Niceway.to
Crowd Sourced Scenic Route Sharing

Submitted March 2016 in partial fulfilment of the conditions of the award of the degree MSci (Hons) Computer Science

Craig Knott
psyck

With Supervision from Max L. Wilson

School of Computer Science and Information Technology
University of Nottingham

I hereby declare that this dissertation is all my own work, except as indicated in the text:

Signature _____

Date _____/_____/_____

Abstract

Project abstract

Words in text | 1,604

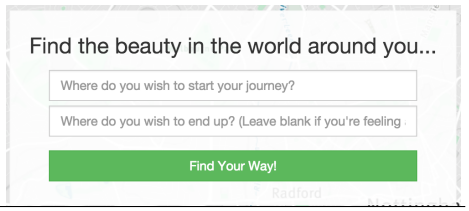
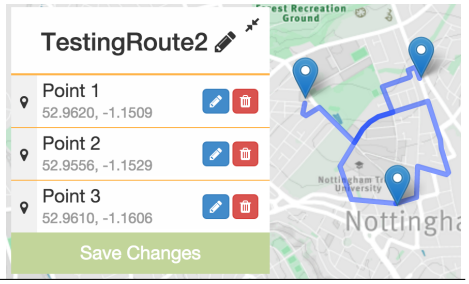
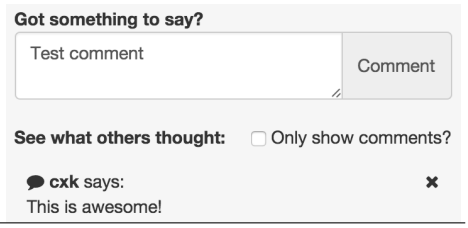
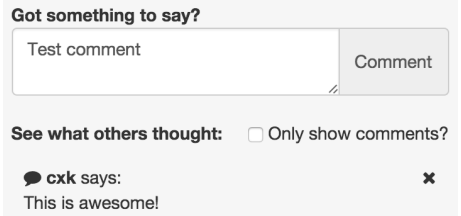
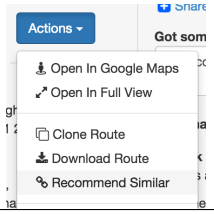
Calculated with the TeXCount web service
`http://app.uio.no/ifi/texcount/online.php`

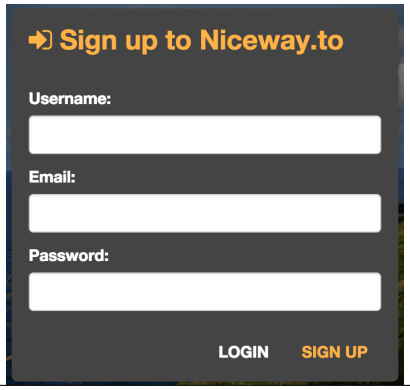
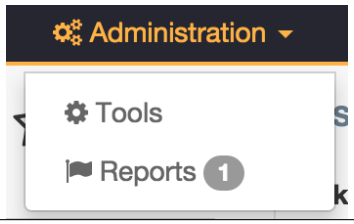
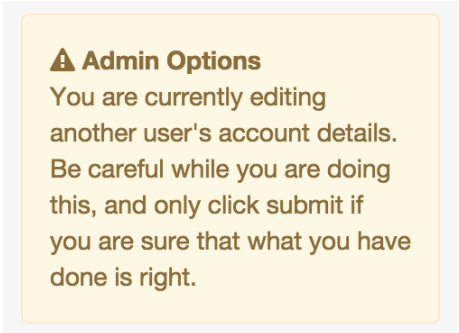
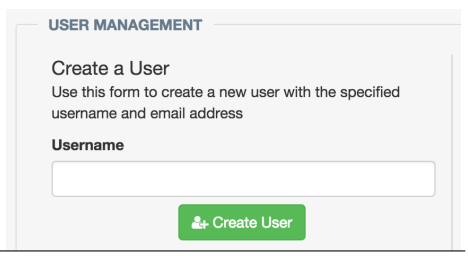
Contents

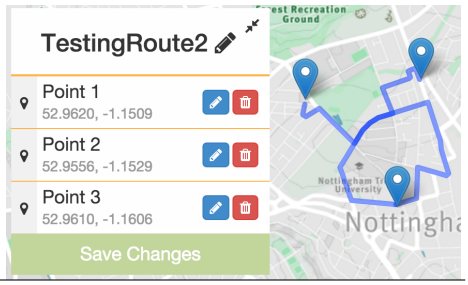
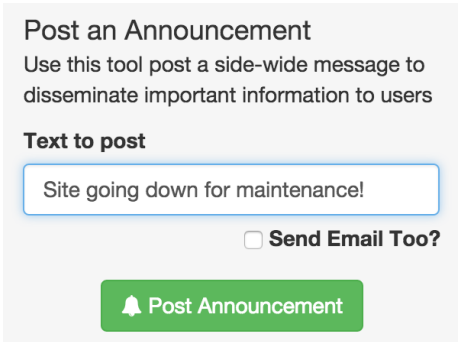
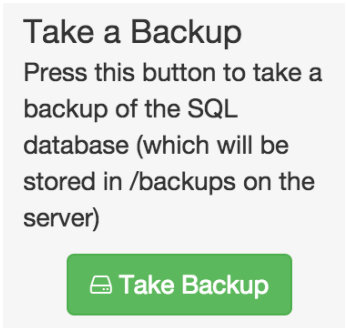
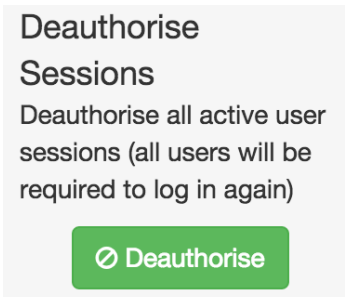
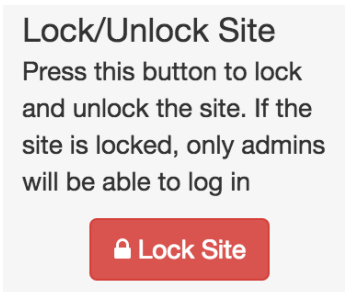
1 Testing of the Project

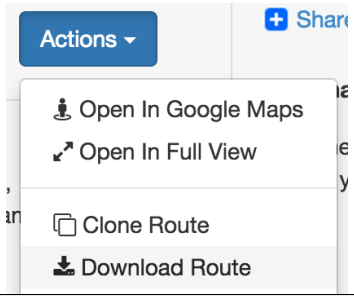
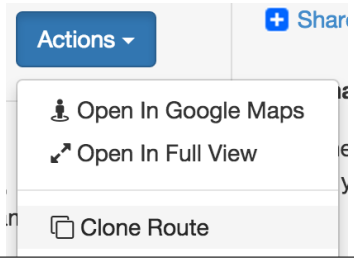
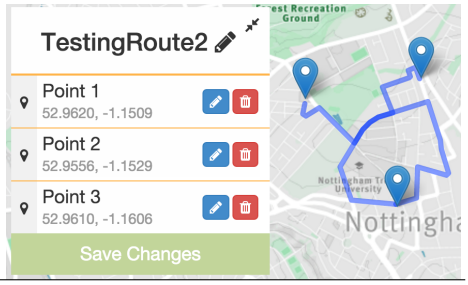
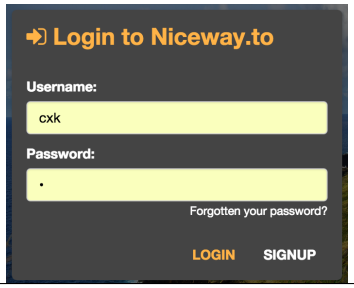
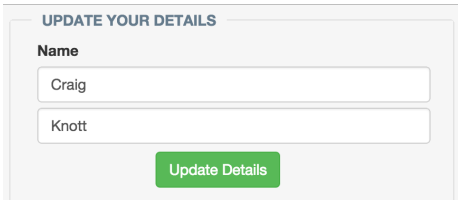
1.1 Functional Testing

In this section, each of the functional requirements laid out in section **??** have been evaluated and tested, to ensure that the system meets them. Due to these tests coming directly from the requirements, it was easy to determine if each test was successful or not, based on whether or not the feature had been included. In cases where the test is marked as "passed", a screen shot of evidence has been provided. This testing was only interested in whether or not specific features were present, and the inner workings of these features was irrelevant, for this reason, these can be considered black box tests[4] (testing where only the input and output can be observed).

FR#	Test	Result	Proof
1.	Users can search by geographical region	Passed	
2.	Users can contribute routes	Passed	See 2.1 and 2.2
2.1.	The creator of a route (only) can modify it	Passed	
2.2	Users can make their routes private	Passed	
3.	Users can interact socially with routes	Passed	See 3.1, 3.2 and 3.3
3.1.	Users can comment on routes	Passed	
3.2.	Users can recommend routes similar to the current route	Passed	

FR#	Test	Result	Proof
3.3.	Users can share routes externally	Passed	
4.	Users can create accounts	Passed	
5.	There are administrative users	Passed	
5.1.	Administrators can delete users	Passed	
5.2.	Administrators can update users	Passed	
5.3.	Administrators can create users	Passed	

FR#	Test	Result	Proof
5.4.	Administrators can delete routes	Passed	
5.5.	Administrators can delete user comments made on routes	Passed	
5.6.	Administrators can post messages that will be displayed on every page	Passed	
5.7.	Administrators can make backups	Passed	
5.8.	Administrators can close and deauthorize active sessions	Passed	
5.9.	Administrators can lock the site	Passed	

6.	Users can export/download their routes	Passed	
7.	Users can make a copy of another user's route	Passed	
8.	There is a route creation/editing component	Passed	
9.	Users can log into their account	Passed	
9.1.	Users can edit their personal information	Passed	
9.2.	Users can access and edit their routes	Passed	

1.2 Non-Functional Testing

In this section, each of the functional requirements laid out in section **??** have been evaluated and tested, to ensure that the system meets them. Black box testing[4] was employed here, where the inners workings of the system are irrelevant, as long as the external product could perform the function.

- Look at non-functional requirements and talk about if they were met
- Just like last year's diss

Accessibility
Was this met? If so, **how**?

Usability and Operability
Was this met? If so, **how**?

Maintainability & Documentation
Was this met? If so, **how**?

Quality
Was this met? If so, **how**?

Resource Requirements and Constraints
Was this met? If so, **how**?

Cross Platform Compatibility
Was this met? If so, **how**?

Security
Was this met? If so, **how**?

Disaster Recovery
Was this met? If so, **how**?

1.3 User Feedback Testing

Usability testing is the process of getting actual users to use the system, with these users performing a set of tasks whilst being observed. The time taken to complete the various tasks, and any comments or criticisms the user had were recorded, as well as any bugs the user encountered. The purpose of these tests was to discover usability problems in the interface, and what could be made simpler.

For the tests a sample of 15 users were selected, with a skill level ranging from low, to very high, with ages ranging from 21 to 46. The reason for this broad range was that users of different skill levels, and different ages, use and understand computers differently, and therefore what is considered intuitive for one user is not necessarily considered the same by others. This meant that the number of usability issues and simplifications that could be identified was greatly increased. The five tasks that the users were expected to complete are given below, and a full list of instruction can be found in appendix A.

1. Search for a route, and view it's details
2. Create an account for the system
3. Comment, rate and download a route
4. Create a route
5. Navigate back to their route, and make edits

These five tasks represented the five core tasks that users of Niceway.to would be expected to engage in on a regular basis (except signing up, which would only occur once, but was a barrier for entry so it was important it was short and simple). This meant it was vital that they were easy to understand, and easy to complete by users of all skills levels. It was for this reason that the instructions for the tests were as vague as possible, as not to lead the users to the correct answers. Some of these tasks were purposefully extremely simple and short, so that users could really focus on the specific areas of the system, and therefore identify more issues.

The RITE method (Rapid Iterative Testing and Evaluation) was employed during the usability tests to quickly iterate on user feedback to fix issues with the system. This meant that, after each user completed the set of tasks, their feedback would be implemented, and any bugs they discovered would be fixed before the start of the next test. This meant that each participant would be looking at a slightly different product, and they would all be able to identify unique issues instead of being focused on the same issue.

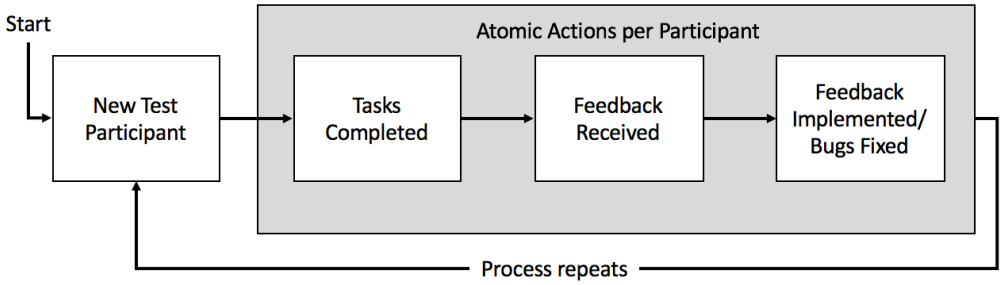


Figure 1: The employed RITE method life cycle

The time taken for each participants to complete the tasks can be found in appendix B, with a summary presented below, and an discussion of these results forthwith.

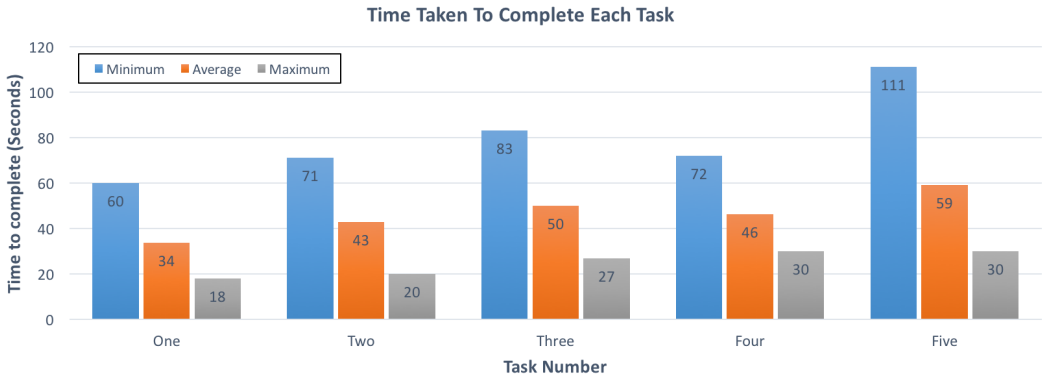


Figure 2: Summarised results from user testing

From these results it would not be far-fetched to claimed that each of these tasks were simple to achieve. They could all be completed in under two minutes by users of all skills levels, with an average completion time of just under a minute. Some expert users could even complete the tasks in under thirty seconds, which is promising, and is a figure that many users would eventually be able to replicated, as their usage of the site increased. A brief analysis of each of the tasks is given below.

Task One - Searching for Routes
This task was completed with the fastest of them all, which in part is due to users starting on the page they needed to use, but also that the functionality was easy to locate. This was because of the large search box in the middle of the page, which was eye catching and intuitive for users to understand. The main limiting factor in this test was not the software, but rather how quickly the user could type the search terms, which was the cause for the differing times. On the search results page, most users were almost instantly able to find the link to the details page, and complete the test unhindered. One user attempted to click on the title of the route, which he believed to be the "more intuitive thing to do", and thus this functionality was added after that user completed their testing.

Task Two - Creating an Account
Creating an account required the user to enter a user name, their email, and a password. This was therefore an extremely simple task, that most users performed with little hindrance. The main factors that drove the time up for this task were the waiting for the confirmation email (which varied based on the participants Internet connection speed), and errors in the form. The main error being users entering passwords that were too short (less than six characters), and their accounts being rejected as a result. This meant that users has to completed this step again, and spend some time trying to understand the problem. None of these, however, were points of discussion, as most users accepted this as standard, and didn't feel like it was a usability problem.

One issue that was not addressed in this process was what happens when a user attempted to sign up with a user name that already exists in the system. This is because there were so few accounts created, that the odds of two users picking the same were minuscule. If a user did happen to pick the same user name as someone else, it would likely result in a highly inflated time for this task, because the user would then be required to think of another unique user name, which can be difficult, as most users tend to use the same one for most websites.

Task Three - Interaction with a Route
The third task was used to determine how easy it was to experience the social elements of the system, which was an extremely important part of the system in regards to building a community around the website. In this task, users were required to search for a route and open it (building on knowledge they acquired in the first task), then perform three social interactions: commenting on the route, giving the route a rating, and downloading the route. Of these three, the only one that users struggled with was the downloading of the route, as many users could not find this option. It was clear that most users expected the download button to be somewhere in plain site, which was due to them being unaware of the other interactions they could have with the route, and thus assumed the download functionality be available just like commenting on routing. After the users discovered the action button, they quickly found the download feature, as well as a host of other features, which would then be able to use next time they were on the site.

Task Four - Creating a Route
It is worth pointing out that, despite the results for this test being very positive, there are not indicative of how a real user would use the route creation page. In the tests, users were simply asked to construct a route with three points, and save it. A real user would spend much longer in positioning these points, ensuring the route between them was good, and adding rich content, like titles, descriptions and media to the points. In the tests, most users clicked on three places at random, and hit the save button. It may have been beneficial to enforce the users to look for specific locations, which would have better reflected real users.

Regardless of this, a lot of useful feedback was gathered from these tests. The most prominent (which could have easily been missed as a result of the format of the test), was the difficultly of navigating large portions of the map at once. This was only discovered when one user that was not local to Nottingham, decided to create a route started at his house in Guildford. This required him to scroll and pan then map for a considerable time to find this location. As a result of this feedback, the ability to search for specific locations, and centre the map on them, was added to the route creation page. This meant that users could search for a location and instantly jump to it, which was useful for when they wanted to create a route that started far away from their initial location.

Task Five - Editing your Route
The fifth task was the task that, on average, took the longest to complete, and had the greatest range of results (with a different of 81 seconds between the fastest and slowest times). This is most probably caused by the users requiring some level of intuition to finish the task. In two of the tasks, the user was asked to use the search functionality, but in this task they were told to specifically avoid it. This meant the user needed to think about the system and utilise tools they had already used (the navigation bar), but apply them to a new problem - finding where their routes were saved.

After users determined that their routes were stored in the “My Profile” area of the site, locating the ability to edit them was very simple. The synonimity of a pencil icon, and the ability to edit is very strong, and many users (after locating the specific route), jumped to the edit page very shortly after. Perhaps changing the testing instructions to use the word “modify” or “change”, rather than “edit”, would have had an impact here.

An interesting thing to point out in task five, which was a merit of the RITE method, was how the editing of titles changed as a result of the tests conducted. One of the first users commented that having to click "Save" before being able to change the title, especially when it is already displayed on the page. He suggested putting an edit icon next to the title, and allowing users to change this value here would be more intuitive. This feedback was then implemented and it was observed that every single participant utilised this new feature, and thus sped up the time it took to complete that particular task

Issues Identified
The main issues that were identified during the usability tests, and were then resolved in between testing stages, have been listed below. The advantage of resolving these issues in between tests is that subsequent participants were able to detect unique and novel issues, rather than each user identifying the same set of issues.

Page	**Comments Made**	**Resolution**
Landing	"Why can't I press enter to search?"	Allowed users to press the return key to submit their search results on the landing page.
Landing	"I accidentally searched without a starting point and got loads of errors"	Prevented users from submitting their search if no start point was provided.
Listing	"I thought that clicking on the title would have been the more intuitive thing to do"	Allowed users to click on the title of a search result to view full details
Listing	"After I clicked on a route, I clicked the back button and there was an error about having to resubmit a form and I couldn't get my original search results back"	Changed form submission mechanics so users could press the back button to access their original search results
Creation	"It was strange that I couldn't rename my route unless I opened the save popup, especially considering how the title is displayed on the page already"	An edit icon was added to the title, which users could click on to modify their route title, without having to open the save dialogue.
Creation	"I had to scroll and pan for a very long time to get the map to centre over my house in Guildford, because it started in Nottingham"	Added a search box on the route creation page that would take the entered location and centre the map on this point
Creation	"I was worried that clicking 'Save Route' would create a new, duplicate, route"	Changed button to read 'Save Changes' instead, when on the edit page.
Creation	"I accidentally deleted one of my points, and the 'Loading Map' thing stayed forever"	Modified behaviour of the loading icon to account for when points are deleted
Listing	"Some of the route were really long and didn't fit in the box"	The maximum zoom limit for routes on the listing and detail page was removed

References

[1] Google Maps, My Maps website. `https://www.google.com/maps/d`. Accessed: 01/02/2016.

[2] MADMAPs website. `http://www.madmaps.net/`. Accessed: 01/02/2016.

[3] My Scenic Drives website. `https://www.myscenicdrives.com/`. Accessed: 01/02/2016.

[4] Boris Beizer. *Black-box testing: techniques for functional testing of software and systems*. John Wiley & Sons, Inc., 1995.

[5] Zaiben Chen, Heng Tao Shen, and Xiaofang Zhou. Discovering popular routes from trajectories. In *Data Engineering (ICDE), 2011 IEEE 27th International Conference on*, pages 900–911. IEEE, 2011.

[6] Joshua Gross. Please stop using twitter bootstrap, 2013.

[7] Matthew Joint. Road rage. 1995.

[8] Henrik Kniberg. Scrum and xp from the trenches. *Lulu. com*, 2007.

[9] Jonathan Lazar, Adam Jones, and Ben Shneiderman. Workplace user frustration with computers: An exploratory investigation of the causes and severity. *Behaviour & Information Technology*, 25(03):239–251, 2006.

[10] Kimberly Ling, Gerard Beenen, Pamela Ludford, Xiaoqing Wang, Klarissa Chang, Xin Li, Dan Cosley, Dan Frankowski, Loren Terveen, Al Mamunur Rashid, et al. Using social psychology to motivate contributions to online communities. *Journal of Computer-Mediated Communication*, 10(4):00–00, 2005.

[11] Yin Lou, Chengyang Zhang, Yu Zheng, Xing Xie, Wei Wang, and Yan Huang. Map-matching for low-sampling-rate gps trajectories. In *Proceedings of the 17th ACM SIGSPATIAL International Conference on Advances in Geographic Information Systems*, pages 352–361. ACM, 2009.

[12] John D McCarthy, M Angela Sasse, and Jens Riegelsberger. Could i have the menu please? an eye tracking study of design conventions. In *People and computers XVI-IDesigning for society*, pages 401–414. Springer, 2004.

[13] George A Miller. The magical number seven, plus or minus two: some limits on our capacity for processing information. *Psychological review*, 63(2):81, 1956.

[14] Jakob Nielsen. 10 usability heuristics for user interface design. *Fremont: Nielsen Norman Group.[Consult. 20 maio 2014]. Disponível na Internet*, 1995.

[15] Heather L O'Brien and Elaine G Toms. What is user engagement? a conceptual framework for defining user engagement with technology. *Journal of the American Society for Information Science and Technology*, 59(6):938–955, 2008.

[16] Ofcom. The communications market report, published 6th august 2015. Ofcom, 2015.

[17] Fernando S Peregrino, David Tomás, Paul Clough, and Fernando Llopis. Mapping routes of sentiments.

[18] Daniele Quercia, Rossano Schifanella, and Luca Maria Aiello. The shortest path to happiness: Recommending beautiful, quiet, and happy routes in the city. In *Proceedings of the 25th ACM conference on Hypertext and social media*, pages 116–125. ACM, 2014.

[19] Shneiderman Ben Shneiderman and Catherine Plaisant. Designing the user interface 4 th edition. *ed: Pearson Addison Wesley, USA*, 2005.

[20] Pierre Thiffault and Jacques Bergeron. Monotony of road environment and driver fatigue: a simulator study. *Accident Analysis & Prevention*, 35(3):381–391, 2003.

[21] Steven Van Canneyt, Steven Schockaert, Olivier Van Laere, and Bart Dhoedt. Time-dependent recommendation of tourist attractions using flickr.

[22] Jason Vest, Warren Cohen, and Mike Tharp. Road rage (usa). *US News and World Report*, 1997.

[23] Susan B Wilson and Michael S Dobson. *Goal Setting: How to Create an Action Plan and Achieve Your Goals*. Publisher - Amacom, 2008.

A Usability Testing Instruction Set

The purpose of these tests is for you to experience the five main features of Niceway.to so that their ease can be evaluated. Follow the instructions below to complete each of the tasks, during which you will be timed. Please make a note, or comment on anything you find difficult or unintuitive, or any bugs you find.

Task One - Searching for routes

1. Navigate to http://www.niceway.to
2. Search for a route from Nottingham to Derby
3. Navigate to the details page of one of these routes

Task Two - Creating an account

1. Navigate to http://www.niceway.to
2. Sign up for an account
3. Ensure you get an email confirmation

Task Three - Interaction with a route

1. Navigate to http://www.niceway.to
2. Search for a route from Nottingham to Derby
3. Navigate to the details page of one of these routes
4. Leave a comment on the route
5. Give this route a rating
6. Download this route

Task Four - Creating a route

1. Navigate to http://www.niceway.to
2. Go to the route creation page
3. Create a route with three points
4. Save this route and give it a name

Task Five - Editing your route

1. Navigate to http://www.niceway.to
2. Without using the search feature, find the route you just made
3. Open your route for editing and change the title
4. Save your route

B Times recorded for usability tests

The tasks users were asked to perform, with the times taken listed in the table below, were as follows:

1. Search for a route, and view it's details
2. Create an account for the system
3. Comment, rate and download a route
4. Create a route
5. Navigate back to their route, and make edits

	Completion Time in Seconds				
Participant	Task 1	Task 2	Task 3	Task 4	Task 5
1	30	25	42	36	60
2	22	47	58	30	30
3	20	37	37	36	45
4	40	51	78	72	65
5	22	20	36	35	45
6	44	35	60	51	75
7	25	42	40	43	44
8	59	71	78	49	111
9	18	36	27	48	36
10	22	43	31	48	40
11	60	62	83	56	52
12	37	54	47	44	67
13	32	46	45	46	72
14	28	26	36	44	56
15	47	49	52	58	91