Use case

Company: MobilityCorp

Booking

- Cars and vans up to 7 days in advance and can be booked for a specific duration
- Bikes and scooters can be booked up to 30min in advance but booking is open ended (they can be kept for up to 12 hours)
- Booking is done via mobile app

Payment

- Pay per minute 🤖 (AI for pricing)
- Fines if returned late or to wrong location
  - Cars & vans: Vehicle must be back at certain time -> fine if late or wrong location. If theft, vehicle can be tracked, but theft is not a big issue for the company right now
- Insurance is out of scope
- Customers can cancel at any time without penalty
- For bikes and scooters you start to pay from the time you book / reserve them. Say I reserve a bike now but I start driving only in 15mins, then I already start paying now even though I will only use it in 15mins
- For cars and vans you start to pay from the time your booking windows starts. Say I book a 4h windows for tomorrow, then I start paying at the start of the 4h windows

The vehicles

- Have GPS
- All vehicles can be locked and unlocked remotely by MobilityCorp
- Customers must have NFC-capable smartphone to lock and unlock vehicles.
-
  - All vehicles have GPS
- Vehicles can be disabled remotely if needed 🤖 (AI to predict if driver is too driving too risky)
- For bikes and scooters we have swappable batteries
- Staff drive around and replace batteries. They also help move bikes and scooters around so they are nicely distributed and not all concentrated in a single spot 🤖 (AI to predict how to prioritize staff where to go when)
- Every second we get a GPS signal / telemetry

The trip

- Cars, vans, scooters and bikes must be returned to designated parking spots at the end of their rental
- We need proof of return - customers need to submit photo 🤖 (AI to check photo)
- Cars and vans need to be plugged in to EV chargers at designated parking spot when return
- Ask customers to provide feedback about the trip (e.g. if car was dirty of bike had fault)
- Vehicle must come back to designated parking bay at end of booking duration
- The app should already give the customer heads up about which parking bays are near the location they want to go to
- Customers for cars and vans should be able to extend booking ad-hoc during the trip. If customer booked for 4hours but need longer they can book extension - if the vehicle isnt already needed / booked by someone else
- If vehicle (car or van) runs out of battery during the trip, customer can pay for energy top-up by charging at EV station during the trip
- If customer cannot get to EV charging station in time and vehicle really runs our there is a support fleet
- Maybe we can incentivise customers to leave vehicle in certain location 🤖 (AI to predict where vehicles will be needed and thereby incentivise customers that are in the area to park vehicle there)
- If vehicle breaks down, we have to have a process for it
-

Business challenges

- Customers keep complaining that vehicles arent in right location
- How do we know when people want to use the vehicles and where -> 🤖 (AI for demand forecast, weather forecast to predict which vehicle types more in demand)
  - For example, bikes at train stations might be sensible where commuters that get off train and onto bike
- Range issues: Less with cars and vans but more with bikes and scooters. They are often run out and batteries cant be swapped in time. Exacerbated by bikes and scooters not being in a convenient location so they can be swapped
  - can we prioritize where they need to go
  - if there are 25 different parking bays where should they go first
- Customers are not really relying on use yet and not using yet as part of daily commute
- We have 5000 scooters , 5000 bikes, 200 cars, 200 vans in every EU country
- Goal: Use vehicles more effectively -> used more often before adding new vehicles. Vehicles are often in the wrong place at the wrong time

- We can assume we already have a historical dataset of rides available
- At the moment, theft is not a big issue for the company

Criterions:

- Interesting uses of GenAI
    - How can we build the solution to deal with uncertainty around GenAI
    - Validation and verification of AI results
    - Do we have ability to swap out a model for another one
    - How would we deal with price fluctuations
    - What if a model provider all the sudden shuts down
- How suitable is the solution for the constraint
- Understand how we came up with the architecture / thought process must be transparent
    - ⚠️ Gather architecture decision records:
        - Title, Status, Context, Decision, Consequences
          see https://cognitect.com/blog/2011/11/15/documenting-architecture-decisions
          see https://www.thoughtworks.com/radar/techniques/lightweight-architecture-decision-records
          see https://structurizr.com/share/39459/decisions/adr-tools
-

Judges

- Andrew Harmel-Law
    - Book "Facilitating Software Architecture"
    - Looking for train of thought. Show the thinking. Why we made certain decisions. What trade offs did we have to make
- Gayathri Mohan
    - How to include AI in enterprise systems
    - Assumptions clearly stated
    - What risks around the uncertainty -> how to protect business revenue when there is uncertainty around the GenAI.
    - What works in terms of pricing
- Kent Beck

Resources

https://github.com/thekatalog