RASD Delivery

Lab 16/11/2016
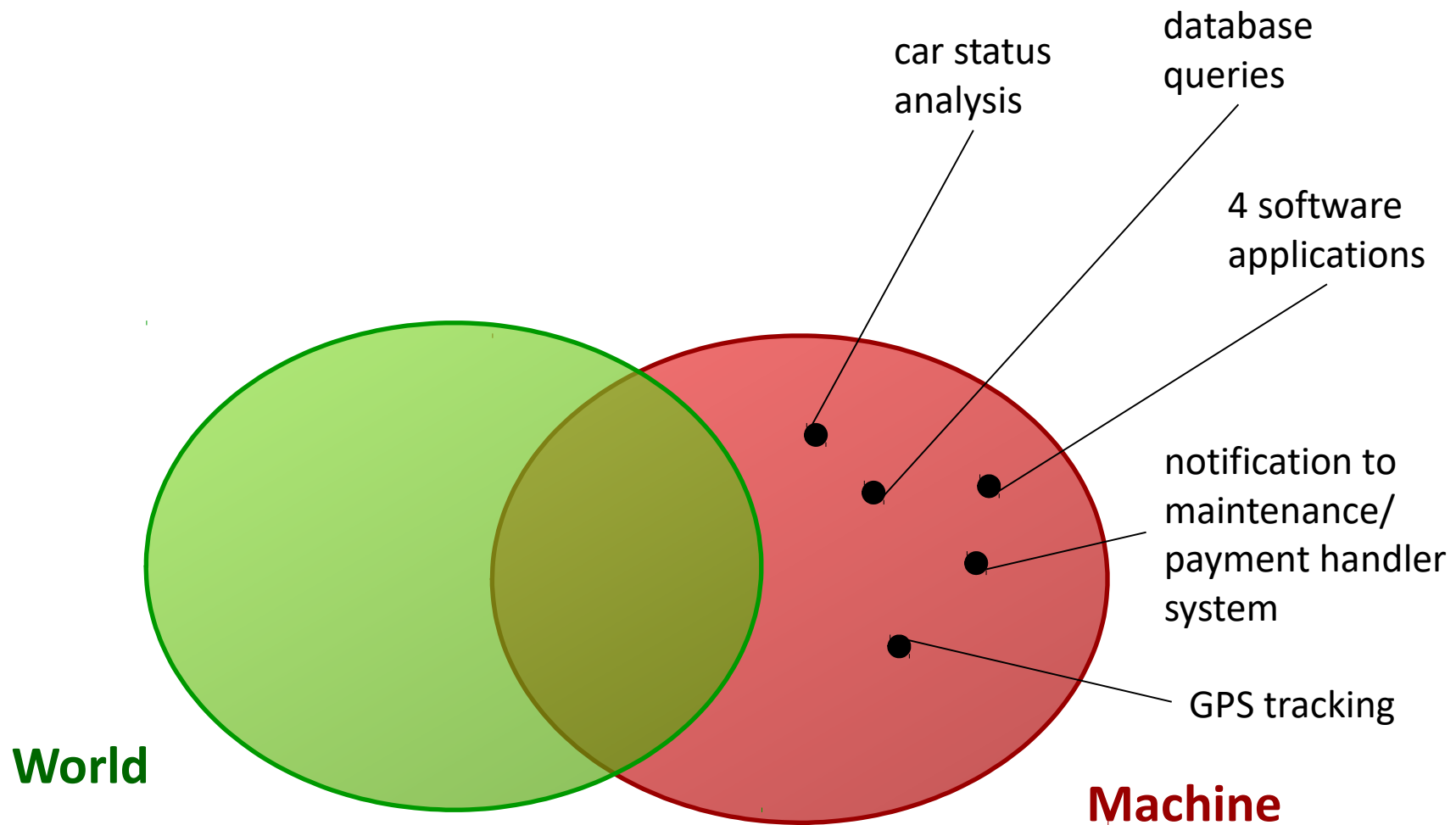
Structure of the document

- IEEE standard 830-1998
- 3 sections:
  - Introduction: scope and goals;
  - Overall description: domain assumptions and relevant (HW & SW) interfaces;
  - Specific requirements: functional and non-functional requirements, scenarios and use-cases.

World and Machine

- We now show you our work by inspecting relevant features of our Requirements Analysis with the help of the World and Machine model by Jackson and Zave.

Relevant Interfaces

- The main characteristic to highlight is the presence of 4 distinct software applications:
  - Back-end application: database and service management;
  - Front-end applications: mobile/desktop versions, interface with user, service access, user data collection;
  - On-board application: vehicle management and monitoring, interface with existing hardware.
- Other relevant features include:
  - Communication with external/existing systems for maintenance and payments;
  - GPS tracking of cars.

car status analysis

database queries

4 software applications

notification to maintenance/ payment handler system

GPS tracking

World
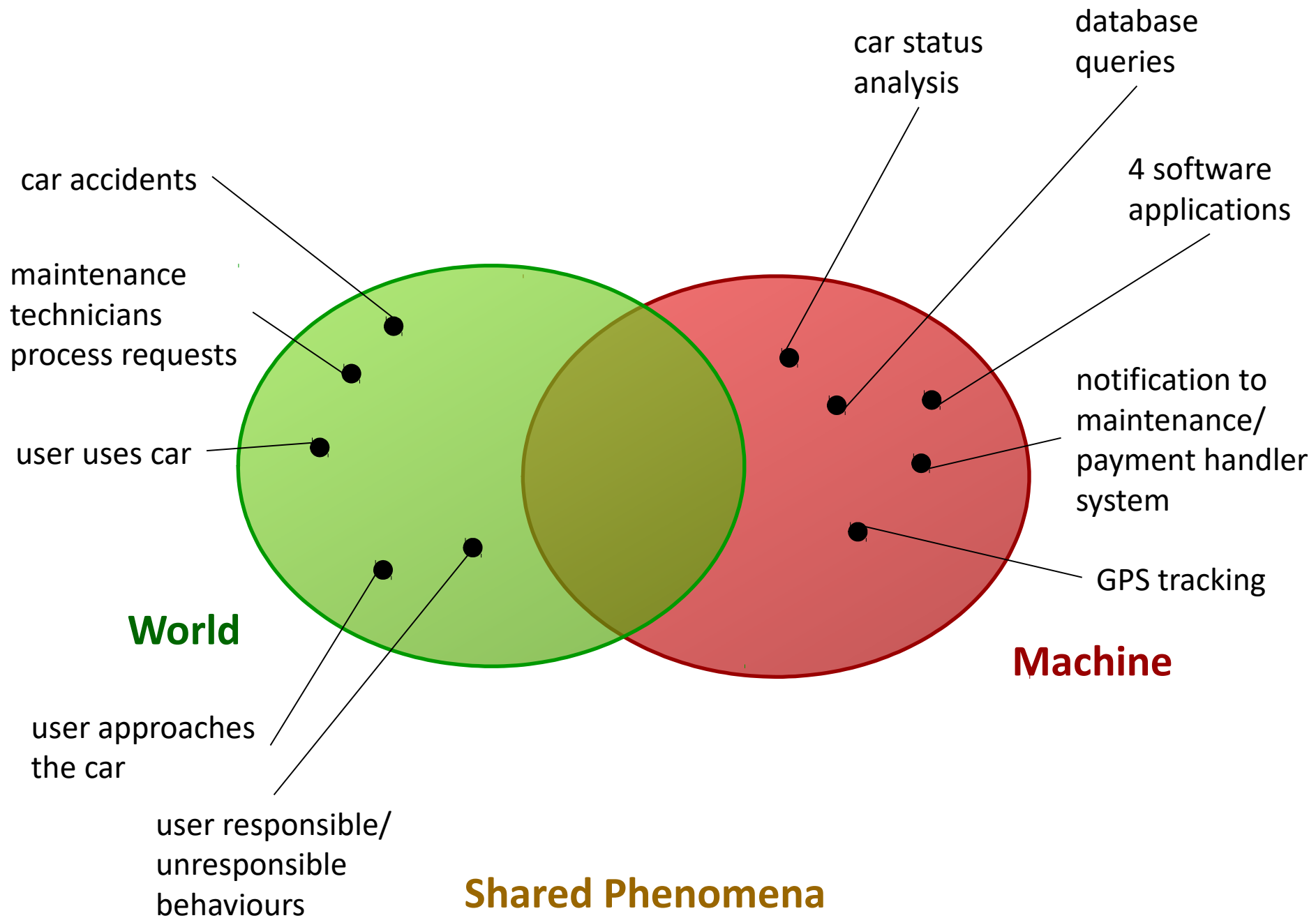
Machine

Shared Phenomena

Goals

1. Let the user register to the service and login via the provided credentials;
2. Let the user manage his/her own profile;
3. Let the driver find the location of nearby available cars and reserve a chosen car;
4. Improve the efficiency of the service by assuring that no car stays reserved for more than an hour if not actually in use;
5. Allow the user to easily access the cars by unlocking them once the driver is in proximity;
6. Automatically manage payments in order to make the service quicker and more dynamic to use;
7. Allow the user to start a ride, drive to his/her destination and finish the ride with the car he/she reserved;
8. Incentivize responsible behaviors, providing discounts for the worthiest users and additional charges for bad users.

Assumptions...

1. The GPS location of users and cars is always functioning and accurate, with an uncertainty of ±1 m;

2. All users can access a reliable and stable internet connection;

3. The users' mobile devices feature a working GPS;

4. All users are always charged the correct amount after the ride;

5. The on-board computers always notify the correct charge to the driver during the ride;

6. All cars unlock properly upon insertion of a vehicle-specific code by the user who reserved them or in case he/she is detected to be in proximity;

7. The equipment of the cars always gives a correct reading of the number of passengers, driver included, for the current ride;

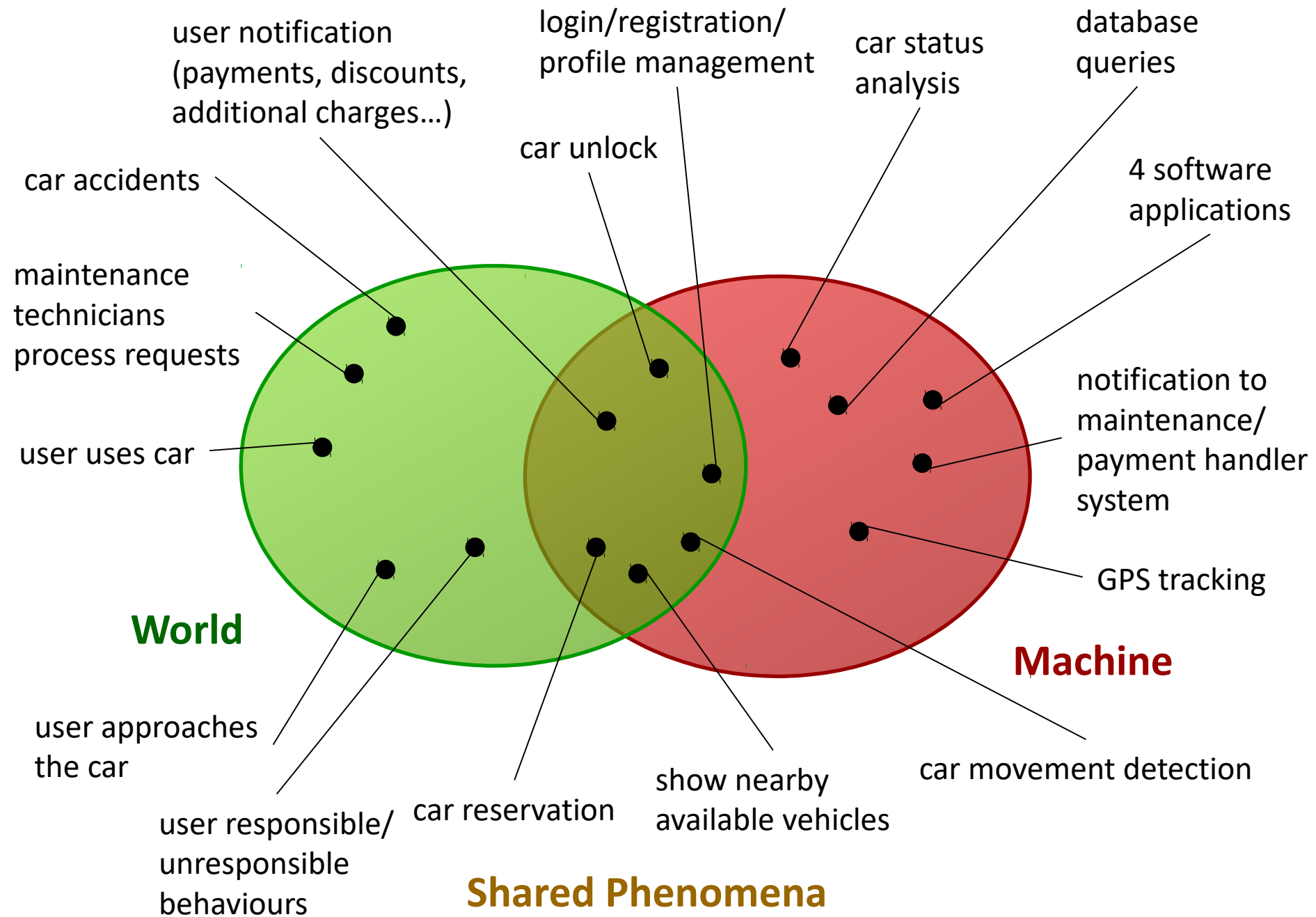8. The number of passengers never changes for the duration of the ride;

…more assumptions

9. Whenever a car is marked as "out-of-service" and the system sends a notification, it is always refueled or fixed by the existing maintenance service before becoming available again;

10. If a user reserves and uses a car he/she is the one who drives it and is responsible for the associated trip;

11. The maintenance service technicians process each request in no more than 1 hour;

12. The maintenance system has the ability to mark "out-of-service" cars as "available" again after each maintenance intervention;

13. If a user is fined while driving a rented car, *PowerEnJoy sends the fine* at his/her address and he/she takes care of its payment;

14. Every type of vehicle damage is properly reported by the system;

15. Each car is provided with a unique, vehicle-specific code.

car status analysis

database queries

4 software applications

car accidents

maintenance technicians process requests

notification to maintenance/ payment handler system

user uses car

GPS tracking

World

Machine

user approaches the car

user responsible/ unresponsible behaviours

Shared Phenomena

Shared Phenomena – Main requirements

- Controlled by the user and observed by the system:
  - Login/registration/profile management;
  - Car unlock/rental;
  - Car movement detection.
- Controlled by the system and observed by the user:
  - Show nearby available cars;
  - User notifications;
  - Safe Area boundaries definition;
  - Management of user reservations;
  - Carry out payments and take care of discounts and additional charges.

A Venn-style diagram with two overlapping ellipses. The left green ellipse is labeled **World**, the right red ellipse is labeled **Machine**, and the overlapping region is labeled **Shared Phenomena**.

World (green, left):
- car accidents
- maintenance technicians process requests
- user uses car
- user approaches the car
- user responsible/ unresponsible behaviours
- user notification (payments, discounts, additional charges…)

Shared Phenomena (overlap):
- car unlock
- login/registration/ profile management
- car reservation
- show nearby available vehicles

Machine (red, right):
- car status analysis
- database queries
- 4 software applications
- notification to maintenance/ payment handler system
- GPS tracking
- car movement detection

To better understand our choices about actual requirements...

...let's see the overall use-case diagram!

The use-case analysis will allow better comprehension of the correlation between GOALS and REQUIREMENTS.

Register, Login, Manage Profile

- Covered goals: 1 and 2
- These use-cases imply requirements about creation, modification and deletion of user accounts, such as:
  - Control on existing accounts
  - Thorough user information collection
  - Permanent elimination of sensible info upon account deletion
  - Credentials generation and check
  - Account locking (also see use-cases related to payments)

Reserve car

- Covered goal: 3
- Implied requirements concern the main functionalities related to car rental, including:
  - Ways of finding nearby cars
  - Valid positions for car searches
  - Precision of vehicle information (position, availability)
  - Concurrent conflicting reservation resolution
  - Reservation info storage
  - Reservation management

Unlock car

- Covered goal: 5
- This function suggests requirements about security and precision of unlock procedures:
  - User-reservation-car matching
  - User proximity detection range
  - Alternative unlock methods (GPS, vehicle-specific code...)

Start ride, Use car, End ride

- Covered goal: 7
- Requirements related to this use-cases express constraints about ride-specific characteristics, for example:
  - Vehicle position tracking
  - Car status monitoring (damages, accidents, battery level…) and update (car state changes)
  - Authentication method
  - Start and end time limits definition
  - Charges interval definition (start/stop charging)

Apply fee, Apply discount, Apply additional charges

- Covered goals: 4 and 8
- Related to these use-cases are all those requirements concerning extraordinary payment situations, namely:
  - Virtuous and vicious behaviours and related discounts/penalties
  - Discounts/penalties application criteria
  - Reference metrics to evaluate virtuous/vicious behaviours
  - Reservation time limits

Apply charges, Manage payments

- Covered goal: 6
- These use-cases involve requirements about automatic payments and charges computation:
  - Factors and time limits of charging computation
  - Payment situations
  - Account locking
  - Communication with payment handler(s)