*Acknowledgments*

*Abstract*

(Quick summary of the dissertation)

# Problem Specification.

The original problem specification is located in the appendices…

## 1.1 Problem description.

The concept of car sharing has received a lot of attention over the last few years. The idea is heavily supported by the Intelligent Energy Europe commission as it promotes efficient use of existing resources, contributes to the reduction of CO2 emissions and also helps to reduce the number of cars on the road by utilizing existing car space more efficiently.

The following project brief, provided by Kainos, a local software development company in Belfast has served as a foundation for my problem specification:

**Project aim:  *Create an app to facilitate the matching up of car sharing participants.***

***The application should allow users to advertise or search for car sharing participants. It should allow users to enter start/end locations, route, travel times.  Once a match is made the driver should be notified so they can approve. Once approval is received the application should provide a way for the driver and passenger to communicate.***

***The application could be extended by gamifying the driver role. The application could reward points to drivers for lift sharing and display a leader board of the results.***

With a number of systems designed to serve the purpose of car sharing already in place, significant amount of time was spent on researching the topic which consisted of interviewing potential users of the app as part of my requirements elicitation process.

## 1.2 Problems with current approach

Despite a number of well-established car sharing services, there is a lack of a truly mobile platform bringing together all the necessary functionality of a car sharing service and combining it with the advantages that mobile devices offer. The most notable pitfalls of current car sharing services include:

- Personalisation: users should not have to perform explicit search for every journey that they wish to participate in. Instead, they should be able to create a uniform journey template which matches their desired journey criteria and be notified by the system when a journey matching their criteria becomes available. For journeys that are not found in the database at the time of searching, users should be offered the option to be notified by the system when one becomes available.

- Location aware search. Users might search for a journey leaving from a particular place from which no journeys depart. However, the system must be able to suggest another journey which departs from a place that’s within the radius specified by the user.

- Notification system: app cannot rely on email and SMS service messages alone due to factors such as poor cellular signal or inability to access ones email.

- Social features & security: A lot of users are concerned about sharing their car with someone they don’t know.

- Address format, users will enter their start and destination address in different formats with possible spelling mistakes.

## 1.3 Solution

A truly mobile car sharing app will utilise the features provided by the Android framework to create a user friendly, secure and fully functional car sharing platform. Using their Android handheld devices, users would be able to search for and offer journeys that will immediately become visible to other users of the system. The app aims at bringing together everyone who wishes to participate in car sharing through in-app social features that will allow users to manage their friends, carry out real-time conversations as well as rate drivers and view feedback left by others. To provide for better journey matching functionality, search engine will be based on a mathematical formula that will be able to perform intelligent location-aware search rather than basic string comparison and will work independently of the address format entered by the user.

The search function has been extended to make the Google Maps API in order to provide a location aware system that’s able to provide users with recommendations when results matching their exact criteria are unavailable.

Personalisation features give users the ability to create their own journey preferences and be automatically notified by the system when a journey that matches their criteria becomes available. This means a number of advantages for the end users:

* When no matches for a particular search query have been found, users have the option to choose whether they wish to be notified by the system them as soon as a journey that matches their criteria becomes available, instead of asking the user to perform the search on a regular basis.
* A journey template can be created for all types of journeys that users wish to be notified for.

Through numerous social features, users are able to maintain list of their friends, carry conversations in real time using the app’s built in instant messenger as well as view profiles of other users and be able to change their own privacy settings essentially controlling what aspects of their profile are visible to their friends and other users of the system.

To provide a more secure and reliable environment for users, the app facilitates a rating system where users can leave feedback and rating for the drivers. Leaderboard of the best drivers together with their feedback and scores will be maintained by the system and visible to all users.

## 1.4 Advantages of the new approach

The above solution will benefit the user in a number of ways:

- Users searching for journeys will not only be able to see results that are exact matches for their search queries but also recommendations for journeys that depart from places nearby.

- Users will not be constrained to a specific address format which can be advantageous if they only partially know the designated address.

- Security will be improved through ability to maintain list of friends and view feedback left by other users. Drivers will also be able to offer journeys as private that will only be visible to their friends.

- Through personalisation features and an efficient notification system, users will be immediately notified of an event that concerns them and the Android app will contact the web service to download the most-up-to-date information.

## 1.4 Goals

The core goal is to implement the entire solution consisting of the Android app, WCF web service as well as the administrator’s panel by 15th of May 2014.

A working prototype is scheduled to be demoed on the week beginning 9th of December.

## 1.5 Requirements

The below list of requirements is a direct result of the requirements elicitation process which involved interviewing potential users of the app and was carried out prior to start of the development process. The MoSCoW technique has been used as means of prioritisation of each individual piece of functionality.

**Must haves:**

Represent requirements that must be satisfied in order for the final solution to be considered successful.

* User registration/login
* A web based admin panel to allow Administrator to log in and manage the system. **(Modified)**
* Searching for car share listings by start & end locations as well as date.
* Ability for users to post new car share listings and specify dates, locations and fee.
* Save a list of user trips**. (Modified)**
* Exchange messages with other users via the application.
* Implementation of Google Maps API to find cities and plot routes on the map.
* Quick search facility with locations and dates based on user defined search criteria**.(Modified)**

**Should haves:**

Represent high-priority items that should be included in the final solution.

* Advanced search options such as: women only, smokers, type of vehicle, fee, and number of seats.
* Rating system based on passengers experience with leader board.

**Could haves:**

//TODO description

* Service in the background with notifications when a car share becomes available. **(Modified)**
* Specify the main stops in the journey.
* Allow users to specify a radius from the start and end locations in miles.
* Allow users to specify a city region from the start and end locations in miles. **(Deleted)**
* Instant messaging feature to allow app users exchange messages in real time.
* Search for car share listings with the help of GPS to find the one with nearest start location. **(Modified)**

**Would like to haves:**//TODO description

* Live driver tracking using GPS.
* Possible integration with Facebook/Google+

## 1.6 Requirement Modifications.

This section explains the list of changes that have been made to the original list of requirements.

* A web based admin panel to allow Administrator to log in and manage the system. **(Modified)**

After reviewing the concept of the applications admin panel with both of my supervisors, Seamus Sands and Garth McFalrand, it has been unanimously decided that the admin panel should be instead implemented as a desktop application. The admin panel should not be available to the outside world nor should it be visible to the regular end user.

//TODO finish.

* Save a list of user trips**. (Modified)**

This requirement has been modified as a result of an important design decision made at an early stage of the development phase. For security purposes, all user information will be stored in a remote database that will be accessed through a web service residing in the service layer. This will allow the Android app to always stay in sync with the web service by downloading the most up-to-date data each time the user logs in.

* Quick search facility with locations and dates based on user defined search criteria**.(Modified)**

The quick search facility has been replaced with user defined journey templates. Those templates are then used by the web service to notify the user once a journey which matches the template parameters has been offered.

* Service in the background with notifications when a car share becomes available. **(Modified)**

//TODO.. GCM notifications…

* Search for car share listings with the help of GPS to find the one with nearest start location. **(Modified)**

//TODO GPS Button, radius.