T Systems

# hackaTUM 2024 Connected Mobility Challenge

Garching bei München

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# T-Systems at hackaTUM 2024

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**T-Systems** is a part of **Deutsche Telekom.**
We are big enough to **scale globally** and small enough to **care.**

**#1**
**GERMAN BRAND**

**#1**
**EUROPEAN BRAND**

**#9**
**GLOBAL BRAND**

# About Deutsche Telekom

| | |
|---|---|
| 1 | of the **strongest brands** in the world |
| > 50 | **countries** |
| 112 B € | **revenue** in 2023 |
| 291 M | **customers** |
| > 1,000 | global leading **partners** |
| 199,652 | **employees** worldwide |

# T-Systems as Telekom's B2B IT unit – Automotive

## Mission

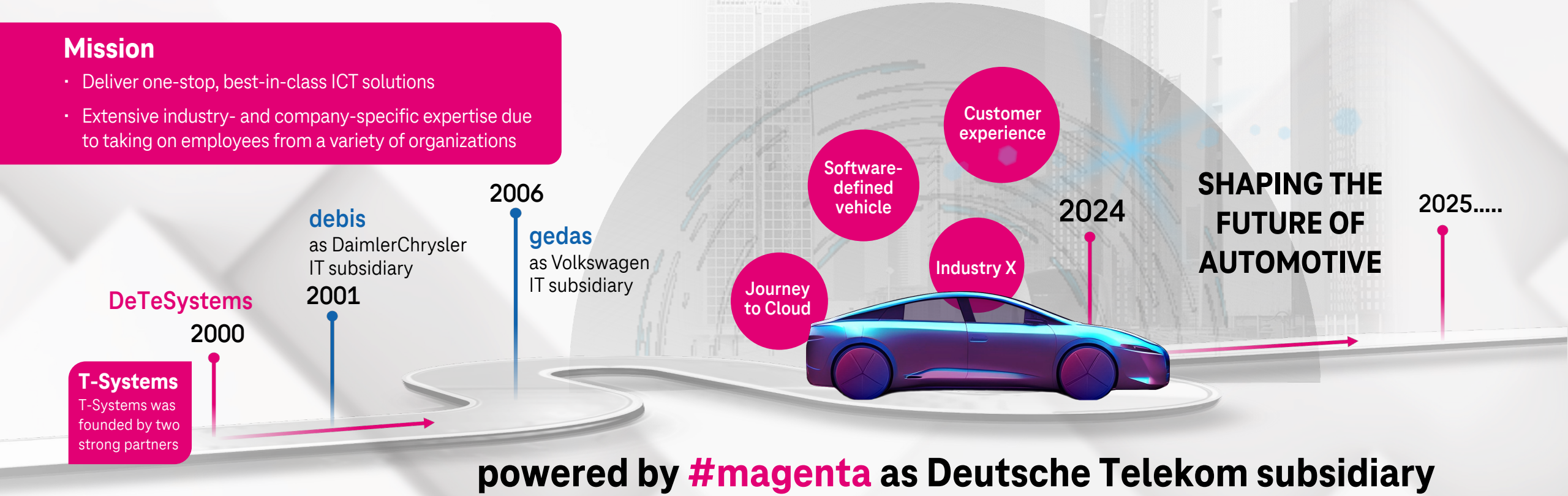
- Deliver one-stop, best-in-class ICT solutions
- Extensive industry- and company-specific expertise due to taking on employees from a variety of organizations

**T-Systems**
T-Systems was founded by two strong partners

DeTeSystems 2000

debis as DaimlerChrysler IT subsidiary 2001

2006 gedas as Volkswagen IT subsidiary




## powered by #magenta as Deutsche Telekom subsidiary

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **#1 AUTOMOTIVE** Market Leader in Germany in the Automotive sector for over 10 years | **#1** IT Service provider in DACH | **> 4K** Automotive Experts Worldwide | **> 3K** Dealerships are our clients | **> 700K** Vehicles with OBD adapter | **65%** of the top 20 OEMs, numerous multi-national Tier 1 supplier and manufacturer | **> 32M** Vehicles on Connected Car Platform | **> 5K** Automotive projects in 2022 | **> 25 yrs** of Expertise in Automotive |

# Automotive

## Challenges and opportunities: today

| | Autonomous/ automated | Connected | Electrified | Shared |
|---|---|---|---|---|
| Consumer | | | | |
| Technology | | | | |
| Regulation | | | | |

**Economics** Opportunity sizing and investments

**Capabilities** Build-up and partnering

## Outlook and predictions: 2030

**>10%** **of cars sold will be used for driverless taxi fleets** (with a total of 26 mn autonomous vehicles in operation)

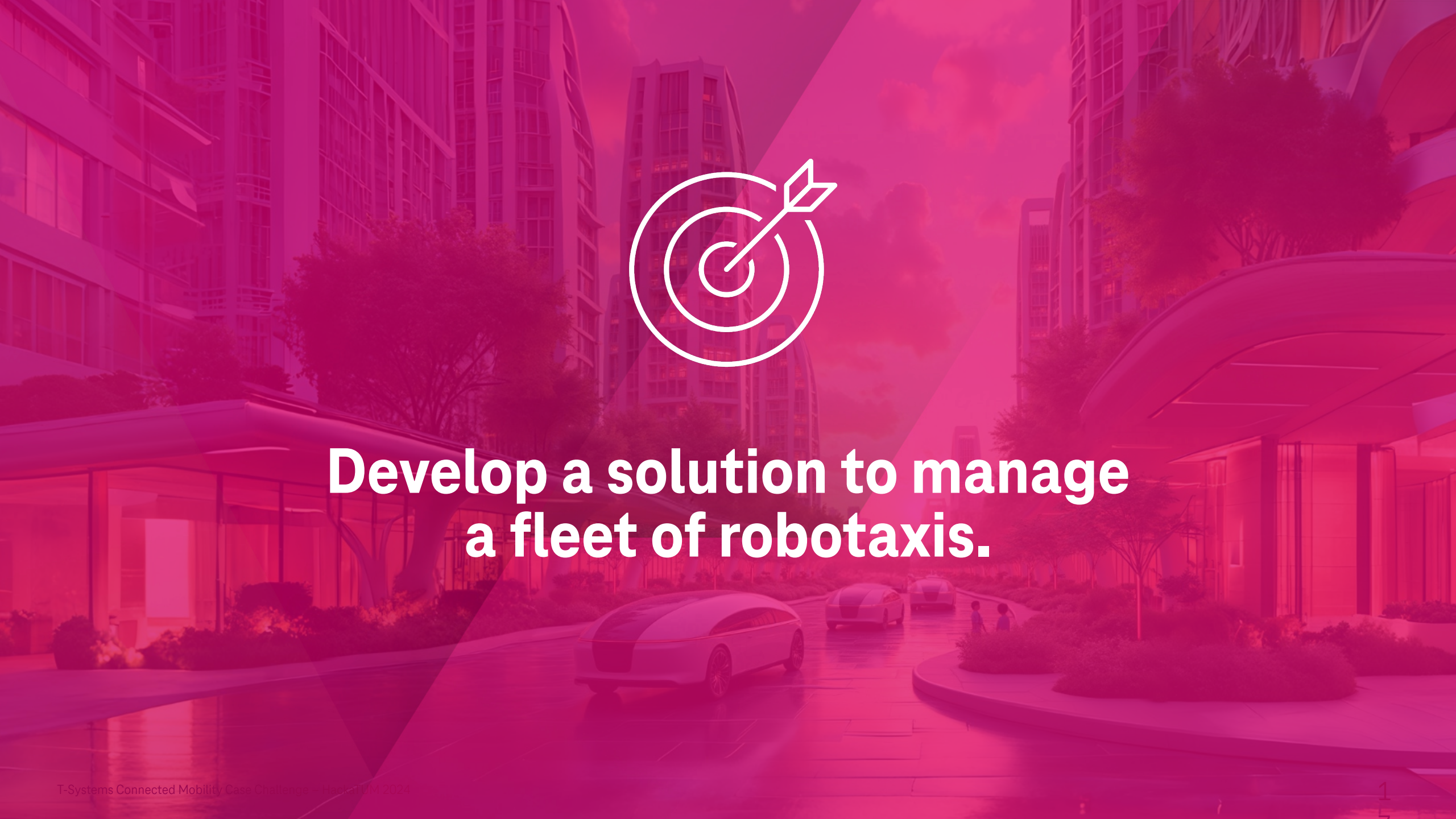
**New cars** = **100%** **Electric** + **100%** **Connected** and software-defined + **50%** **Autonomous** L2 / L2+

Up to **ten thousand dollars**

**Lifetime revenues** from subscriptions, upselling, and ecosystems

# Net-zero

**production**; recycled content quotas; and modular / upgradable components



# Develop a solution to manage a fleet of robotaxis.

# Goals of the challenge

Build an algorithm to commission a robotaxi fleet in the most effective/efficient way, i.e. optimize for different parameters such as kWh, utilization, revenues, etc.

Create a visualization layer to
(1) manage the fleet and
(2) create dashboards/reports.

# Robotaxi Fleet Management: the challenge in detail

**GIVEN:** A number of robo-taxis in the area München Zentrum
A number of customers, expecting to use said robo-taxis to get from point A to point B

**WHERE:** A robo-taxi expects an input of a customer's information (curent XY coordinates, destination XY coordinates), in order to commission it to serve said customer.

**THEN:** Develop a solution that will handle the distribution and commission order of your fleet

**Requirements:**

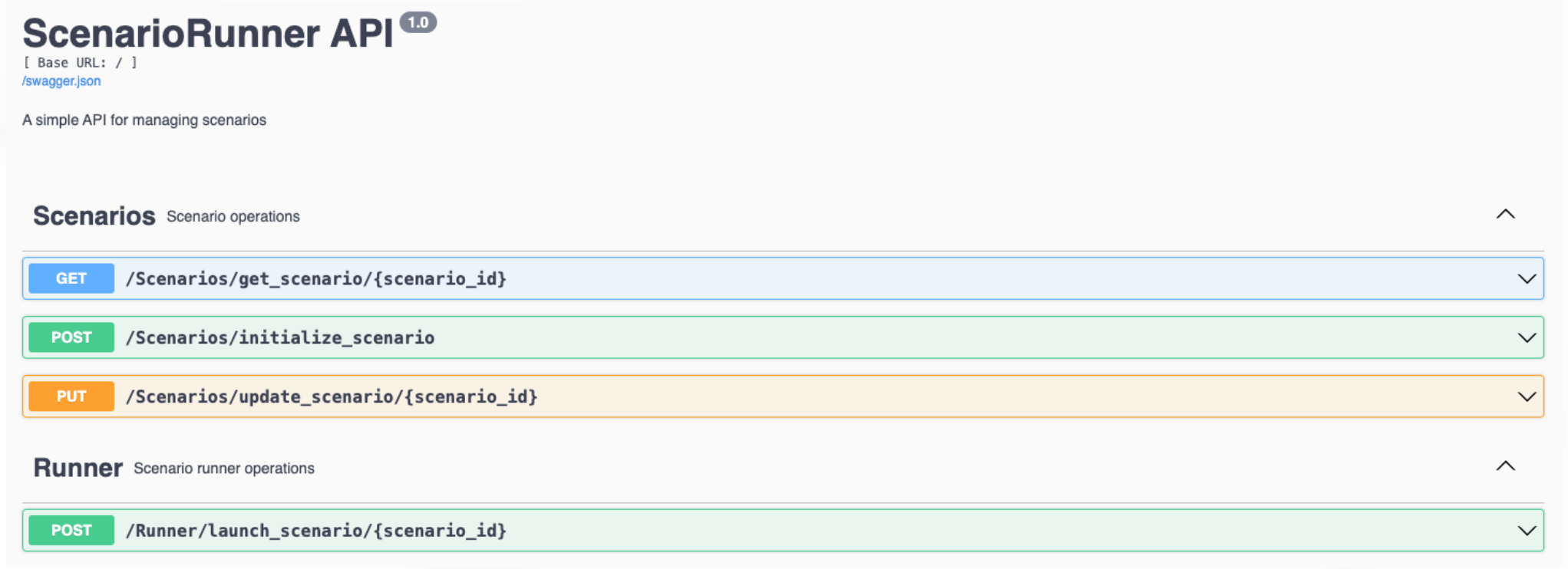
- Your solution only knows customer's current and destination coordinates, which vehicles are ready to accept a commission, their position and other relevant metadata.
- Your solution operates autonomously based on the above data and handles the job of a coordinator (who goes where).
- Commission decisions are made based on two pillars:
  1) customer satisfaction (fast service, optimized routes, etc.)
  2) the environmental footprint of the operation (expected fuel consumption, total distance traveled, etc.)
- A UI of some sort must exist and should contain relevant information (# of vehicles currently handled, total number of commissions, errors, etc.)

# What we provide: API

- A simple API that handles the administration of mobility scenarios.

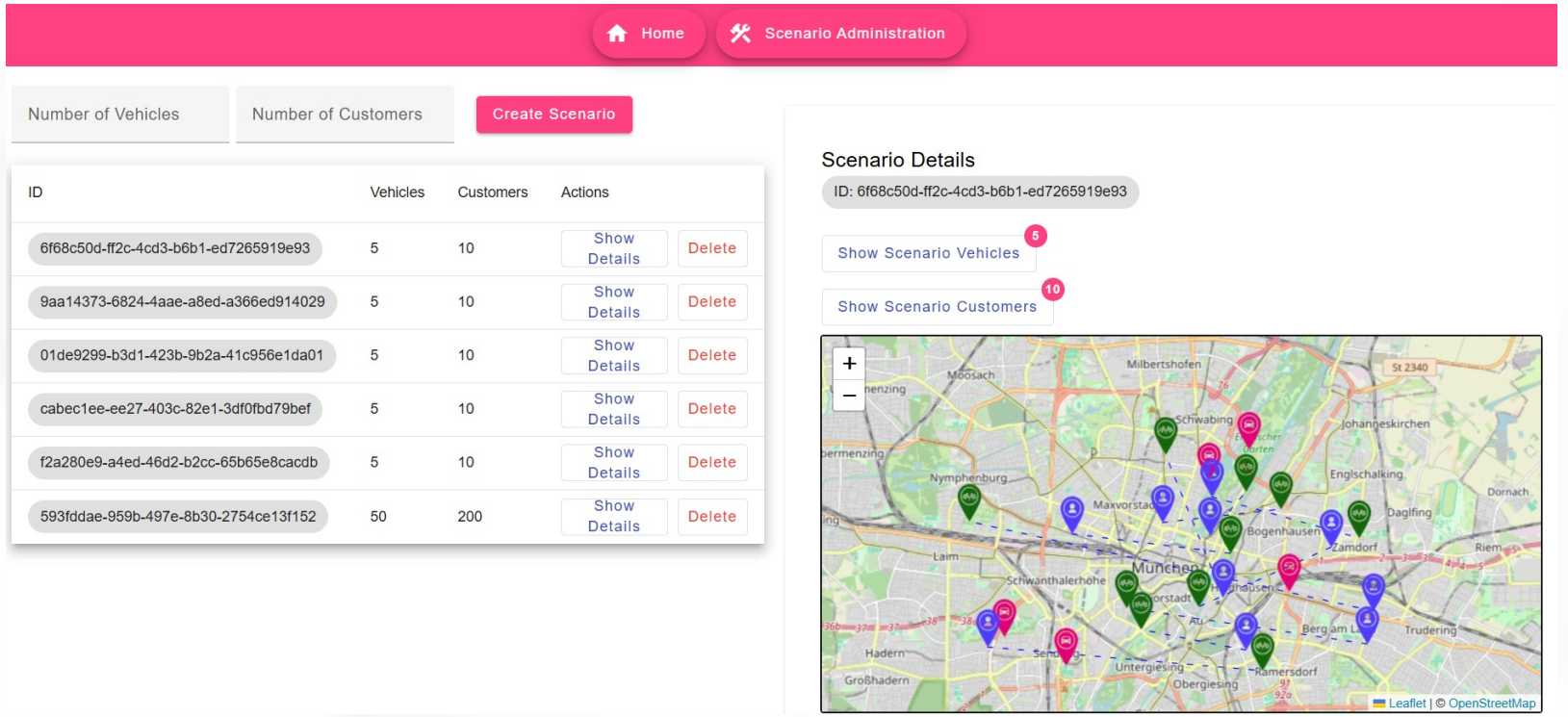
# What we provide: API

- A python API that runs simulations for scenarios created with the backend API.

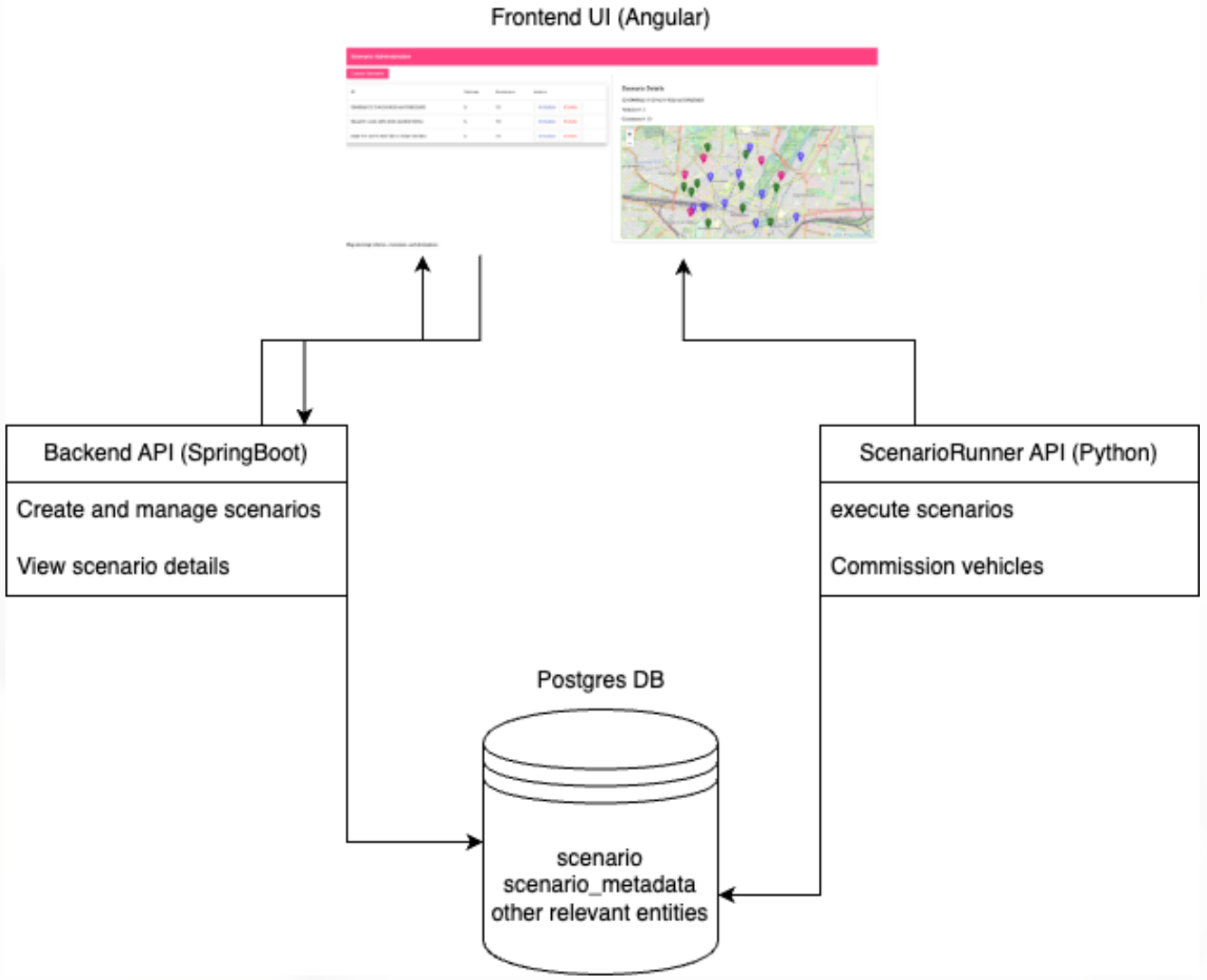


# What we provide: Administration UI

- A UI panel that lets you interact with the scenario administration backend.



# What we provide: Architecture diagram



# Steps to use in a nutshell

- BE or UI: Create a scenario
- RUNNER: Initialize a scenario (input via JSON or provide ID to query existing scenario from DB)
- RUNNER: Launch the scenario (provide desired execution speed)
- RUNNER: Use /Scenarios/update_scenario/{scenario_id} endpoint to commission vehicles
- YOUR APPLICATION: Keep track of vehicle and customer parameters and extract/generate relevant data to visualize and optimize.
- BE or RUNNER: Limited scenario metadata is available after each simulation run to provide you a basic set of relevant parameters

# Details

- Docker and Docker compose is required to run the API locally
- The scenario execution happens in memory (no persistence)
- The runner supports multiple concurrent scenario executions
- The distance and time calculations are linear for simplicity
- Vehicle range, wear etc. are not simulated for simplicity. You may apply your own vehicle model in your implementation.
- The API is intended as a basic testing platform for your solution, therefore, any other open-source licensed tool that you deem as helpful may be used

# Helpful additional optional tools

- A postgres DB client (PGadmin or similar)
- A docker UI solution (Docker desktop or similar)
- Detailed code analysis tools to check app cpu/ram benchmarks

# Evaluation criteria

Your solution will be evaluated on the following criteria:

- Code efficiency (does it consume significant amount of resources to operate)
- Operational efficiency (How effectively it optimizes the commissioning process)
- Execution speed (How fast it can make decisions)
- Ability to learn/self-improve (for the AI enthusiasts)
- UI/UX experience (is it easy to deploy/operate from a no-knowledge standpoint? Does it look good to the eye)

# Prizes

## 1st PLACE


Meta Quest 3
Mixed Reality VR Headset

## 2nd PLACE

DJI Mini 4K
Drone

# Q&A