for distributing tasks. In the real world, SCRUM may have been the best approach for a software development company working regular hours.

2.2. Implementation Schedule

2.2.1 Stage 2

Progress - □ - Completed on Time □ - Delayed □ - Not Completed

□□ - Partially Completed

Task Name	Duration	Start	Finish	Progress*
Mid Stage Halfway	45.75 days	Fri 06/11/15	Thu 28/01/16	
Code Design decisions for whole project	4 hrs	Fri 13/11/15	Fri 13/11/15	□
Website design(Plan)	6 hrs	Fri 13/11/15	Mon 16/11/15	□
Website design(implementation-template)	8 hrs	Wed 18/11/15	Wed 18/11/15	□
Sprint 1 - Database	3 days	Thu 19/11/15	Mon 23/11/15	□
Database Planning	2 days	Thu 19/11/15	Fri 20/11/15	□

Database Implementation	1 day	Mon 23/11/15	Mon 23/11/15	☐
Server Set-up	4 hrs	Thu 19/11/15	Thu 19/11/15	☐
Sprint 2 - F-UR1 Login and Registration	6.25 days	Tue 24/11/15	Tue 22/12/15	
Login & Registration form creation	2 days	Tue 24/11/15	Wed 25/11/15	☐
Coding F-UR1	3 days	Thu 26/11/15	Mon 30/11/15	☐
Login & Registration Testing	5 hrs	Mon 21/12/15	Mon 21/12/15	☐
Login & Registration Documentation	5 hrs	Mon 21/12/15	Tue 22/12/15	☐
Sprint 3 - F-UR2 Collecting Profile Information	7.75 days	Tue 22/12/15	Thu 31/12/15	
Collecting Profile Information Interface Creation	2 days	Tue 22/12/15	Thu 24/12/15	☐
Coding F-UR2	4 days	Thu 24/12/15	Wed 30/12/15	☐
F-UR2 Testing	5 hrs	Wed 30/12/15	Wed 30/12/15	☐
F-UR2 Documentation	9 hrs	Wed 30/12/15	Thu 31/12/15	☐
Sprint 4 - F-UR3 Visualising Career Path	10.63 days	Thu 24/12/15	Thu 07/01/16	
Career Timeline Creation	3 days	Thu 24/12/15	Tue 29/12/15	☐
Timeline Coding	6 days	Wed 30/12/15	Thu 07/01/16	☐

Timeline Testing	4 hrs	Thu 07/01/16	Thu 07/01/16	
F-UR3 Documentation	5 hrs	Thu 07/01/16	Thu 07/01/16	
Sprint 5 - F-UR4 -External Data Gathering	2.5 days	Thu 07/01/16	Mon 11/01/16	
F-UR4 Coding	2 days	Thu 07/01/16	Mon 11/01/16	
F-UR4 Testing	4 hrs	Mon 11/01/16	Mon 11/01/16	
F- UR4 Documentation	4 hrs	Mon 11/01/16	Mon 11/01/16	
Sprint 6 - F-UR6 Presenting Future Pathways	16.63 days	Tue 29/12/15	Wed 20/01/16	
F-UR6 Interface Creation	2 days	Tue 29/12/15	Thu 31/12/15	
F-UR6 Coding	7 days	Mon 11/01/16	Wed 20/01/16	
F-UR6 Testing	5 hrs	Wed 20/01/16	Wed 20/01/16	
F-UR6 Documentation	4 hrs	Wed 20/01/16	Wed 20/01/16	
Sprint 7 - F-UR8 Administration Tools	15.38 days	Thu 31/12/15	Thu 21/01/16	
F-UR8 Interface Creation	2 days	Thu 31/12/15	Mon 04/01/16	
F-UR8- Coding	1 day	Wed 20/01/16	Thu 21/01/16	
F-UR8 Testing	3 hrs	Thu 21/01/16	Thu 21/01/16	

F-UR8 Documentation	3 hrs	Thu 21/01/16	Thu 21/01/16	
Sprint 8 - F-UR7 Mentor/Mentee Linking	15.5 days	Mon 04/01/16	Mon 25/01/16	
Mentor Monitoring Page Creation	1 day	Mon 04/01/16	Tue 05/01/16	
F-UR7 Coding	2 days	Thu 21/01/16	Mon 25/01/16	
F-UR7 Testing	4 hrs	Mon 25/01/16	Mon 25/01/16	
F-UR7 Documentation	3 hrs	Mon 25/01/16	Mon 25/01/16	

(Table taken from parts of the original plan, see appendix 2 for copy of original plan)

Dilemmas faced and resolved in Stage 2

At the beginning of stage two, we noticed an imbalance of skills with regards to web programming. Additionally, when delegating tasks in the midst of an ever growing workload it was difficult for our programmers to adhere to the project plan. We later revised the plan and set up a more agile method, allowing every team member to manage their time more freely and contribute effectively.

As you can see in the table from sprints 3-7, many tasks were delayed; it is important to note that the workload for coding, and the length of time it would take was also underestimated. Consequently, the pathway feature was only partially completed by the end of stage two and the development of it was continued into stage three. External data gathering proved to be a more difficult and complex task than was first anticipated. By underestimating this task, we had more work to be completed than first thought at this stage.

By the end of the project, the Mentor View was only partially finished. This was due to the delays in previous tasks and so we did not have time to start this until third stage. Also, we chose to prioritise other tasks, such as the Profile Builder.

Despite delays, we were able to rectify the plan and have over half of the functionality completed by the end of stage two, which was more than sufficient at this stage.

2.2.2 Stage 3

Progress - □ - Completed on Time □ - Delayed □ - Not Completed

□□ - Partially Completed

Task Name	Duration	Start	Finish	Progress
Final Stage	**34.75 days**	**Mon 08/02/16**	**Fri 25/03/16**	
Sprint 9 - F-UR5 Real-time Reporting and Analytics Data	**4.38 days**	**Mon 08/02/16**	**Fri 12/02/16**	
F-UR5 Interface Creation	1 day	Mon 08/02/16	Mon 08/02/16	□
F-UR5 Coding	2 days	Tue 09/02/16	Wed 10/02/16	□
F-UR5 Testing	6 hrs	Thu 11/02/16	Thu 11/02/16	□
F-UR5 Documentation	5 hrs	Thu 11/02/16	Fri 12/02/16	□
Sprint 10 - NF-UR4 Security	**4 days**	**Fri 12/02/16**	**Thu 18/02/16**	□
Extra Time for Coding/Extra Functionalities	5 days	Thu 18/02/16	Thu 25/02/16	□
Sprint 11	**9 days**	**Mon 22/02/16**	**Fri 04/03/16**	

Integration Testing	3 days	Mon 22/02/16	Thu 25/02/16	
Usability Evaluation	2 days	Fri 26/02/16	Tue 01/03/16	
Project Evaluation	3 days	Tue 01/03/16	Fri 04/03/16	
Marketing	**9 days**	**Fri 12/02/16**	**Thu 25/02/16**	
Marketing Analysis	3 days	Fri 12/02/16	Wed 17/02/16	
Marketing Strategy	3 days	Wed 17/02/16	Mon 22/02/16	
Marketing Review	3 days	Mon 22/02/16	Thu 25/02/16	
System Integration Tested	3 days	Fri 04/03/16	Wed 09/03/16	
System Performance Tested	1 day	Wed 09/03/16	Thu 10/03/16	
Final Usability Evaluation	2 days	Thu 10/03/16	Mon 14/03/16	
Final Design & Implementation	2 days	Mon 14/03/16	Wed 16/03/16	
User Guides	2 days	Wed 16/03/16	Fri 18/03/16	
Documentation	**7 days**	**Wed 16/03/16**	**Fri 25/03/16**	
Draft Documentation	2 days	Wed 16/03/16	Fri 18/03/16	
Final Documentation	3 days	Fri 18/03/16	Wed 23/03/16	

Documentation Review + Final Changes	2 days	Wed 23/03/16	Fri 25/03/16	

(Table taken from parts of the original plan, see appendix 2 for copy of original plan)

Dilemmas faced and resolved in Stage 3

The 'real time reporting' and 'analytic data' features remain incomplete, as our development focus shifted to finishing core functionalities of the system, such as the pathway algorithm. Issues with mobile responsiveness and scaling on every device were resolved as and when they arose. Documentation and testing were both completed and carried out throughout the development process, as features were coded. Four members of our team worked collaboratively to ensure system robustness and importantly, the clarity of our documentation. With a few application changes and a review of the documentation, the final amendments were made on the last day which was April 1st.

2.3. Version Control

From the very beginning, it was our intention to use GitHub in order to implement version control for the website; following through with this, we were able to control and manage concurrent updates to the system, as well as keep backup versions of the site which could be rolled back to if needed.

After a while, we found that it was rather cumbersome to continually have to push, pull and commit code - and then transport it through FTP to see changes. It was at this point that we decided to make changes to the site code directly using an FTP connection to the server.

While this meant losing some of the GitHub features such as rolling code back to previous versions, we got around these problems by configuring the server to perform routine backups of the entire application directory and databases (twice daily). We also made a key effort to keep track of the tasks which users were assigned during meetings.

The assigned tasks were arranged so that group members would not need to work on the same code concurrently. This meant we didn't have any problems of code being overwritten by multiple group members

3. Product evaluation

3.1. Overview

Requirement comparison

This first section compares the features specified in the original requirements document to the functions as implemented. Details of how a requirement has (or has not) been met are provided as well as suggestions for future expansion in some instances.

Key, added and missing features

In this instance we have illustrated clearly what we believe to be the core features and achievements of Roadmapp at the delivery stage. Furthermore, we have cast light on which features have been provided over and above the specification, and explanations for missing or removed functionality that was originally in the specification.

Robustness evaluation

We have provided a relatively concise overview of the robustness of Roadmapp based on the steps we have taken to ensure it, with some examples of testing to reinforce our position.

Usability summary

A summary of our findings in the usability has also been provided to give an insight into how users feel about the application overall and what improvements would need to be made going forward to make it an even better experience.

3.2. Requirements assessment

This section takes a more detailed look in evaluating the delivered product against the original requirements outlined in 'Careers Pathfinder System: Requirements Document' produced in Stage 1.

We have illustrated, using tables, which functions are fully implemented, not implemented or partially implemented, with caveats to the functionality '(Par.)'. Further to this, there are overviews and analysis provided for each of the primary requirements, including the extent of functionality available from incomplete functions.

Throughout these table we have also used colour markers to denote the original priority level assigned to a requirement:

◉	High priority	◉	Medium priority	◉	Low priority

2.4.1. Functional

Code	Description	Implemented
F-UR1	**Registration**	Yes / No / Par.
F-UR1-1.1	◉ Register as individual	Yes
F-UR1-1.2	◉ Register email	Yes
F-UR1-1.3	◉ Email verification	No
F-UR1-2	◉ Register as mentor	Yes
F-UR1-2/3	◉ Login / logout user	Yes
F-UR1-4	◉ Assign mentor	No
F-UR1-5	◉ Account age restriction	Yes
F-UR1-6	◉ Store login securely	Yes
F-UR1-7	◉ Account limit	Yes
F-UR1-8	◉ Account deletion	Yes

Register and login

We have utilised 'Ion Auth' to provide a secure registration and login system with session tracking and the form validation features included with Codeigniter. Users are able to manage their account via the 'My Account' page where they can edit their details and profile picture and also close their account.

Code	Description	Implemented
F-UR2	**Collecting profile information**	Yes / No / Par.
F-UR2-1	Career history input interface	Yes
F-UR2-2	Gather additional profile information	Yes
F-UR2-3	Edit profile information	Yes

Collecting data from users

We have provided facilities for a user to build a personal profile after registration and ways for them to edit this data within the interface, via their account page and from the 'journey' page. We have functionality in place to retrieve career history from the user.

Code	Description	Implemented
F-UR3	**Visualising future career path**	Yes / No / Par.
F-UR3-1	Timeline representation of a user pathway	Yes
F-UR3-2	Edit timeline	Yes

Visual representation of the timelines as 'My Journey'

After profile information is completed the user is directed to 'My Journey' which displays visual representation of possible career paths based on their previous education and profile information. The user is also able to edit timeline by going back to their profile and continue building it by adding new qualifications received, which will automatically update on timeline.

Code	Description	Implemented
F-UR4	**External data gathering**	Yes / No / Par.
F-UR4-1	Provide data from multiple sources	Yes
F-UR4-2	Gather data via SQL dump	Yes
F-UR4-3	Gather data via HTML parsing	No

Parsing external data sets

Ultimately it was not necessary to gather data this way as we made use of SQL databases and APIs instead to retrieve essential external data.

Code	Description	Implemented
F-UR5	**Real-time reporting and analytics data**	Yes / No / Par.
F-UR5-1	Usage analytics	Par.
F-UR5-2	Statistical reporting	No

Administrator tools

We have implemented a basic administrator dashboard, which you can read more about in ‘F-UR8: Administration tools’.

Providing detailed statistics in graphical form (e.g. dynamically generated graphs) have ultimately been sidelined in favour of completing functionality of core site features.

Code	Description	Implemented
F-UR6	**Presenting future pathways**	Yes / No / Par.
F-UR6-1.1	Display potential opportunities	Yes
F-UR6-1.2	Filter potential opportunities	No
F-UR6-2.1	Provide a pathway to selected career destination	No
F-UR6-2.2	Link user to possible relevant institutions	Yes
F-UR6-2.3	Link to possible employers	Yes

Future pathways

The system displays potential opportunities on 'My Journey' but we were not able to implement filter option as we simply ran out of time; this could easily be implemented in the future. Pathways are built according to a user's career history and qualifications, generated automatically after a user has provided their profile information. In future we may allow users to manually provide their dream job to show tailored results, in conjunction with the way it works currently.

Code	Description	Implemented
F-UR7	**Mentor / mentee linking**	Yes / No / Par.
F-UR7-1	Mentors accessing mentee data	No

Mentor/mentee integration

Whilst we have implemented the user role of mentors and have the beginnings of a mentor dashboard in place, we have not made provisions for the linking of mentor/mentee accounts. Providing this functionality would have been fairly straightforward if mentors were allowed to add any user to their group, however in practice there is the issue of mentee consent which adds a further degree of complexity to it.

We have a clear idea of how this system could be implemented in the future, but unfortunately it will not be part of the product delivered at this point.

Code	Description	Implemented
F-UR8	**Administration tools**	Yes / No / Par.
F-UR8-1	Admin support	Yes
F-UR8-2	Delete account	No
F-UR8-3	Edit account	No

Administration tools

A basic administration dashboard UI has been constructed, with only some features implemented:

- Analytics: this section would report statistics relating to the total number of users, active users and user groups
- User management: admins would be able to edit a user's account type, their user groups, delete the user and resend a verification email/manually override verification
- User group management: this would provide the ability to create/delete groups and add/remove users to groups
- File management: currently does provide the functionality to flush the avatar folder, freeing disk space from now unused profile pictures

3.4.2. Non-functional

Code	Description	Implemented
NF-UR1	**Operating platform**	Yes / No / Par.
NF-UR1-1	Internet-connected web server hosting	Yes
NF-UR1-2	PHP version 5 or later will be used for the development of the system	Yes
NF-UR1-3	Scalable system capacity	Yes

The application's operating platform meets the requirements in full.

Code	Description	Implemented
NF-UR2	**Software**	Yes / No / Par.
NF-UR2-1	Multiple viewport capabilities	Yes
NF-UR2-2	Assign user roles	Yes
NF-UR2-3	Browser support	Yes
NF-UR2-4	Disability support	No
NF-UR2-5	MVC Architecture	Yes

Basic software requirements

Roadmapp has been implemented using an MVC-like architecture which incorporates user management and roles and supports most modern web browsers as set out in our Stage 2 document, 'Progress Report'.

Code	Description	Implemented
NF-UR3	**Data**	Yes / No / Par.
NF-UR3-1	User data storage	Yes
NF-UR3-2	User details storage	Yes
NF-UR3-3	Input validation	Yes
NF-UR3-4	Vacancy posting framework	No

Server data storage

User data is being stored in MySQL databases and is used by the application.

Input validation

The application is carrying out secure and comprehensive input validation of all forms using Codeigniter's built-in tools. More discussion on this is provided in ‘Section 4.1. - Application architectural design’ in the ‘Progress Report’ from Stage 2.

Code	Description	Implemented
NF-UR4	**Security**	Yes / No / Par.
NF-UR4-1	Standard security techniques	Yes
NF-UR4-2	Appropriate data views	Yes
NF-UR4-3	Login details stored securely	Yes
NF-UR4-4	Password criteria	Yes
NF-UR4-5	Company validation	No
NF-UR4-6	Privacy settings	Yes

Password criteria

Input validation is utilised during registration to ensure users enter passwords of at least eight characters and that they are able to verify the password by repeating it.

Secure login details

Passwords are stored in the database in the *bcrypt* encrypted format with a randomly generated salt per password. This makes for incredibly secure password storage. To assess whether the user has entered the correct password, we simply apply the same hashing function to their input and compare its result with that stored in the database; the user's password is NEVER stored or used in raw format.

Code	Description	Implemented
NF-UR5	**Usability**	Yes / No / Par.
NF-UR5-1	◉ Simple interface design	Yes
NF-UR5-2	◉ Help section	Yes

Usability / ease of use

The user interface is built upon the mockups used during the Stage 1 'Usability evaluation' in which we received user feedback about the design, layout and ease of use of the application. Having taken much of that feedback on board we believe to have achieved a simple and easy to navigate interface.

Code	Description	Implemented
NF-UR6	**Time**	Yes / No / Par.
NF-UR6-1	◉ Release date	N/A

Code	Description	Implemented
NF-UR7	**Legislation**	Yes / No / Par.
NF-UR7-1	◉ Data protection	Yes
NF-UR7-2	◉ Legal disclaimers	Yes
NF-UR7-3	◉ Privacy policy	Yes

Compliance with legislation

User data is protected in the following ways:

- The hosting and database server frequently installs security patches;
- All input data from the web application is subject to input validation;
- Users can close their account at any time.

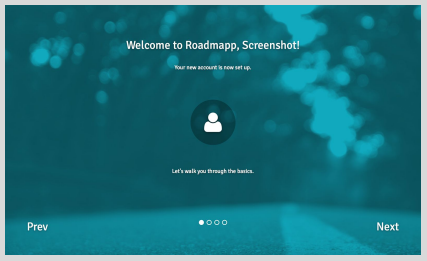
Furthermore, we provide a legal section of our website accessible from the footer of every page outlining our terms and conditions as well as the privacy policy.

3.3. Key and additional features

This section highlights some of the key features that have been implemented in Roadmapp, including those that are additional to the requirements. Each feature is accompanied by some brief discussion of the benefits it brings to our product and to our customers.

Features that have been provided excess to requirements have been marked as such.

3.3.1. ‘Welcome to Roadmapp’ carousel

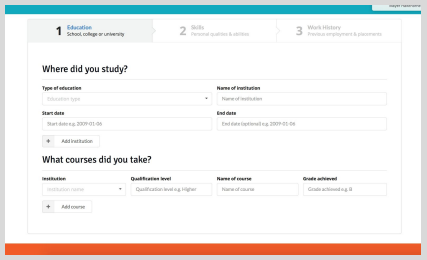


In order to improve the ease of use of the application we have added a series of slides that are presented as soon as a user completes registration.

Essentially it serves as a quick and engaging tutorial on how to use Roadmapp, reducing the need for customers to navigate through the full user guide.

Additional: ✓

3.3.2. Three-stage profile builder



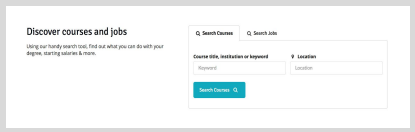
In the original requirements we specified that the application would have a profile builder to gather three types of user data: education/qualifications, skills and jobs.

This has materialised in the form of a streamlined three-stage process which guides the individual through the input of this each type of data.

Inputted data is also built up in a container at the bottom of the page as the process moves along so that the user can see what they have inputted so far and make edits if necessary.

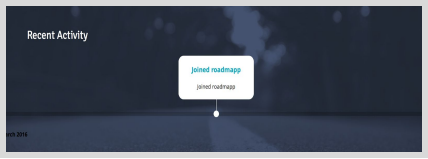
Additional: ✗

3.3.3. Dashboard



Additional: ✗

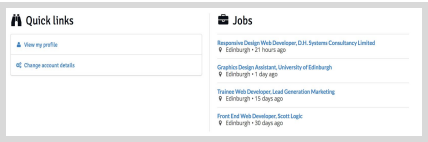
Manual course and job search
As per the user requirements we have provided facilities for users to manually search for courses and jobs. The tabbed search area allows for both, with the benefit of refining by location.



Additional: ✓

Recent activity timeline
As a way of letting an individual view a record of their own activity across the site we have implemented a timeline-based 'Recent Activity' module to the dashboard.

It is necessary to track user activity in order to accommodate the implementation of mentor facilities which will depend on providing a collated view of mentee activity.

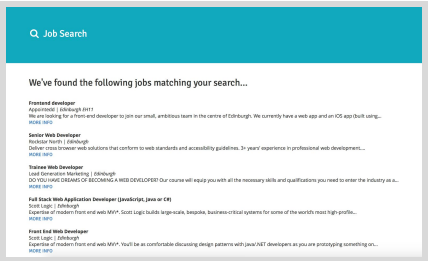


Additional: ✗

Quick links and suggestions
The final panes on the dashboard offer a handle of navigation links and, more importantly, suggested opportunities.

The pane on the right automatically searches for jobs/course opportunities that the system has determined relevant based on their career history entered via the Profile Builder.

3.3.4. API-based job search

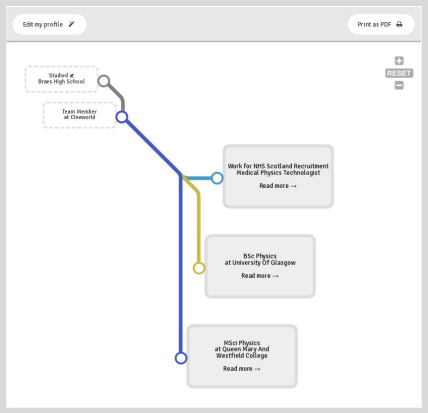


Additional: ✗

In practically all use cases involving potential jobs we pull data from Indeed's search API. Primarily its purpose is to serve the automated suggestions and pathways, however we have also provisioned a manual search facility.

Users can search based on keyword and location and will be able to view results within the Roadmapp environment. Only when they select a specific posting will they be redirected to Indeed in a new tab in order to read more about the opportunity.

3.3.5. My Journey



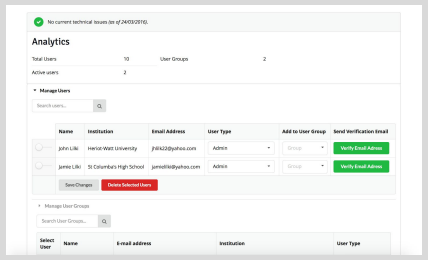
Additional: ✗

The actual user pathway (Journey) is rendered in its own frame on the My Journey page. Like applications such as Google Maps, it allows a user to move the canvas by dragging and to zoom in and out freely.

The timeline represents career history as nodes connected by the grey lines, ordered chronologically.

The nodes connected with coloured lines towards the end of the Journey indicate dynamically generated nodes that represent suggested future options tailored to the individual. These are clickable, with further information about each opportunity displaying below the Journey element.

3.3.6. Administrator tools

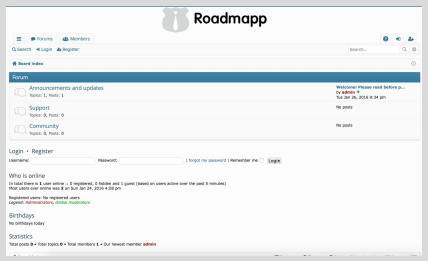


Additional: ✗

The administrator panel, whilst not as fully featured as originally planned, does have some simple functions:

- View total / active users
- User management: delete / verify / permissions
- User groups: create / edit members
- Flush avatar folder (frees disk space by removing old profile pictures)

3.3.7. User forums

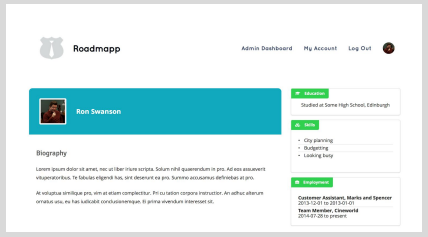


The dedicated Roadmapp forums help us in achieving the following goals:

- Build a sense of community through user-to-user interactions;
- Allow for Roadmapp staff to provide support in a familiar environment;
- Provide a place where we can gather feedback about Roadmapp.

Additional: ✓

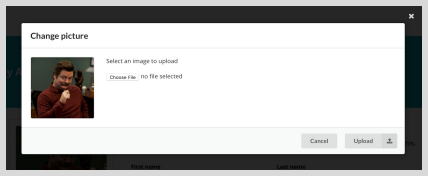
3.3.8. User profiles



Additional: ✓

Profile page
Much like social media networks, Roadmapp allows for the 'My Profile' perspective which gives a more high-level view of an individual. This page directly reflects much of the information from the Profile Builder in addition to showing some user activity.

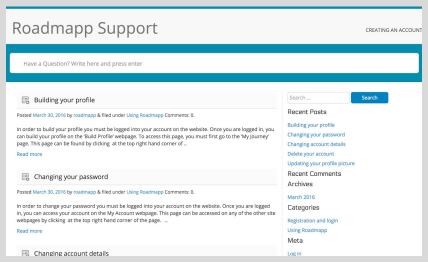
Profile pages could have more prominence in the future if the application was to evolve to have more social-media qualities, whereby this page would serve as the public-facing element of an individual's presence on the site.



Additional: ✓

Profile pictures
To add a degree of customizability to the user experience there is also the ability to customise profiles further by way of profile pictures.

3.3.9. Online documentation



For a modern web application such as Roadmapp it is only natural that the user documentation and guides are also provided online. In this case there is a dedicated searchable area of the site for this purpose.

Additional: ✓

3.4. Features not implemented from the specification

During the initial requirements analysis in Stage 1 we allocated priority levels to each functional requirement. This meant that we would be able to ensure the core features would be functional upon delivery, however, it also means that some features did not make the cut due to time and resource constraints.

What follows is an overview of the features that either have incomplete functionality or are not present at all in this version of the product.

3.4.1. Mentor functionality

STATUS	Partially implemented

The beginnings of this feature are present in this iteration of Roadmapp, with some elements visible on the site:

- Users can sign up to be a mentor on registration, which sets their default dashboard to the mentor view;
- The mentor dashboard exists, but most elements are filled with placeholder data;
- The user profile database has a field to hold the ID of their mentor and the mentor profile database has a field to hold group and mentee IDs.

At this point we would realistically disable the mentor functionality (by hiding the option to become one at registration) as it is not a polished feature by any measure. However, a basic framework is in place that could easily be built on in future iterations to finalise the functionality.

3.4.1. Administrative tools

STATUS	Partially implemented

At this point there is a usable implementation of an administrator dashboard that will be part of the delivered product. The functionality available to administrators however, is diminished in comparison to our original ambitions.

Achieved functionality is limited to what is discussed in Section 3.3.7. As such there are no graphical representations of usage giving detailed breakdowns of user demographics (e.g. % of users per industry, average level of user education, etc.). Implementing such features would have required a considerable amount of algorithm design given that much of the user data is built-up of unique input and not predefined values. Also, adding further graphing tools and learning how to use them would have had a considerable overhead for our programmers.

3.5. Robustness evaluation

3.5.1. Known issues

3.5.1.1 My Journey section

Section	Description	Example
Education		
Where did you study?	End date of a user's educational period can can come before the start date.	The start date can be the 2nd March 2015 and the finish date can be the 1st of March 2015.
Where did you study?	Name of institution can be entered as a number.	The user can enter the number 5 as the name of an institution they attended.
What courses did you take?	The user can enter any string of text in the Grade achieved box.	The word 'randomstring' can be entered as the grade achieved instead of a real grade.
Work History		
Where have you previously worked?	End date of a user's employment can can come before the start date.	The start date can be the 2nd March 2015 and the finish date can be the 1st of March 2015.

3.5.1.2 Job and course search

Section	Description	Example
Search Jobs		
Job title, company or keyword	Clicking the search jobs button without entering any input into the search box results in several PHP errors.	N/A

3.5.1.3. My Account section

Section	Description	Example
My Account		
Change your account details	Users can change their birthday to a date that doesn't exist.	Date of birth can be changed to the 31st of February.

3.5.2. Summary

There was only one problem found on the application which would cause a site error. This was due to users searching for jobs with a blank search box and is very easy to fix.

The majority of the problems found were only related to the user entering invalid input for their personal information. These problems could be easily sorted by just going to the relevant information input section of the site and changing the current details.

3.6. System usability overview

For a summary of the usability study please see Section 5 of the Usability Evaluation.

4. Conclusion

With our shared ideas and vision for the system, we created an intuitive experience to support and build on the original project specification. Tools such as the Profile Builder, the user onboarding wizard and the 'Recent Activity' dashboard timeline were unique to our project, built with the intention of enhancing the system usability and the overall product flow.

The 'Journey' concept was introduced to maintain relevance to our product theme, as opposed to simply naming it 'Your Pathway' or 'Suggestions' which may have seemed disconnected from our brand to users. Similarly, the diagram visualisation crafted is intended to resemble a metro-style map format.

In terms of our group dynamic, with our three developers collaboratively working on key features we achieved many of the functional requirements. Others in the group worked on additional features to improve the user experience, such as the support forum and user guide website, as well as testing the system for robustness and reliability.

As a team, we worked well together to troubleshoot and resolve issues; outside of meetings, we maintained a "to-do" list with prioritised tasks allocated to specific individuals. This helped to increase our productivity as a group overall, as we were able to direct our development focus accordingly at each stage.

Appendix I

Definitions and abbreviations

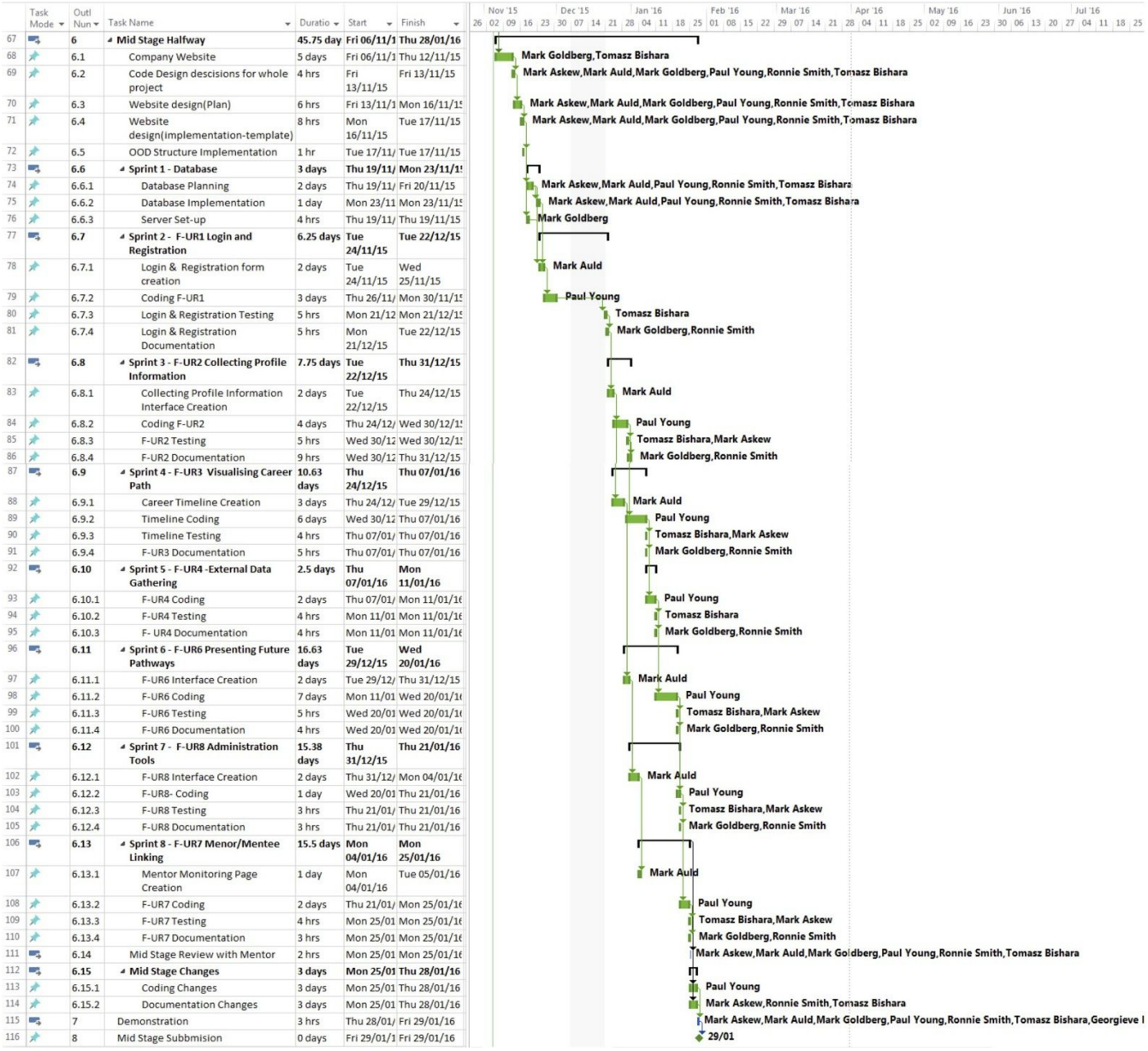
A1.1. Abbreviations

HTML	Hyper Text Markup Language
CSS	Cascading Style Sheet
JS	JavaScript
IIS	Internet Information Services
FTP	File Transfer Protocol
SSL	Secure Socket Layer
HTTP (HTTPS)	Hypertext Transfer Protocol (Secure)
CI	Codeigniter
MVC	Model View Controller
PHP	PHP: Hypertext Preprocessor

Appendix II

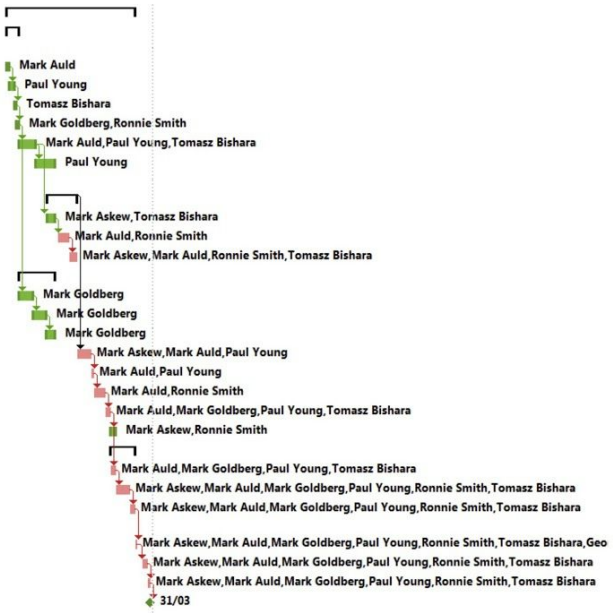
Original Project Plan

	Task Mode	Out Num	Task Name	Duratio	Start	Finish
1		1	**Meetings**	**111.13 da**	**Tue 06/10/**	**Tue 29/03/16**
28		2	Communication set up	1 hr	Tue 29/09/	Tue 29/09/15
29		3	Role Allocation	3 hrs	Tue 29/09/	Tue 29/09/15
30		4	Mentor Meeting	1 hr	Wed 30/09	Wed 30/09/15
31		5	**The Bid**	**27 days**	**Thu 01/10/**	**Fri 06/11/15**
32		5.1	Create Project Plan	4 hrs	Mon 05/10	Mon 05/10/15
33		5.2	**Requierements Specification**	**4.38 days**	**Tue 06/10/**	**Mon 12/10/15**
34		5.2.1	Create Specification Template	2 hrs	Tue 06/10/	Tue 06/10/15
35		5.2.2	Write Introduction	4 hrs	Wed 07/10	Wed 07/10/15
36		5.2.3	Write General Description	6 hrs	Thu 08/10/	Thu 08/10/15
37		5.2.4	Write Functional Requierements	4 hrs	Thu 08/10/15	Thu 08/10/15
38		5.2.5	Write non-functional Requierements	2 hrs	Fri 09/10/15	Fri 09/10/15
39		5.2.6	Review and Changes	3 hrs	Fri 09/10/1	Fri 09/10/15
40		5.3	**UML**	**5 days**	**Tue 13/10/**	**Mon 19/10/15**
41		5.3.1	Use Case Diagrams	4 hrs	Fri 09/10/1	Mon 12/10/15
42		5.3.2	Scenarios	6 hrs	Mon 12/10	Mon 12/10/15
43		5.3.3	Activity Diagrams	5 hrs	Mon 12/10	Tue 13/10/15
44		5.3.4	Sequence Diagrams	3 hrs	Tue 13/10/	Tue 13/10/15
45		5.3.5	State Machine Diagrams	2 hrs	Wed 14/10	Wed 14/10/15
46		5.3.6	Review and Changes	3 hrs	Thu 15/10/	Thu 15/10/15
47		5.4	Create Project Costing	9 hrs	Thu 15/10/	Fri 16/10/15
48		5.5	**Risk Management Strategy**	**5 days**	**Mon 19/10**	**Fri 23/10/15**
49		5.5.1	Introduction	3 hrs	Mon 19/10	Mon 19/10/15
50		5.5.2	Risk Identification	5 hrs	Tue 20/10/	Tue 20/10/15
51		5.5.3	Risk Analysis	4 hrs	Wed 21/10	Wed 21/10/15
52		5.5.4	Risk Planning	3 hrs	Thu 22/10/	Thu 22/10/15
53		5.5.5	Risk Monitoring	2 hrs	Thu 22/10/	Thu 22/10/15
54		5.5.6	Review and Changes	5 hrs	Fri 23/10/1	Fri 23/10/15
55		5.6	**Mockup Evaluation**	**6.5 days**	**Mon 26/10**	**Tue 03/11/15**
56		5.6.1	Introduction	2 hrs	Mon 26/10	Mon 26/10/15
57		5.6.2	Test Plan	5 hrs	Tue 27/10/	Tue 27/10/15
58		5.6.3	Usability test goals	2 hrs	Wed 28/10	Wed 28/10/15
59		5.6.4	Testing Protocol	4 hrs	Wed 28/10	Wed 28/10/15
60		5.6.5	Create Mockups	5 hrs	Wed 28/10	Thu 29/10/15
61		5.6.6	Test & Questionnaire Findings	7 hrs	Fri 30/10/15	Fri 30/10/15
62		5.6.7	Conclusion	2 hrs	Mon 02/11	Mon 02/11/15
63		5.6.8	Review and Changes	4 hrs	Tue 03/11/	Tue 03/11/15
64		5.7	Internal Bid Review	2 hrs	Wed 04/11	Wed 04/11/15
65		5.8	Bid Changes	1 day	Thu 05/11/	Thu 05/11/15
66		5.9	Bid Submission	0 days	Fri 06/11/1	Fri 06/11/15



	Task Mode	Outl Num	Task Name	Duratio	Start	Finish
67		6	**Mid Stage Halfway**	**45.75 day**	**Fri 06/11/1**	**Thu 28/01/16**
68		6.1	Company Website	5 days	Fri 06/11/1	Thu 12/11/15
69		6.2	Code Design descisions for whole project	4 hrs	Fri 13/11/15	Fri 13/11/15
70		6.3	Website design(Plan)	6 hrs	Fri 13/11/1	Mon 16/11/15
71		6.4	Website design(implementation-template)	8 hrs	Mon 16/11/15	Tue 17/11/15
72		6.5	OOD Structure Implementation	1 hr	Tue 17/11/	Tue 17/11/15
73		6.6	**Sprint 1 - Database**	**3 days**	**Thu 19/11/**	**Mon 23/11/1**
74		6.6.1	Database Planning	2 days	Thu 19/11/	Fri 20/11/15
75		6.6.2	Database Implementation	1 day	Mon 23/11	Mon 23/11/15
76		6.6.3	Server Set-up	4 hrs	Thu 19/11/	Thu 19/11/15
77		6.7	**Sprint 2 - F-UR1 Login and Registration**	**6.25 days**	**Tue 24/11/15**	**Tue 22/12/15**
78		6.7.1	Login & Registration form creation	2 days	Tue 24/11/15	Wed 25/11/15
79		6.7.2	Coding F-UR1	3 days	Thu 26/11/	Mon 30/11/1
80		6.7.3	Login & Registration Testing	5 hrs	Mon 21/12	Mon 21/12/1
81		6.7.4	Login & Registration Documentation	5 hrs	Mon 21/12/15	Tue 22/12/15
82		6.8	**Sprint 3 - F-UR2 Collecting Profile Information**	**7.75 days**	**Tue 22/12/15**	**Thu 31/12/15**
83		6.8.1	Collecting Profile Information Interface Creation	2 days	Tue 22/12/15	Thu 24/12/15
84		6.8.2	Coding F-UR2	4 days	Thu 24/12/	Wed 30/12/1
85		6.8.3	F-UR2 Testing	5 hrs	Wed 30/12	Wed 30/12/1
86		6.8.4	F-UR2 Documentation	9 hrs	Wed 30/12	Thu 31/12/15
87		6.9	**Sprint 4 - F-UR3 Visualising Career Path**	**10.63 days**	**Thu 24/12/15**	**Thu 07/01/16**
88		6.9.1	Career Timeline Creation	3 days	Thu 24/12/	Tue 29/12/15
89		6.9.2	Timeline Coding	6 days	Wed 30/12	Thu 07/01/16
90		6.9.3	Timeline Testing	4 hrs	Thu 07/01/	Thu 07/01/16
91		6.9.4	F-UR3 Documentation	5 hrs	Thu 07/01/	Thu 07/01/16
92		6.10	**Sprint 5 - F-UR4 -External Data Gathering**	**2.5 days**	**Thu 07/01/16**	**Mon 11/01/16**
93		6.10.1	F-UR4 Coding	2 days	Thu 07/01/	Mon 11/01/16
94		6.10.2	F-UR4 Testing	4 hrs	Mon 11/01	Mon 11/01/16
95		6.10.3	F- UR4 Documentation	4 hrs	Mon 11/01	Mon 11/01/16
96		6.11	**Sprint 6 - F-UR6 Presenting Future Pathways**	**16.63 days**	**Tue 29/12/15**	**Wed 20/01/16**
97		6.11.1	F-UR6 Interface Creation	2 days	Tue 29/12/	Thu 31/12/15
98		6.11.2	F-UR6 Coding	7 days	Mon 11/01	Wed 20/01/16
99		6.11.3	F-UR6 Testing	5 hrs	Wed 20/01	Wed 20/01/16
100		6.11.4	F-UR6 Documentation	4 hrs	Wed 20/01	Wed 20/01/16
101		6.12	**Sprint 7 - F-UR8 Administration Tools**	**15.38 days**	**Thu 31/12/15**	**Thu 21/01/16**
102		6.12.1	F-UR8 Interface Creation	2 days	Thu 31/12/	Mon 04/01/16
103		6.12.2	F-UR8- Coding	1 day	Wed 20/01	Thu 21/01/16
104		6.12.3	F-UR8 Testing	3 hrs	Thu 21/01/	Thu 21/01/16
105		6.12.4	F-UR8 Documentation	3 hrs	Thu 21/01/	Thu 21/01/16
106		6.13	**Sprint 8 - F-UR7 Menor/Mentee Linking**	**15.5 days**	**Mon 04/01/16**	**Mon 25/01/16**
107		6.13.1	Mentor Monitoring Page Creation	1 day	Mon 04/01/16	Tue 05/01/16
108		6.13.2	F-UR7 Coding	2 days	Thu 21/01/	Mon 25/01/16
109		6.13.3	F-UR7 Testing	4 hrs	Mon 25/01	Mon 25/01/16
110		6.13.4	F-UR7 Documentation	3 hrs	Mon 25/01	Mon 25/01/16
111		6.14	Mid Stage Review with Mentor	2 hrs	Mon 25/01	Mon 25/01/16
112		6.15	**Mid Stage Changes**	**3 days**	**Mon 25/01**	**Thu 28/01/16**
113		6.15.1	Coding Changes	3 days	Mon 25/01	Thu 28/01/16
114		6.15.2	Documentation Changes	3 days	Mon 25/01	Thu 28/01/16
115		7	Demonstration	3 hrs	Thu 28/01/	Fri 29/01/16
116		8	Mid Stage Subbmision	0 days	Fri 29/01/1	Fri 29/01/16

117		**9**	**Final Product**	**34.75 day**	**Mon 08/02**	**Fri 25/03/16**
118		**9.1**	**Sprint 9 - F-UR5 Real-time Reporting and Analytics Data**	**4.38 days**	**Mon 08/02/16**	**Fri 12/02/16**
119		9.1.1	F-UR5 Interface Creation	1 day	Mon 08/02	Mon 08/02/16
120		9.1.2	F-UR5 Coding	2 days	Tue 09/02/	Wed 10/02/16
121		9.1.3	F-UR5 Testing	6 hrs	Thu 11/02/	Thu 11/02/16
122		9.1.4	F-UR5 Documentation	5 hrs	Thu 11/02/	Fri 12/02/16
123		9.2	Sprint 10 - NF-UR4 Security	4 days	Fri 12/02/1	Thu 18/02/16
124		9.3	Extra Time for Coding/Extra Functionalities	5 days	Thu 18/02/16	Thu 25/02/16
125		**9.4**	**Sprint 11**	**9 days**	**Mon 22/02**	**Fri 04/03/16**
126		9.4.1	Integration Testing	3 days	Mon 22/02	Thu 25/02/16
127		9.4.2	Usability Evaluation	2 days	Fri 26/02/1	Tue 01/03/16
128		9.4.3	Project Evaluation	3 days	Tue 01/03/	Fri 04/03/16
129		**9.5**	**Marketing**	**9 days**	**Fri 12/02/1**	**Thu 25/02/16**
130		9.5.1	Marketing Analysis	3 days	Fri 12/02/1	Wed 17/02/16
131		9.5.2	Marketing Strategy	3 days	Wed 17/02	Mon 22/02/16
132		9.5.3	Marketing Review	3 days	Mon 22/02	Thu 25/02/16
133		9.6	System Integration Tested	3 days	Fri 04/03/1	Wed 09/03/16
134		9.7	System Performance Tested	1 day	Wed 09/03	Thu 10/03/16
135		9.8	Final Usability Evaluation	2 days	Thu 10/03/	Mon 14/03/16
136		9.9	Final Design & Implementation	2 days	Mon 14/03	Wed 16/03/16
137		9.10	User Guides	2 days	Wed 16/03	Fri 18/03/16
138		**9.11**	**Documentation**	**7 days**	**Wed 16/0**	**Fri 25/03/16**
139		9.11.1	Draft Documentation	2 days	Wed 16/03	Fri 18/03/16
140		9.11.2	Final Documentation	3 days	Fri 18/03/1	Wed 23/03/16
141		9.11.3	Documentation Review + Final Changes	2 days	Wed 23/03/16	Fri 25/03/16
142		10	Project Review with Manager	2 hrs	Fri 25/03/1	Fri 25/03/16
143		11	Demonstration Prep	2 days	Mon 28/03	Tue 29/03/16
144		12	Demonstration	1 day	Wed 30/03	Wed 30/03/16
145		13	Submission - Final Stage	0 days	Thu 31/03/	Thu 31/03/16



Appendix III

Project diary

3rd Year Group Project

Weekly Meeting 1

Thursday, September 24, 2015 16:15 | EM Crush Area

Minute Taker	Ronnie Smith (RS) <ronniesmith@outlook.com>
Attendees	Mark Askew (MAs), Mark Auld (MAu), Tomasz Bishara (TB), Paul Young (PY), Ronnie Smith (RS)
Others	Apologies from Mark Goldberg (MG)

	Type	Note	Owner	Due
1. Role assignments	INFO	Prior to this meeting roles were assigned as follows: - Liaison: Mark Auld - Organisational Manager: Mark Goldberg - Reporter: Ronnie Smith - Technical Manager: Paul Young		
2. Ideas and decisions	IDEA	Suggestion from Paul Young: To use Slack for team communication. Agreed to by all present team members.		
2.1	IDEA	Suggestion from Tomasz Bishara: To use Microsoft Project as a project management tool - e.g. to create a Gantt chart to aid with time and resource management. Agreed to by all present team members.		
3. To-do's	TODO	The group has agreed to individually examine the project specification and forward questions for the customer to a designated team member before the end of Sunday, 27th September 2015		2015-09-27
3.1	TODO	We will determine suitable times for an initial meeting with our team manager, Lilia Georgieva, by the end of the day. At which point Mark Auld (liaison) will make contact to organise a meeting for next week.		2015-09-24

3rd Year Group Project

Weekly Meeting 2

Tuesday, September 29, 2015 7:06pm | EMG.67

Minute Taker	Ronnie Smith (RS) <ronniesmith@outlook.com>
Attendees	Mark Askew (MAs), Mark Auld (MAu), Mark Goldberg (MG), Tomasz Bishara (TB), Paul Young (PY), Ronnie Smith (RS)

Type	Note	Owner	Due
AGENDA	- Work out possible times for meetings - Make contact with manager - Decide on tasks to be completed before next meeting		
DECISION	Times have been agreed where we could possibly meet: - 12:15 on Tuesday - 10:15 on Wednesday - 14:15 on Monday, Wednesday or Friday The group has selected 12:15 on Tuesdays as our primary weekly meeting time.		
DONE	Email sent from group liaison, Mark Auld, to manager Lilia Georgieva with our availability for meeting.		
DECISION	The group has agreed to individually compile a list of functional/non-functional requirements to bring along to the next meeting so that they can be compiled into a formal requirements document.		
INFO	Tomasz Bishara has begun working on the project Gantt chart and will have it mostly completed by the next meeting.		

3rd Year Group Project

Weekly Meeting 3

Tuesday, October 6, 2015 12:55pm | EMG.47

Minute Taker	Ronnie Smith (RS) <ronniesmith@outlook.com>
Attendees	Mark Askew (MAs), Mark Auld (MAu), Mark Goldberg (MG), Tomasz Bishara (TB), Paul Young (PY), Ronnie Smith (RS)

Type	Note	Owner	Due
AGENDA	Review Gantt chart Review work from last week Subdivide taks to be done by next meeting		
DONE	Tomasz Bishara has completed the the project plan and the group has approved the timescale as it appears in the Gantt chart.		
DECISION	Having reviewed the tasks on the project plan we have delegated tasks to be completed before our next meeting as well as making resource allocations on the Gantt chart for tasks later in the first stage.		
DONE	We have reviewed the work done over the past week. The requirements document is well under way and we have completed: introduction, scope, general requirements and constraints and some of the functional and non-functional requirements		
TODO	Mark Auld will invite group manager and supervisor to the shared Google Drive and slack channel today.		
TODO	By the close of the next meeting we expect to have: - Completed the functional/non-functional requirements - Begin adding UML diagrams and use case descriptions		

3rd Year Group Project

Monday 5th October

Tuesday, October 6, 2015 4:12pm | CMF2.17

Minute Taker	Ronnie Smith (RS) <ronniesmith@outlook.com>
Attendees	Mark Goldberg (MG), Mark Askew (MAs), Mark Auld (MAu), Paul Young (PY), Ronnie Smith (RS), Tomasz Bishara (TB), Lilia Georgieva (LG), Teymoor Rashid (TR)

Type	Note	Owner	Due
AGENDA	Introductions Discuss meeting availability/times Highlight tools using for communication/file sharing Progress report To do's before next meeting		
INFO	Everyone takes a turn at introducing themselves and explain their role in the team. We have discussed which tools we are using for team communication and file management: - Facebook group for announcements and messages - Slack for group discussion and quick file sharing - Google Drive to host the bulk of the project files		
DECISION	Discussion about the attendance of Lilia (manager) and Teymoor (MEng supervisor) to group meetings results in the following as a rough guide for who will attend meetings: - The group will meet at least once a week on Tuesdays at 12:45 in EMG.47 - Lilia will attend approximately one meeting per month, unless invited by the group to attend other meetings - Teymoor will try to attend the weekly meeting as often as possible		
TODO	Tomasz has noted that he is adding the finishing touches to the project plan and that it will be ready for the weekly meeting tomorrow.		
DECISION	In order for everyone to have access to the project plan and weekly minutes they will be uploaded after the meeting to the shared Google Drive.		
INFO	Lilia enquires about our interpretation of the project specification. Consequentially we have briefly discussed the outline of the project in order to ensure we have clear goals and that every one is on the same page about what has to be done.		
TODO	At the next meeting we will have the project plan and so we will be able to assign more specific tasks to each person.		

3rd Year Group Project

Weekly Meeting 5

Thursday, October 22, 2015 1:17pm | Library Mezzanine

Minute Taker	Ronnie Smith (RS) <ronniesmith@outlook.com>
Attendees	Mark Auld (MAu), Paul Young (PY), Ronnie Smith (RS)
Others	Apologies from Mark Goldberg (MG)

Type	Note	Owner	Due
AGENDA	Review previous actions - Requirements document status - Various diagrams - Costing Discuss the Gantt chart Planning usability studies Arrange meetings		
DONE	Requirements specification is very close to completion - Priorities added to functional requirements - Some UML descriptions added - A sequence diagram made - Main UML diagram drafted A first draft of the project costing has also been completed Risk management now also firmly underway		
INFO	Planning of usability study: - Looked through examples of other usability studies - Prioritised creation of mockups so that we can create a test protocol - Delegated some specific tasks to be done ASAP		
TODO	Refactor textual use case descriptions to create a unified format/style.		
TODO	First stage of usability over weekend: - Create document, add templates from Vision/Group Project website for consent - Test protocol document - Mockups		

3rd Year Group Project

Weekly Meeting 6

Tuesday, October 27, 2015 12:15pm | EM2.50

minutes.io

Minute Taker	Ronnie Smith (RS) <ronniesmith@outlook.com>
Attendees	Mark Auld (MAu), Mark Askew (MAs), Paul Young (PY)

Type	Note	Owner	Due
AGENDA	Progress report Review mockups Discuss timescale for delivering stage 1 deliverable Key activities for this week		
INFO	Progress since last meeting: - Requirements document now has all UML content added, meaning it is essentially complete other than some tidying up before submission - Risk assessment is nearing completion - Tomasz has confirmed prior to the meeting that the costing document is almost done - Good progress has been made on the usability documents: mockups will be complete after the meeting today, much of the report is written bar the test result analysis		
DONE	We have reviewed the four mockups created thus far and have created an additional one during the meeting. Everyone present agrees to proceed to testing using these mockups.		
TODO	Main activities for this week: - Now that mockups are complete we aim to have usability test protocol completed (currently around 70% done) by Thursday, with the intention that we will have until the following Tuesday to complete testing. - We will then have three days to writeup test data and analysis before proofing and compiling documentation on Friday 6th for submission. - Group liaison is to arrange a meeting with group manager so that we can update her on our progress thus far.		

3rd Year Group Project

Weekly Meeting 7

Tuesday, November 3, 2015 12:56pm |

minutes.io

Minute Taker	Ronnie Smith (RS)
Attendees	Mark Askew (MAs), Mark Auld (MAu), Mark Goldberg (MGo), Paul Young (PY), Ronnie Smith (RS), Tomasz Bishara (ToB)

Type	Note	Owner	Due
AGENDA	Compare progress to the plan Reviewing risk management Review costing Establish company name Finalise time scale for delivery of stage 1		
DONE	Mark Goldberg has submitted his risk management document to the group. It is ready to be added to the final document.		
DONE	Tomasz has submitted a project costing document and a copy of the project plan that now covers all of the stages. The costing will be formatted so that it can be put into the final document and Tomasz will generate a PDF of the plan.		
INFO	Having deliberated various options for a company name we selected 'Six String Development'. As far as branding is concerned we are exploring two concepts: - 'Roadmapp' - the design used in the mockups which focuses on the idea of using road navigation imagery as a metaphor for the users journey towards their chosen career - 'Runways' - operates in a similar fashion to the other idea, but using planes instead		
TODO	We have set out a basic schedule for the rest of the week: - Tuesday: scan and extract data from completed usability studies - Wednesday/Thursday write analysis of usability study data and create relevant tables and graphs - Friday: compile documentation into one final document and make any necessary last minute additions		

3rd Year Group Project

Tuesday, November 24, 2015

Tuesday, November 24, 2015 12:15pm | EM2.50

Minute Taker	Ronnie Smith (RS) <ronniesmith@outlook.com>
Attendees	Mark Askew (MAs), Paul Young (PY), Ronnie Smith (RS), Tomasz Bishara (ToB)
Others	Apologies from Mark Auld (MAu), Mark Golberg (MGo)

Type	Note	Owner	Due
TODO	Github setup Database design and structure Determine best sources for information scraping Discuss company website Site hosting		
INFO	We have created a github repo for the project and have invited everyone to join as collaborators.		
INFO	Sources for the project will likely be: - SCQF, using the SQL dump We will use this to track a users position along the pathway relative to their career goal. - Prospects.ac.uk, either by building a parser or manually transferring data The data gained from this source will be used to help a user choose a career and to point them towards a next step should they select a career. - UCAS, possibly using PHP requests Using this data we can directly offer a user a possible course that they would be able to apply for.		
DONE	A wordpress site has been set up so that the IS students can begin creating/adding content to create our company website. The company website is at http://sixstrings.rsws.co.uk/		
INFO	We have established how the project will be hosted. The live site and databases will run on one of our own web servers and will be mirrored elsewhere for redundancy. At present the site is located at http://roadmapp.rsws.co.uk/		
INFO	Paul is creating a database design so that we have a clear understanding of what data we will be using and how it interlinks.		

3rd Year Group Project

Thursday, 14th January 2016

Thursday, January 14, 2016 2:23pm | EM2.50

Minute Taker	Ronnie Smith (RS)
Attendees	Mark Askew (MAs), Paul Young (PY), Ronnie Smith (RS), Tomasz Bishara (TB), Mark Auld (MAu), Mark Goldberg (MGo)

Type	Note	Owner	Due
AGENDA	Progress review and clarifications Discuss/arrange meetings with manager Establish priorities for demo functionality Tasks to focus on		
INFO	A few notes on progress thus far: - We have the site live on the web using codeigniter as the foundation - A theme and design has been implemented, using 'Roadmapp' as our brand identity - Some pages and functionality have been implemented (login, sessions, some SQL tables) Some group members had previously mentioned that they were not clear on what our implementation of the 'timeline representation' would be. We have agreed that the timeline would flow in a vertical fashion on the page, with it flowing down the page from birth, milestones and finishing with prospective opportunities.		
TODO	We have agreed that we should meet with the group manager soon to discuss our progress before the demonstration in Week 3. Mark (Auld) will be contacting Lilia to arrange times for both the meeting and the demonstration.		
TODO	We have prioritized tasks to be completed by our next meeting based on providing approximately half-functionality of the site, using dummy data in some cases in order to show functionality where the back-end application may not be fully developed. Therefore we will be focusing on: - Finalizing the datasets used for users personal data (including their education/work background) - Implementing a diagram utility that will allow us to display our data in a visually appealing way - Complete functions that allow the collection and editing of user personal data and career history - Add the 'recent activity' pane to the user dashboard - Creating branding and content for our company website		

3rd Year Group Project

Wednesday, 10th February 2016

Wednesday, February 10, 2016 2:17pm | Em2.50

Minute Taker	Ronnie Smith (RS)
Attendees	Mark Askew (MAs), Paul Young (PY), Ronnie Smith (RS), Mark Auld (MAu), Mark Golberg (MGo)

Type	Note	Owner	Due
AGENDA	To do list utility Job and course search features Application development tasks Prioritisation of tasks for this stage Update the project plan Marketing strategy		
DONE	We have demoed to the group how we will organise tasks for this stage, using prioritised task lists on Todoist.		
INFO	Summary of where we are with the application: - User interface is essentially complete - Databases are nearing completion, but is missing job data - Administrator dashboard has been added - Halfway towards functionality regarding pushing/pulling user skills/quals information from databases via the profile builder GUI - Using reed.co.uk to pull down job postings		
INFO	Our focus for the next week of development will centre on: - Have the profile builder storing all user provided data to the correct table - Finish the implementation of the job search on the dashboard		
INFO	We will be revising our project plan to better reflect the deadlines and SCRUM stages during this part of development.		
INFO	Mark Goldberg is starting work on the Marketing Strategy document prior to the next meeting.		

3rd Year Group Project

Wednesday, 2 March 2016

Wednesday, March 2, 2016 2:23pm | EMG.46

Minute Taker	Ronnie Smith (RS) <ronniesmith@outlook.com>
Attendees	Mark Askew (MAs), Paul Young (PY), Ronnie Smith (RS), Tomasz Bishara (ToB), Markk Goldberg (MG), Mark Auld (MAu)

Type	Note	Owner	Due
AGENDA	Revision of previous progress		
DONE	Functionality achieved: - Timeline now automatically generates based on user data - Administrator panel added, with limited functionality - User profiles now able to get real data from databases - Job search basically is working from the dashboard and is integrated to some site services		
TODO	Tasks delegated: - Tomek: project evaluation, specifically parts relating to organisation and implementation - Ronnie: project evaluation, specifically the product section / create use case scenarios for usability test - Mark (Auld): general application testing - Mark (Askew): develop the administrator dashboard - Paul: enhance the mentor functionality, further develop user activity module to have more of a 'conversation flow' - Mark (Goldberg): marketing analysis and strategy - Paul, Ronnie: develop algorithms for predicting future pathways and automatic course searching		
IDEA	We are considering ways to create user guides, with the possibility of creating a tutorial video walking the user through the basic process of using the application.		

Wednesday, 23rd March 2016

Wednesday, March 23, 2016 4:41pm | EM2.50

Minute Taker	Ronnie Smith (RS) <ronniesmith@outlook.com>
Attendees	Mark Askew (MAs), Mark Auld (MAu), Mark Golberg (MGo), Paul Young (PY), Ronnie Smith (RS), Tomasz Bishara (TB)

Type	Note	Owner	Due
AGENDA	Discuss functionality that will be in final product Usability study overview Review marketing documents Demo		
INFO	We have discussed which functionality we expect will be in the final product and what will not work: - Will meet most of the functional requirements - Mentors will not be fully implemented as other tasks must be prioritised - Minimum functionality expectations: registration, profile building, timeline, suggested courses/jobs, job/course manual search, admin panel basic functionalities		
INFO	The usability study has been prepared and is ready to be undertaken. We aim for each person in the group to carry out two studies which should gives us around 10-12 samples. These should be completed by Tuesday, 29th March to allow for some time to write up analysis.		
INFO	Mark Goldberg has been working on marketing documents which he has shared with the group.		
INFO	We are planning a draft flow for the demonstration of Roadmapp: - Home page: highlight how it advertises who the site is for - Registration process: focus on how simple it is and how easy it is to get started - Welcome carousel: brief demo, highlight how it may be useful for new users - Profile builder: live input of sample profile information - Dashboard: overview - Timeline: demonstrate interactivity, focus on suggested pathways - Dashboard: job/course search functions - Profile pages: overview - Admin dashboard: brief description of the functions available		