

# Pearl Test 111 – Requirements Engineering

## Thu 25 Oct 2018, 8:45–9:45

Program: Technical Computer Science, University of Twente  
Module: Pearls of Computer Science (201700139)  
Module Coordinator: Doina Bucur  
Instructor: Klaas Sikkel

- During this test you may consult one A4 sheet (both sides) with notes.
- Simple calculators are generally allowed for pearl tests, but you won't need one here.
- Grade = #points/10

Questions 1–2 relate to the course materials.

- 1 a) Project Management is concerned with the control of five aspects. (6 pt)  
*Quality* and *Risks* are two of these aspects. Which are the other three?
- b) Under which conditions would the *Waterfall model* be a good approach to software development? (6 pt)
- c) What is a *business-level requirement* for a software system? (4 pt)
- d) What is a *surrogate stakeholder*? (4 pt)
- 2 In Energy Demand Management (EDM), the price of electricity varies across the day in order to discourage electricity consumption in periods where demand is higher than supply. (10 pt)  
Requirements for an envisaged EDM system could include:  
(i) "The system should work with the electricity meters which are currently installed"  
(ii) "The system should allow consumers to know electricity prices at least 24 hours in advance"  
(iii) "The system should allow users of electric cars to determine when it is cheapest to recharge their car".  
In each case: is it a functional requirement, a quality requirement, or a constraint?

Questions 3–5 relate to the case study on page 2.

- 3 For a mission statement for the NeighborhoodCar system, write the paragraphs *Type of System*, *Goal of the system*, and *Exclusions*. (Skip *Motivation* and *Approach*.) (20 pt)
- 4 The "onion-model" has stakeholder roles in multiple layers around the software system, including (but not limited to):  
*The System*: Normal Operator, Maintenance Operator, Operational Support;  
*The Containing System*: Purchaser, Functional Beneficiary, Interfacing System Owner;  
*The Wider Environment*: Developer, Sponsor, Champion, Politician, Functional Beneficiary, Negative Stakeholder, Regulator, The Public.
- a) Which stakeholders are mentioned in the text? To which roles do they fit? *Missing* (12 pt)
- b) Some stakeholder roles *could* exist (but are not filled in or not mentioned in the text). However, for some roles there is definitely no stakeholder, due to the specific properties of this system. Can you mention two of these? Motivate your answer. (8 pt)
- 5 a) Give all user stories for a car owner. (20 pt)
- b) Give 4 acceptance criteria for:  
"As a car renter I want to make a reservation for a selected car" (10 pt)

## Neighborhood Car

“NeighborhoodCar is the ideal solution if you need a car for only a few hours”, say Nick and Peter Brown, founders of the company. Rather than renting a car from a commercial company, you can make use of someone else’s car who does not need it right now. It is easier, because you can pick up a car near your house, and it cheaper, because the fees are lower than with commercial companies.

*Although the system has already been built, it is a suitable case study for which you are requested (with hindsight) to determine some requirements.*

Nick and Peter have set up a website with an underlying backoffice system and developed an app for this. The website and the app offer the same functionality, but for regular usage the app is more convenient. It is (intended to be) self-explanatory, as there are only a few functions (so NeighborhoodCar does not have to provide helpdesk-services). The app is available for Android and iOS and freely available through the Google Play Store and the Apple App Store.

The business model is that NeighborhoodCar charges a small percentage of the rental price as an administrative fee.

In order to offer a car for rent, you have to create an account. After that, you can enter the details of your car (brand name, type, perhaps a picture; address where it can generally be picked up, etc.). A second, but essential piece of information is the price per hour / per day which you are going to ask for your car. Some owners modify this later when they think they get too many or too few rentals. Another piece of information, which needs regular updates, is the times at which the car is available. You can enter the same times / days for every week or fill it in for each week separately.

Anyone can browse through the website, but in order to rent a car, you need to have an account with NeighborhoodCar. After you have selected a car that satisfies your needs, you can make a reservation for a specific time slot for this car. A reservation had the minimum duration of one hour. In principle, reservations can be any length of time, stretching multiple days, but most reservations are only for a few hours.

The car owner is notified when there is a pending reservation, and s/he can either confirm it or reject it (e.g. when the owner needs the car after all, but had forgotten to change the availability in the system).

In either case, the renter gets a message. If the owner has confirmed, the renter has to make a final commitment to rent the car, which involves transferring the required sum of money to NeighborhoodCar (who transfers it to the owner, deducting the administration fee).

The car owner and renter both get a confirmation with each other’s private contact details, so that they can make further appointments offline if needed.

At the rendezvous when the car is being picked up, both the owner and the renter have to fill in some data in the ‘car pick-up’ function in the app. E.g. the car owner is required to enter the last 4 digits of the renter’s driving license number, so as to make sure that s/he has seen it; the renter confirms that s/he has seen the damages to the car as shown in the app; both enter the odometer count.

When the car is brought back, again both the car owner and the renter have to fill in some data in the ‘car return’ function in the app. If no damage has occurred, the rental is closed. If there is damage, there is no procedure in the app (apart from ticking the box that damage occurred in the ‘car return’ function). Nick and Peter intend to add something more suitable for this in the future. For the time being it is expected that the car owner and renter can settle this in mutual agreement. Obviously the renter is responsible for damage, as laid down in the contract to which both parties have agreed by engaging in the rental.

The owner of a car rental company was not amused when he saw posts about NeighborhoodCar on social media and asked the Ministry of Economic Affairs whether this legal. The ministry checked this and replied that there is nothing illegal about the way it has been set up. A rental is a business transaction between renter and car owner. (Profit by the owner is subject to income tax, though). NeighborhoodCar is an only an intermediary, bringing parties together.