**Technical Report**

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**Overview**

*This document is submitted in partial fulfillment of the Team Project module 2019 delivered by Dr Keith Maycock.*

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# Product Overview

The web application will provide real-time public transport information to the commuters of Dublin. It will provide information for the transport services of Dublin Bus, Irish Rail, Luas and Dublin Bikes. First, commuters can plan their journey by entering their start and end location on the maps page. Then the information will be provided on the best route and which type of transport will be the most efficient. The user can then visit the other pages of the web application to get real-time timetable information for whichever mode of transport that the map suggested for them. The system will use a separate API for each service to show the active, real-time data about the specific mode of transport that they wish to commute on.

There will also be a contact page which will enable users to contact us if they have any query regarding the web application. They will be able to fill out a web-form to submit a query or they will be able to view the company’s name, address and phone details. There will also be links to the company’s various social media platforms for people to access news and announcements from the company.

Here is the link to the final web application:  
<http://transport4all.000webhostapp.com/>

# Requirements Specification Migration

We did not migrate very far from our original project proposal but we did make one small change. Our original plan was to have a page with Google Maps feature where a user could enter a start and destination point. The Google Map would then show the most efficient route and also suggest the best mode of public transport. From this point then the user could go to one of the transport pages and get the real-time information for the suggested mode of transport.

**For Example:**

1. The user goes to the maps page and types Santry in the Start point and O’Connell Street in the destination point.
2. The map highlights the best route and suggests a route.
3. The user can see the closest bus stop on the map and the stop number.
4. The user goes to the Dublin bus page and enters this stop number.
5. The user is presented with real-time information of the next busses to arrive at that stop.

When we started the project we did not have any experience of working with Google Maps or their API. When we started to work with it we discovered that there was a slightly better way to implement the journey planning feature that would not just cover the modes of public transport. We now realised that we could provide information for people wishing to use their own car. We could also provide information for people who wished to walk or cycle. In the final version of the application, the user can still enter a start and destination point but they can now choose the mode of transport that they wish to take by clicking on the relevant icon. If the user clicks on the car or bicycle icon then they will be provided with the most efficient route for their journey. If they click on the pedestrian icon then they will be given the best route to walk. Then if they click on the public transport icon the the most efficient route is suggested along with suggested modes of transport like bus or Luas and the nearby stop. The user can then go to the transport pages and get the real-time information for bus, rail and Luas times for that stop. So although this feature works slightly different to the original proposal we do feel that the change was worth making and that we are providing a better user experience.

**[20% of Marks]**

# Self reflective analysis of the initial Gantt chart submitted

Creating the Gantt chart initially looked like one of the more simple tasks associated with the project but it turned out to be fairly tricky. The problem with the Gantt chart was not just trying to break the project down into sub-tasks. That aspect of it was relativly simple. The real problem was trying to predict how long each task would actually take to complete. It was even more difficult to predict how long it would take to complete a task which none of the group members initially had the skills to complete. This was because we would have to learn the particuler skill first before using it to complete the task and then implement it into the project. It is difficult to estimate the timeframe for something like this. The fact that there were also two Sprints each week instead of one meant that some of our minor tasks were often done before we had intended and listed in our original Gantt chart. This did knock some things slightly out of order but it did not prove to be a major problem. However, our final version of the Gannt chart does look slightly different from the original mainly due to these reasons. We have included a copy of the original Gantt chart and the final Gantt chart as Microsoft Project files along with this document. The files show how the original planned tasks differed from the timeframe of the actual tasks.

**[30% of Marks]**

# Discussion on the benefits of using SCRUM

Following the SCRUM model definitly made it easier to complete the project. The SCRUM model provided deadlines for us to work towards and made sure that there was always a part of the project being worked on at any given time. It was also a very useful way to divide tasks amongst the group and it was easy to see what task eash member was working on and when they would complete it. This helped to provide us with goals to work towards each week to try an make sure that nothing was added to the product backlog which would allow the workload to build up. The process itself also acted as a useful motivation tool because no team member wanted to be the one who did not complete the task which had to be added to the backlog. The SCRUM process was especially beneficial when the team could not physically work together in the same location. This happened during the reading week break but did not have any impact on the project schedule because each of the group members had recieved their tasks before the break up and everybody knew exactly what needed to be done.

**[20% of Marks]**

# Challenges Encountered

One of the early challenges that we faced early in the project was when we were in the construction phase of the web application. We had agreed on a wire-frame design, colour scheme and layout. Then we divided up sections of the website to construct on our own. As we developed the sections and began to try to put them together they would not work as expected. We then discovered that during our planning meetings that one thing we had overlooked was to agree on which version of the Bootstrap framework we would use. This resulted in some members of the group using Bootstrap 3 to design their sections and some other members using Bootstrap 4. This led to features like the carousel on the home page and the navigation bar not working. We tried different solutions to try and get the features of both versions of Bootstrap to work together but we were unsuccesful. We decided to call a group meeting before any further work was done which was incompatible. In the end we decided that we would have to make a compromise and use Bootstrap 3 and re-develop the other sections to be compatible. This decision was due to the fact that more of the application had already been developed using Bootstrap 3 at that point. This was an example of how even a small oversight in the planning process could make a big difference later on in the project in it goes undetected.

Another area that we had a problem with was the route planning feature of the maps page. It took a long time for us to learn how to get the maps feature and the route information to work properly.

**[20% of Marks]**

# Conclusion and Future Work

As a group we are happy with how the project turned out but we also acknowledge that there is plenty of room for improvement. One area in particular that we really feel that we could improve on is the API’s that we used to pull the real-time information for the services. The API’s are freely available for personal use and although they would suffice for the duration of the project and to show a working version of the web application, they would not be ideal for a professional or commercial web application. The use of free API’s do not use HTTPS and this causes a CORS error. For this reason, a browser plugin is required as shown below in Fig 01.

A screenshot of a cell phone

Description automatically generated

**Fig 01.**

We are still in the process of learning about the use of API’s and in the future if we were to make further progress with the Transport 4 All web application, we would be hoping to either pay for more professional API solutions or to develop our own.

The same situation applies to the platform that we have used to host the web application. 000 Webhosting service is a free hosting service. This works well to display the web application for the purpose of the project, but it would not work well for hosting a commercial website. We would also like to improve the search feature on the Dublin bus page. We would like to allow the user to search not only by “stop number” but to have the options of also searching by stop address or Bus route. However, with 7711 bus stops in Dublin alone, it would not have been practical to do this within the duration of the project. These are definitely options that we would implement in a commercial project or as possible improvements in the future.

There is also the possibility of expanding the application to cover all of the other counties outside of Dublin. This would be straightforward enough to do and it would be the next step that we would consider if we wished to expand the project. There are also other features that we discussed as the project progressed which we felt would really enhance the user experience. These features included allowing the end user who had access to an NFC reader to be able to top up or check the balance of their Leap Cards. Some of the other members of the group also suggested using the Maps page to show the locations of Taxi cabs. However, as nice as it would have been to be able to implement these features, they were beyond the original scope of the project. We had the idea of these extra features late in the development stage of the project and we did not feel that it was a good idea to risk allowing the scope to change by so much at that late stage. These are definitely aspects of the project that we would be also willing to implement in the future.

For now, we are happy with how the completed project turned out. We feel that we met the original goals of the project. We learned to implement features of Google Maps that we have not previously worked with. We also seen some ideas that we could use to make improvements in the future. We were also happy that the group managed to progress through the project without any major disputes and when problems did arise, they were resolved diplomatically without impacting on the progress or timeframe of the project. Overall it was a very positive experience.

**[10% of Marks]**

**Appendix**

Fig 01: Pic of CORS Add-on by Mozilla Firefox.