**Scenario for *Software Engineering for the Internet*: The City Car Club**

The *City Car Club* (CCC) is an organisation that is planning to set up a car-sharing system that will eventually operate in different cities, and requires a software system to manage this. They will be trying this idea for the first time in Newcastle upon Tyne. CCC will provide a number of small city-type cars that can be used by members of the club, who pay a monthly membership fee, with pick-up and drop-off being required to occur within a defined central area of the city, although a car may go outside this area while it is in use. There will be some reserved locations where cars can be left and collected, indicated by specially coloured hatching on the parking bays, and with these being protected by a ‘fold-down’ post where it is necessary to stop others from using them. Cars may also be left in any other suitable parking area, including a number of supermarket car parks (approval has been obtained for this), but if left in any other places, the club member who is leaving the car will be personally responsible for any parking fees or fines that might be incurred. A member will also be charged an additional fee if a car is left outside of the defined central area of the city.

The position and status of the cars is tracked using a GPS system built into each car. At any time each car will have a *status*, describing its availability, which can have one of the following values:

* *Unavailable* – the care is currently in use by a member of the club, or has been identified as needing to be serviced.
* *Available* – the car is available for use and can be booked by a club member.
* *Reserved* – a member has requested use of the car, but has not yet taken charge of it.

CCC’s central monitoring system will continuously record and track the position and status of each car.

To use a car (a ‘session’), a member uses their club id to access the central booking system, identifies a car that is available and conveniently positioned for their use and makes a reservation, with a unique code being sent to them as an SMS text or in an e-mail. The reservation can be made using a laptop application or a phone app (these are provided when a member registers with CCC). A reservation automatically expires if a car has not been collected within 20 minutes of making the reservation, but it can be extended for one additional period of 20 minutes (the system prompts the member at the end of the first period and gives them the opportunity to extend it). On reaching the car they have reserved, the member uses the unique code to open the car and to operate the ignition system. This can be done by using either a small keypad that is provided to members by CCC, or by means of a Bluetooth link to the app on their phone or tablet. This starts the session, and from that point on they are responsible for the car until they finish the session by locking the car and notifying the central booking system.

Billing for use is based upon a formula that takes account of distance covered and the length of time of a session. Members can also add fuel to a car at a number of set agencies (including the supermarkets providing car parking) and use a payment card that charges the fuel to CCC, for which they get credit. There is a ‘fine’ for leaving a car with an inadequate reserve of fuel in the tank (the fuel level is transmitted to the central monitoring system at the start and end of a session). As well as identifying where nearby available cars are located, the phone app provided by CCC can be used to locate nearby filling stations.

The staff of CCC can perform various 'mobile' tasks of maintenance, including fixing any problems with cars and retrieving any that have been left outside of the central area. While out 'on the road', they will use a similar set of apps to those provided for ordinary members, but with additional privileges (for example, allowing them to declare a care to be *unavailable* when they begin work on it, and *available* once they have finished).

In the longer term, once the system has been tested out in Newcastle, CCC plan to make their cars available in other northern cities. So the design of their software needs to ensure that this is adaptable for use in other places, in addition to the usual requirements for security, robustness and efficiency.