

# Whom do you trust?

Towards a Stakeholder-Centric Trust Management Approach  
for the Automotive Ecosystem

Marco Michl (THI) & Hans-Joachim Hof (THI)  
marco.michl@carissma.eu, hof@thi.de



CARISSMA

Technische Hochschule  
Ingolstadt 



# Author Overview



Marco Michl

Security in Mobility  
C-ECOS  
Technische Hochschule Ingolstadt

Automotive Trust Management,  
Access Control Systems



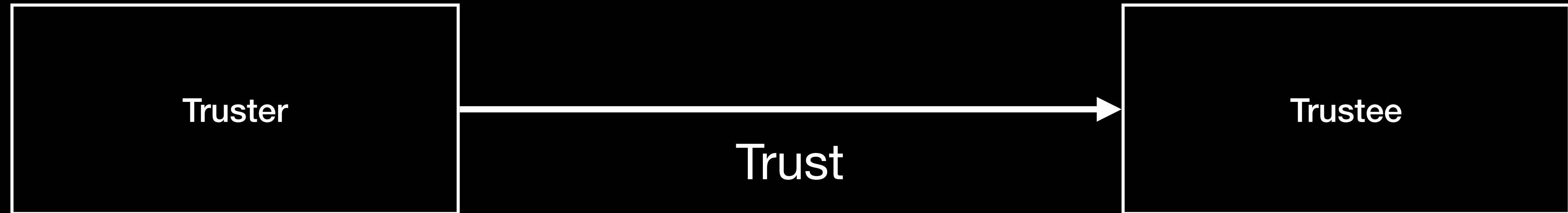
Hans-Joachim Hof

Security in Mobility  
C-ECOS  
Technische Hochschule Ingolstadt

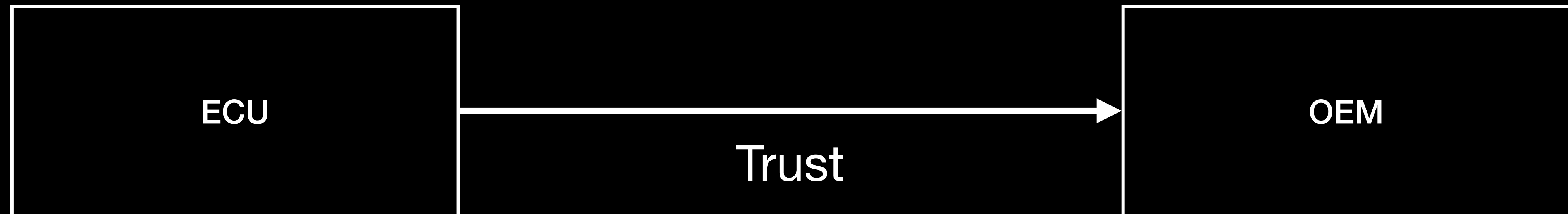
Automotive Security

# Trust

## Concept & Use



„Willingness to **depend on another actor** with a **subjective feeling of security** while there are **risks** that can cause a **threat**“



e.g. to provide firmware

# Trust vs. Authorization

## Trust

„Willingness to **depend on another actor** with a **subjective feeling of security** while there are **risks** that can cause a **threat**“

## Authorization<sup>1</sup>

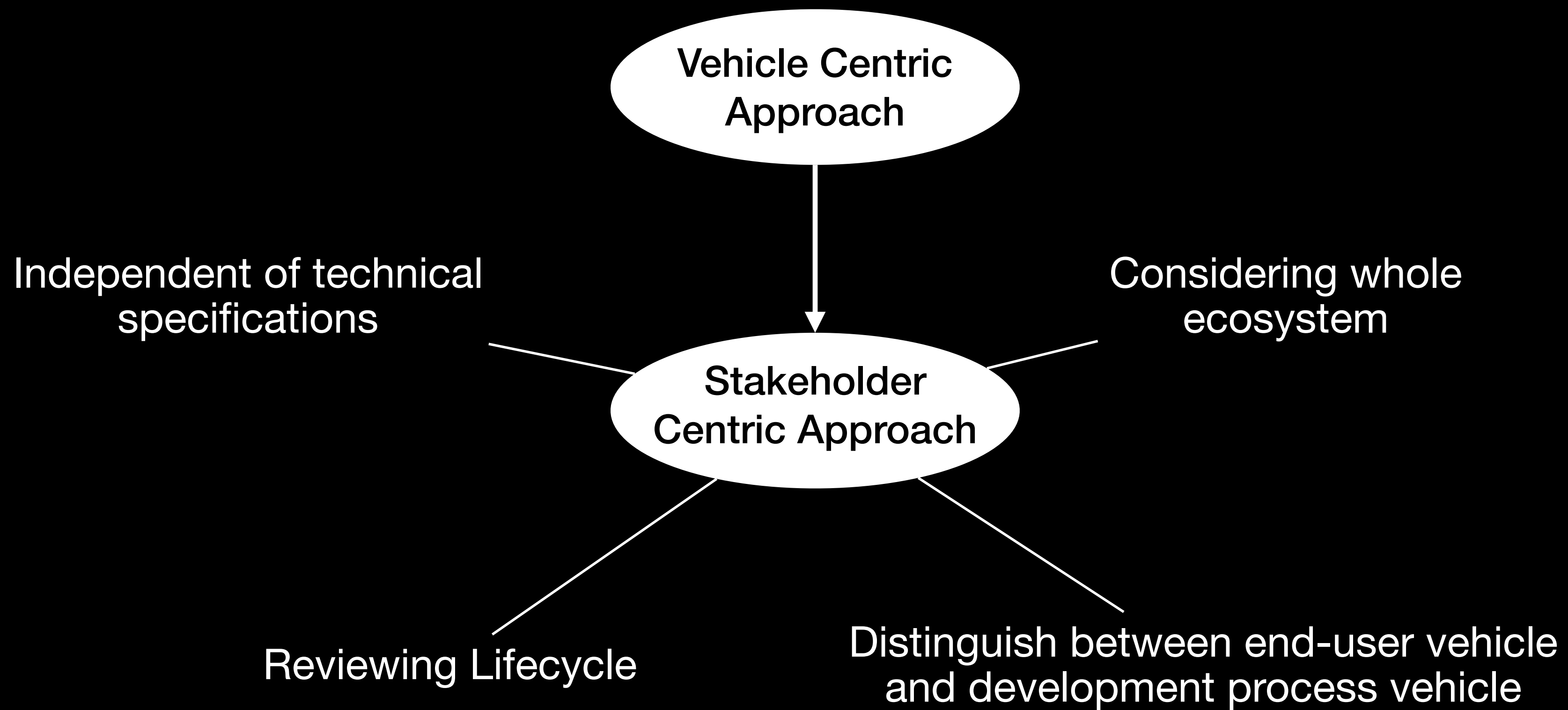
Authentication answers the question “who is this entity?” and **Authorization** answers the question “is this entity **allowed** to do what it is trying to do?”

# Challenges in Trust Management

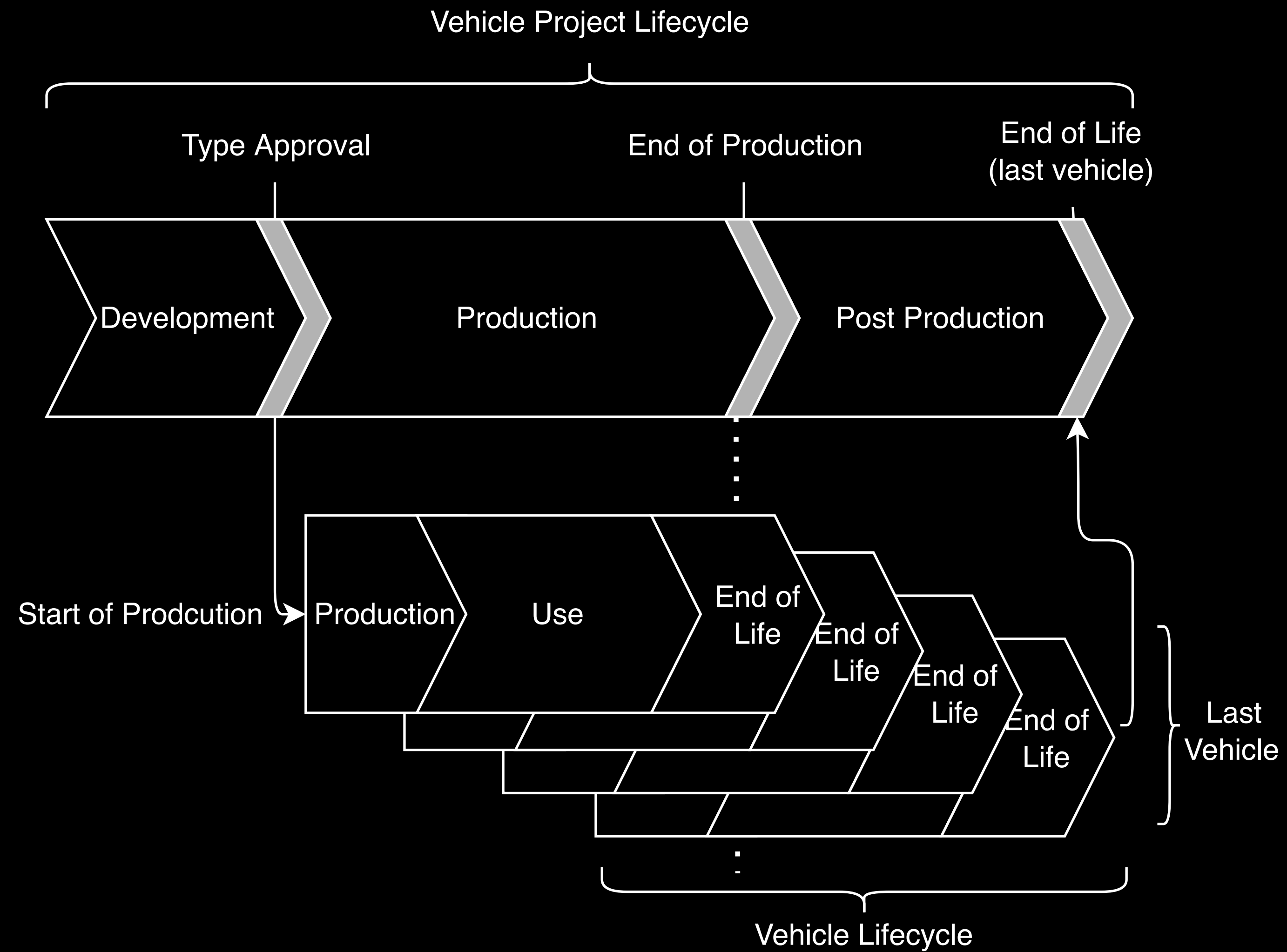
- Multi-stakeholder environment with different interests
- Multiple systems need to cooperate
- Changing relations during the lifecycle

**Question:** What stakeholders or stakeholder groups are relevant for automotive Trust Management Systems?

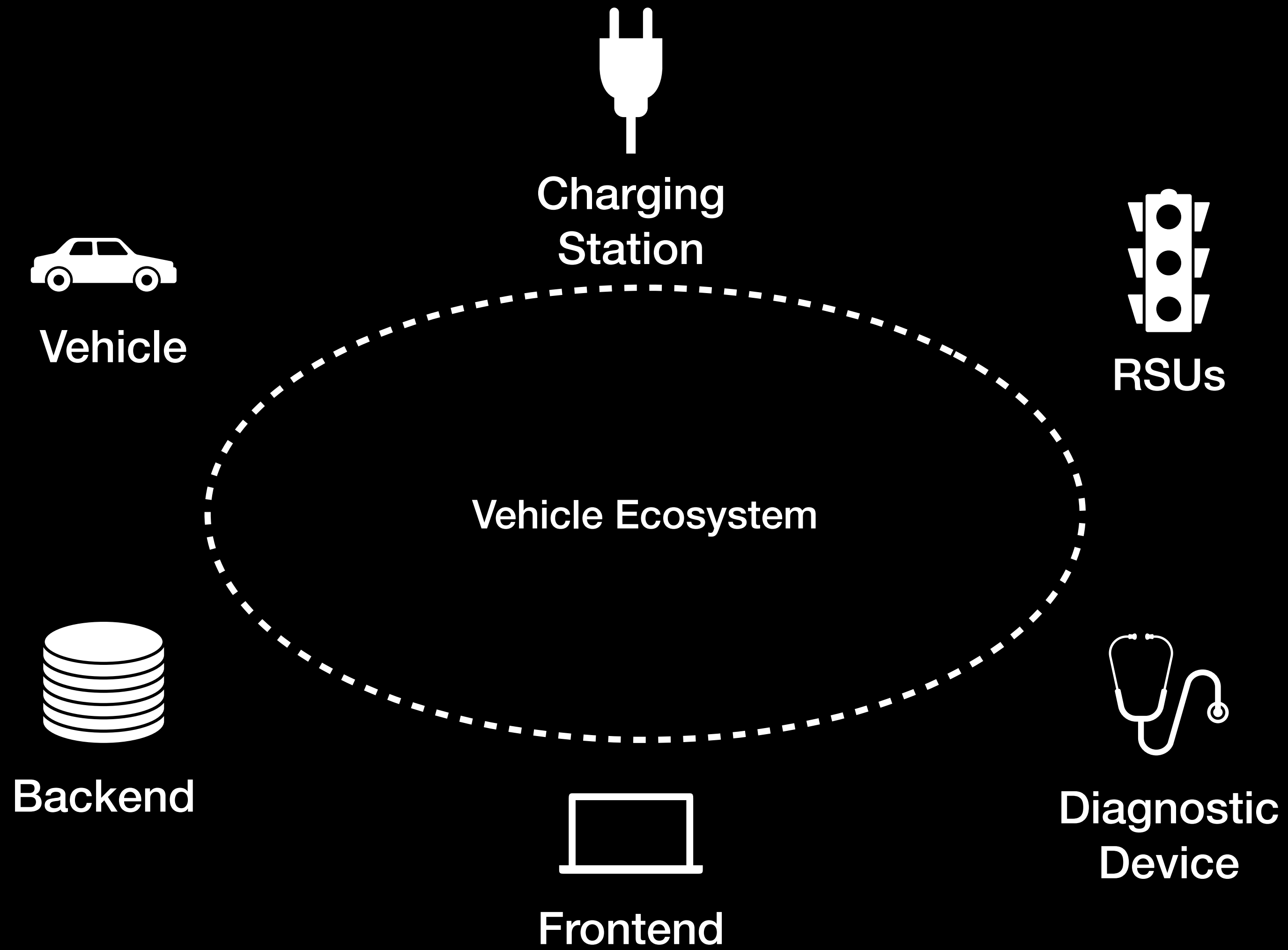
# Stakeholder Centric Approach



# Lifecycle Phases



# User Agents



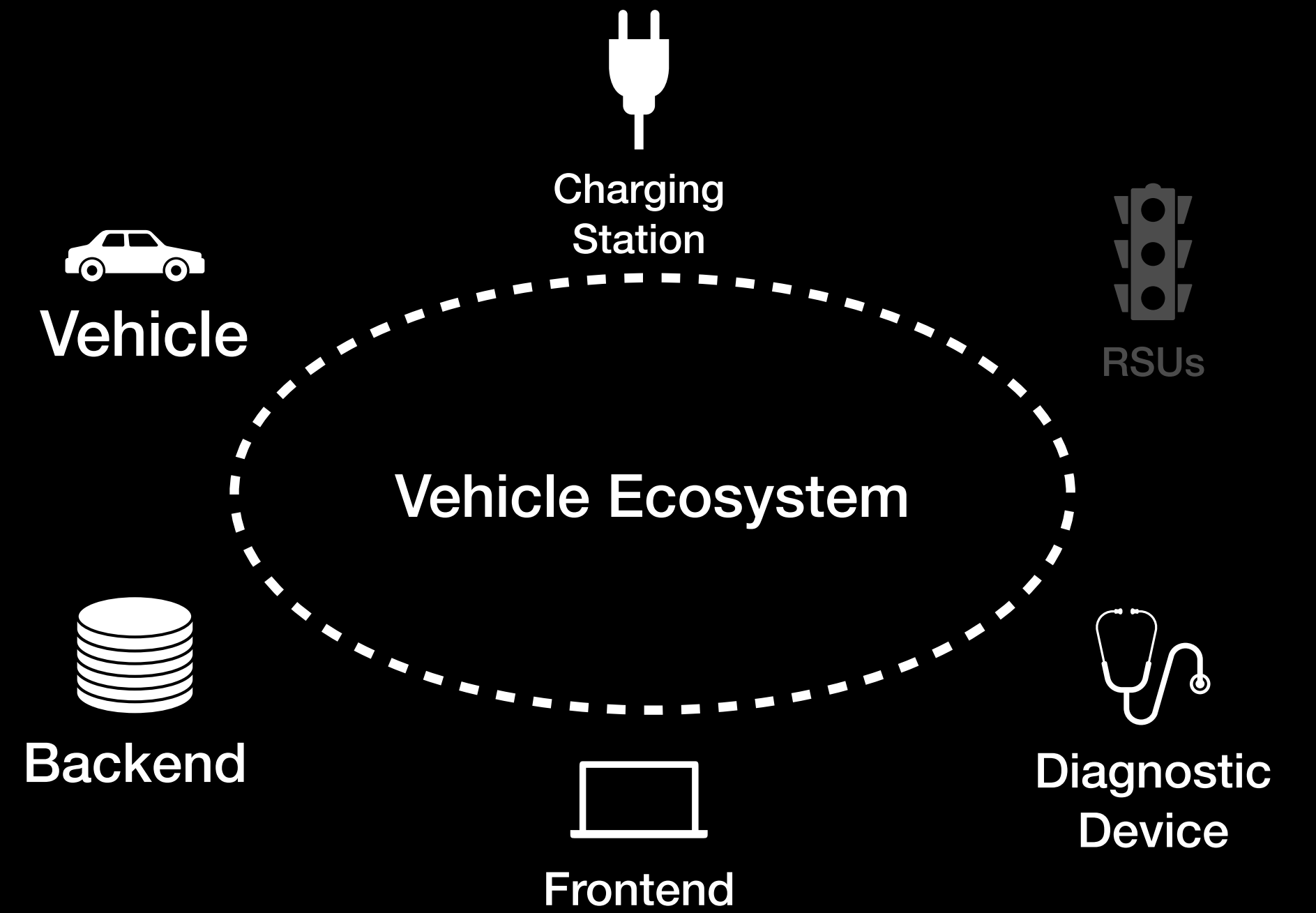


# OEM

## Lifecycle Phases



## User Agents

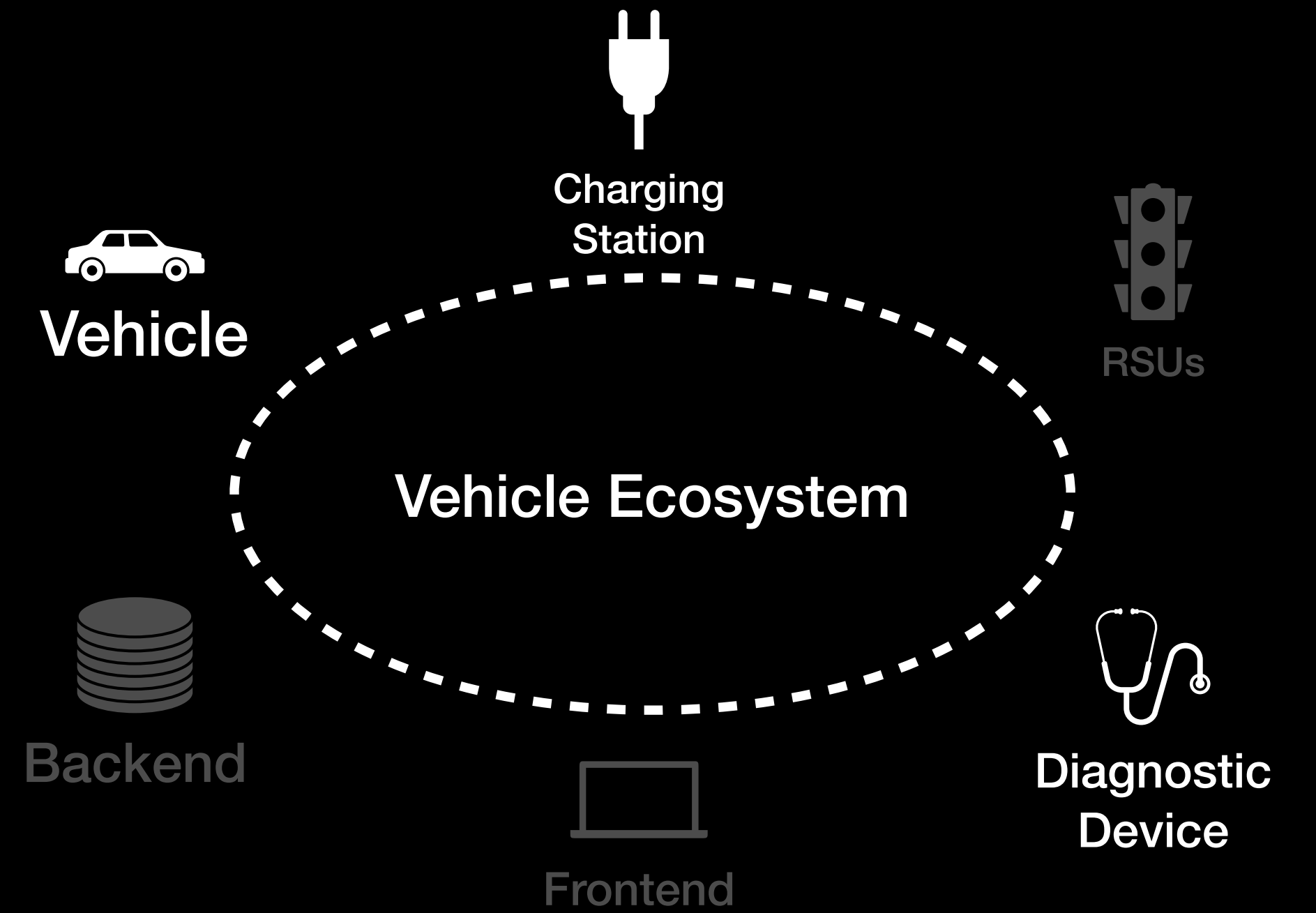


# Supplier

## Lifecycle Phases



## User Agents

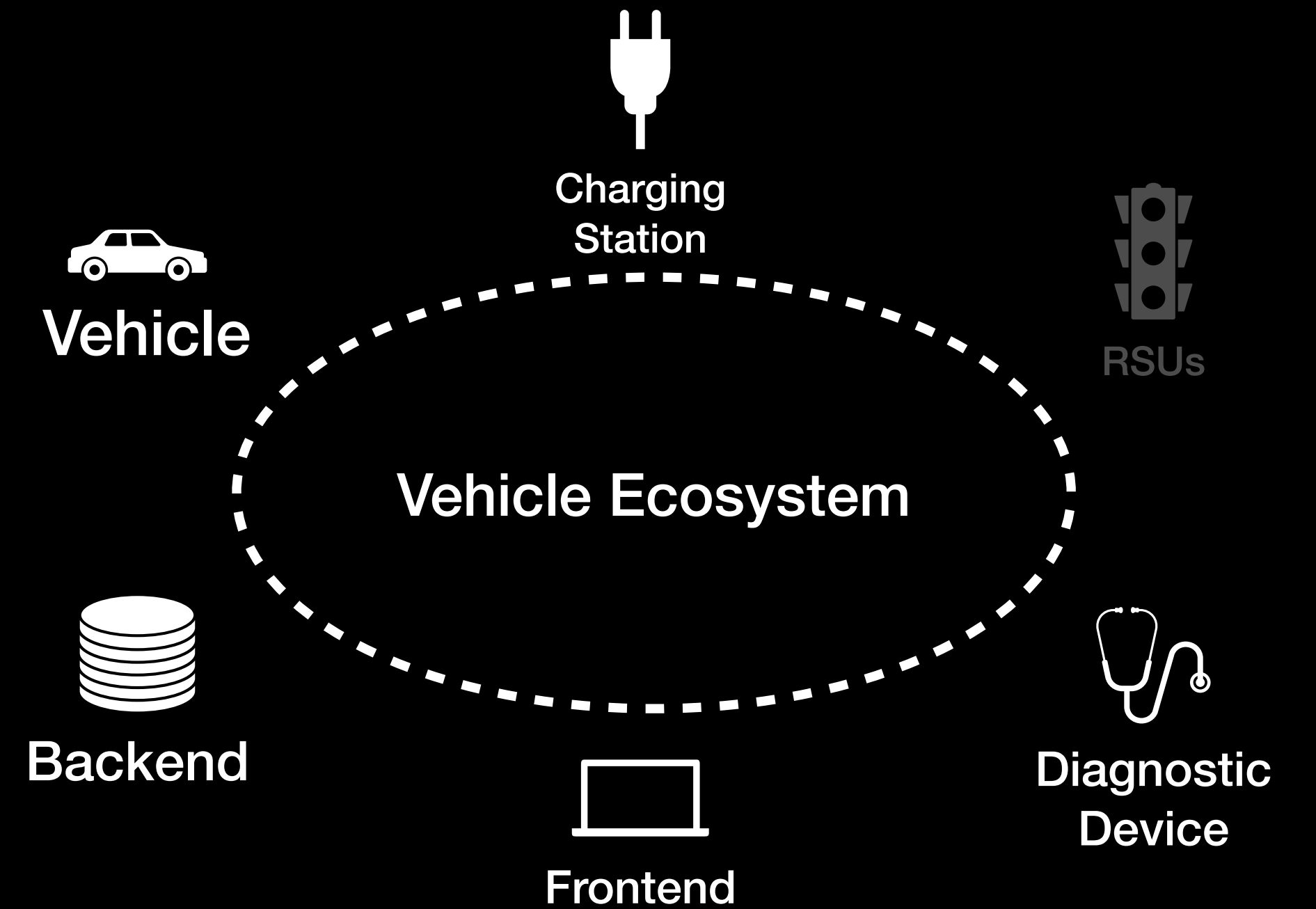


# Development Service Provider

## Lifecycle Phases



## User Agents

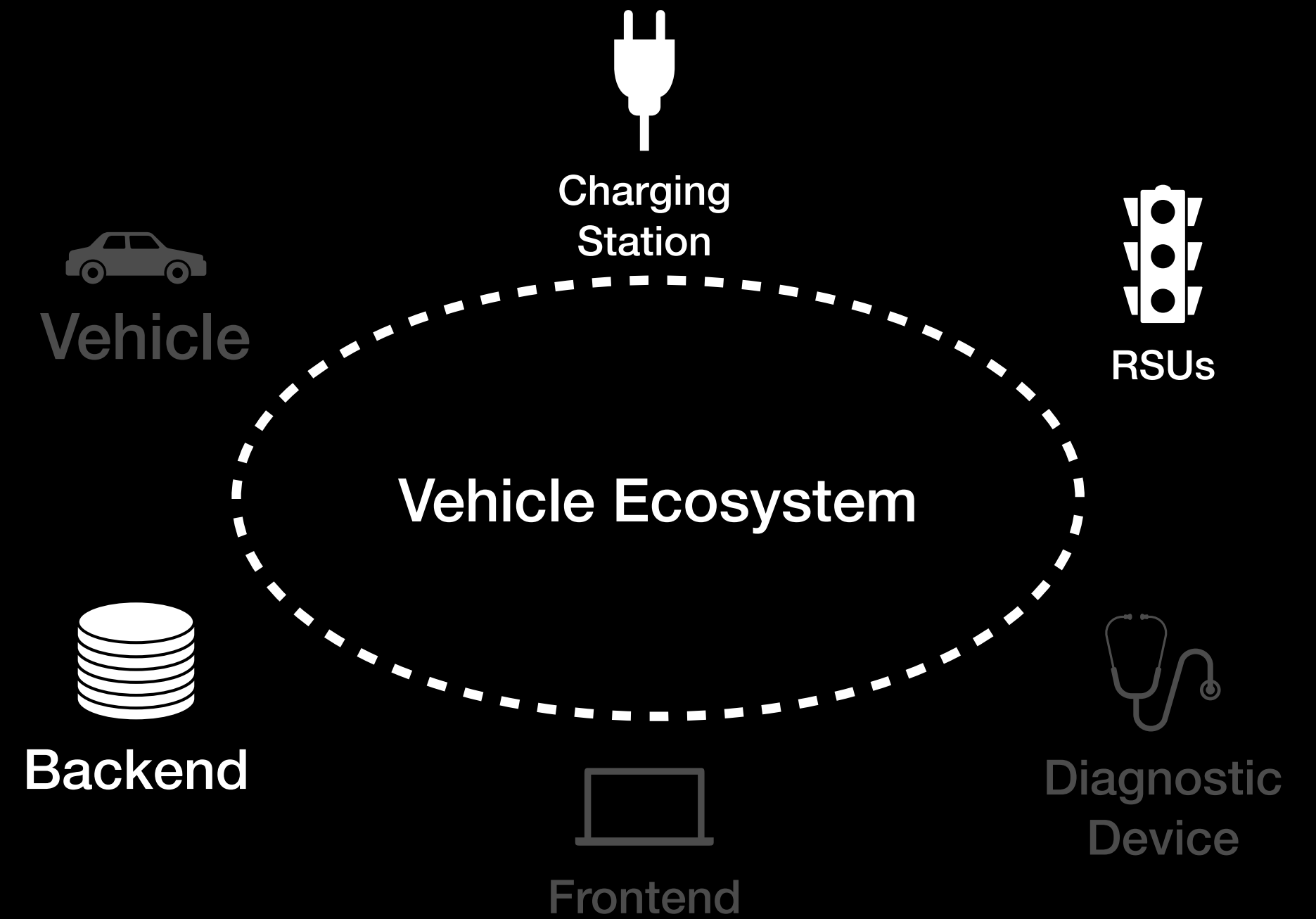


# Service and Content Providers and Operators

Lifecycle Phases

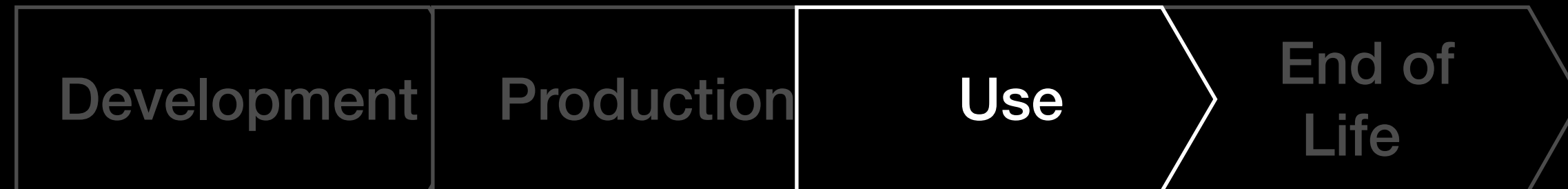


User Agents

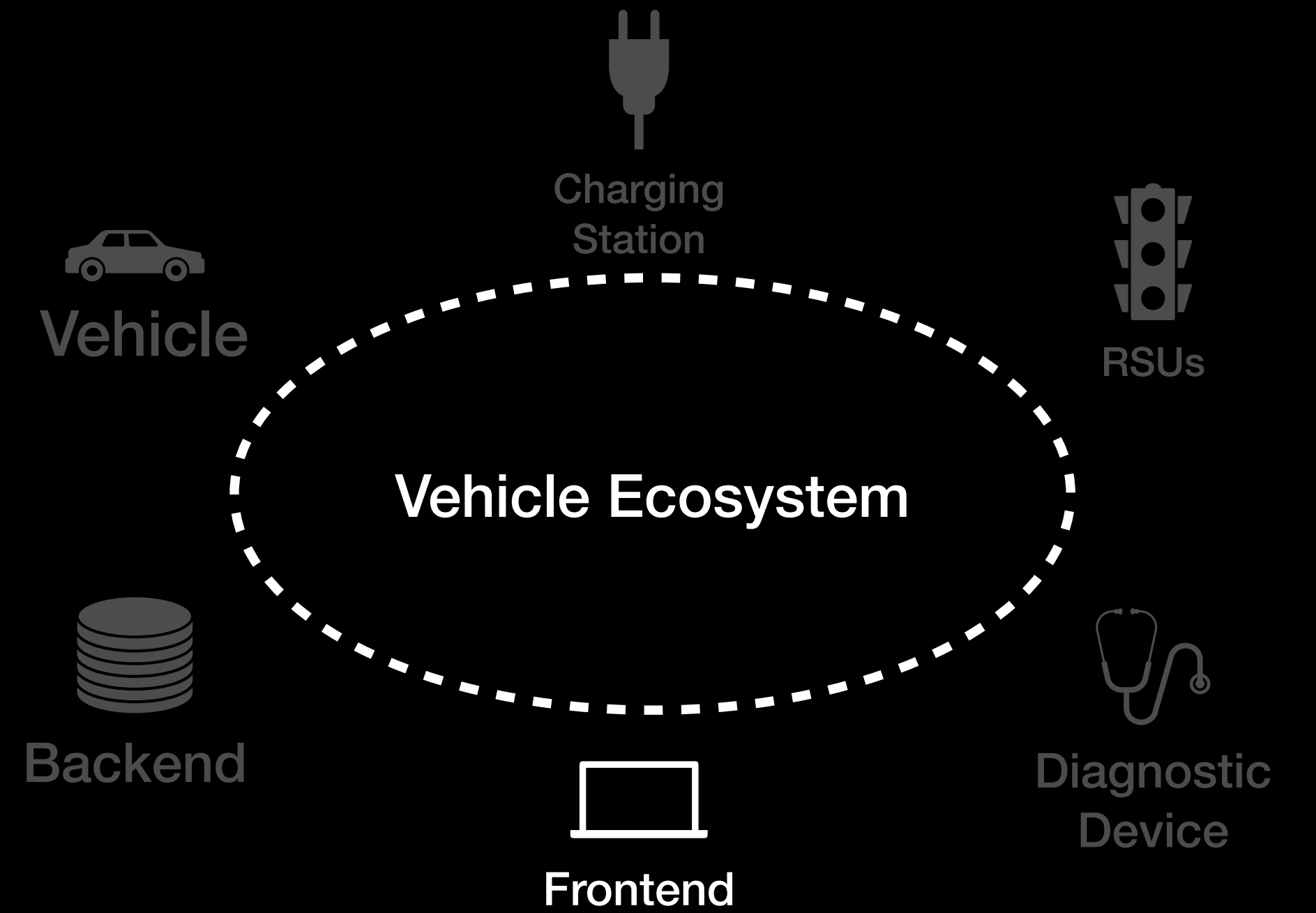


# Owner

## Lifecycle Phases

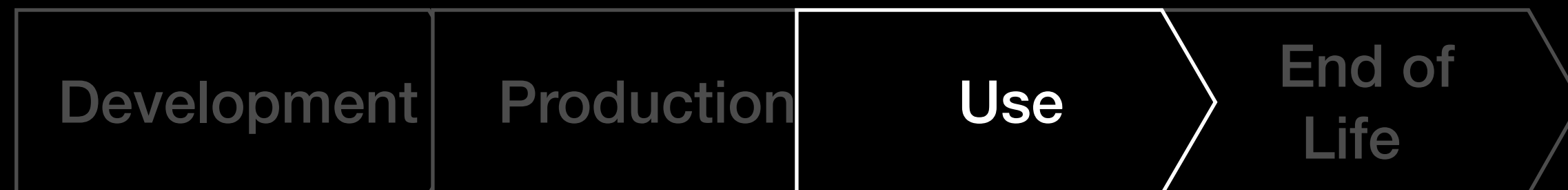


## User Agents

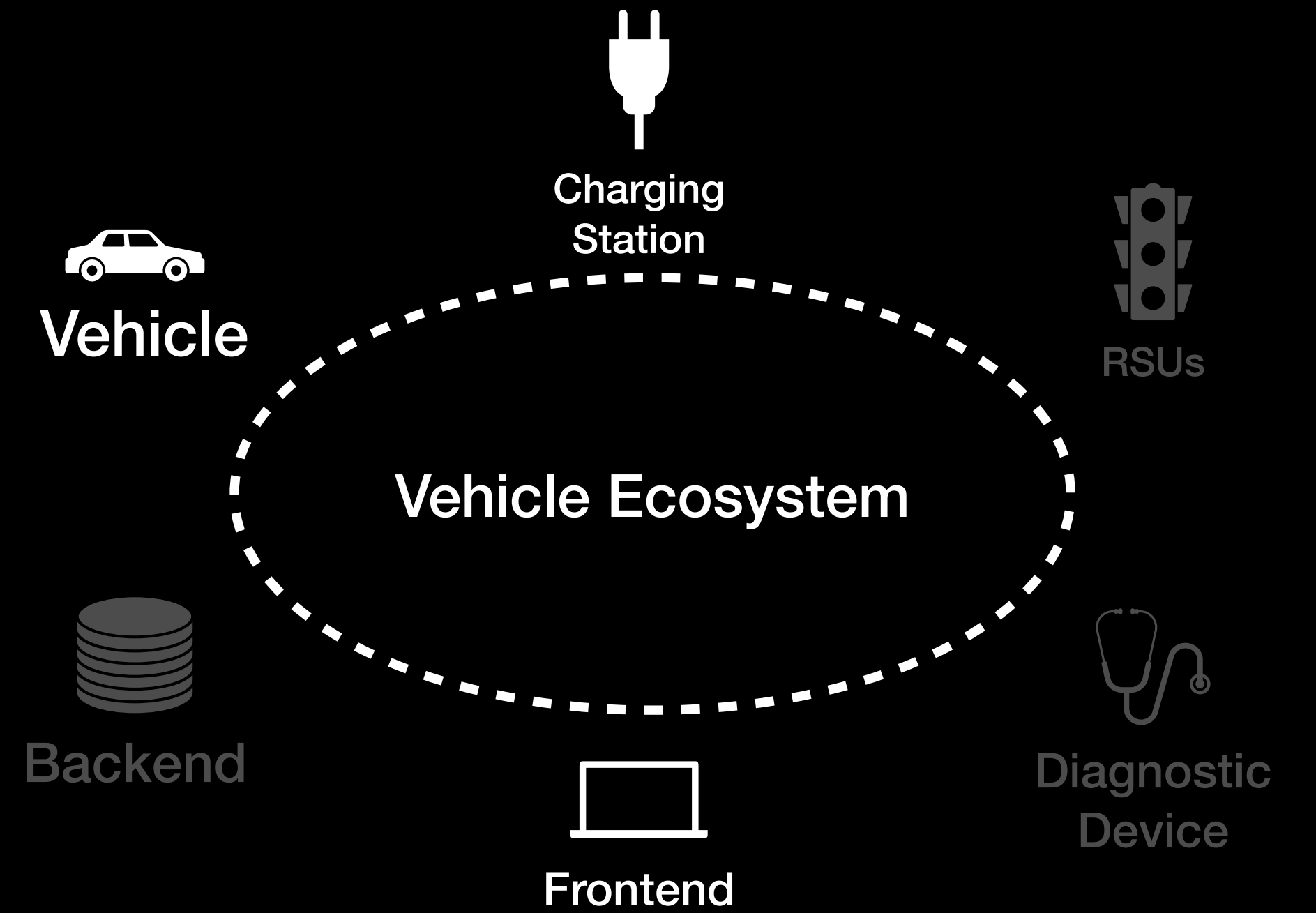


# Driver

## Lifecycle Phases

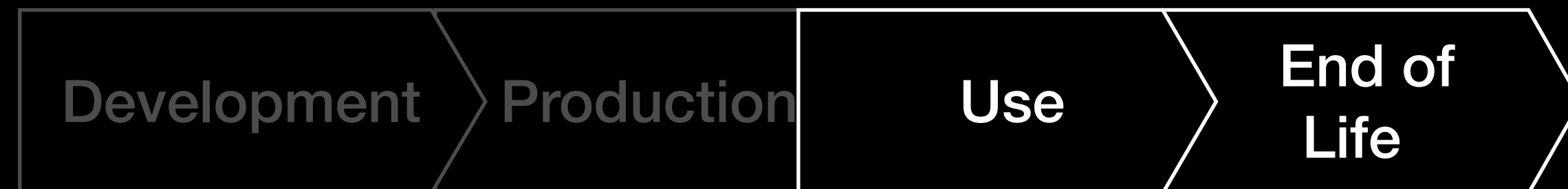


## User Agents

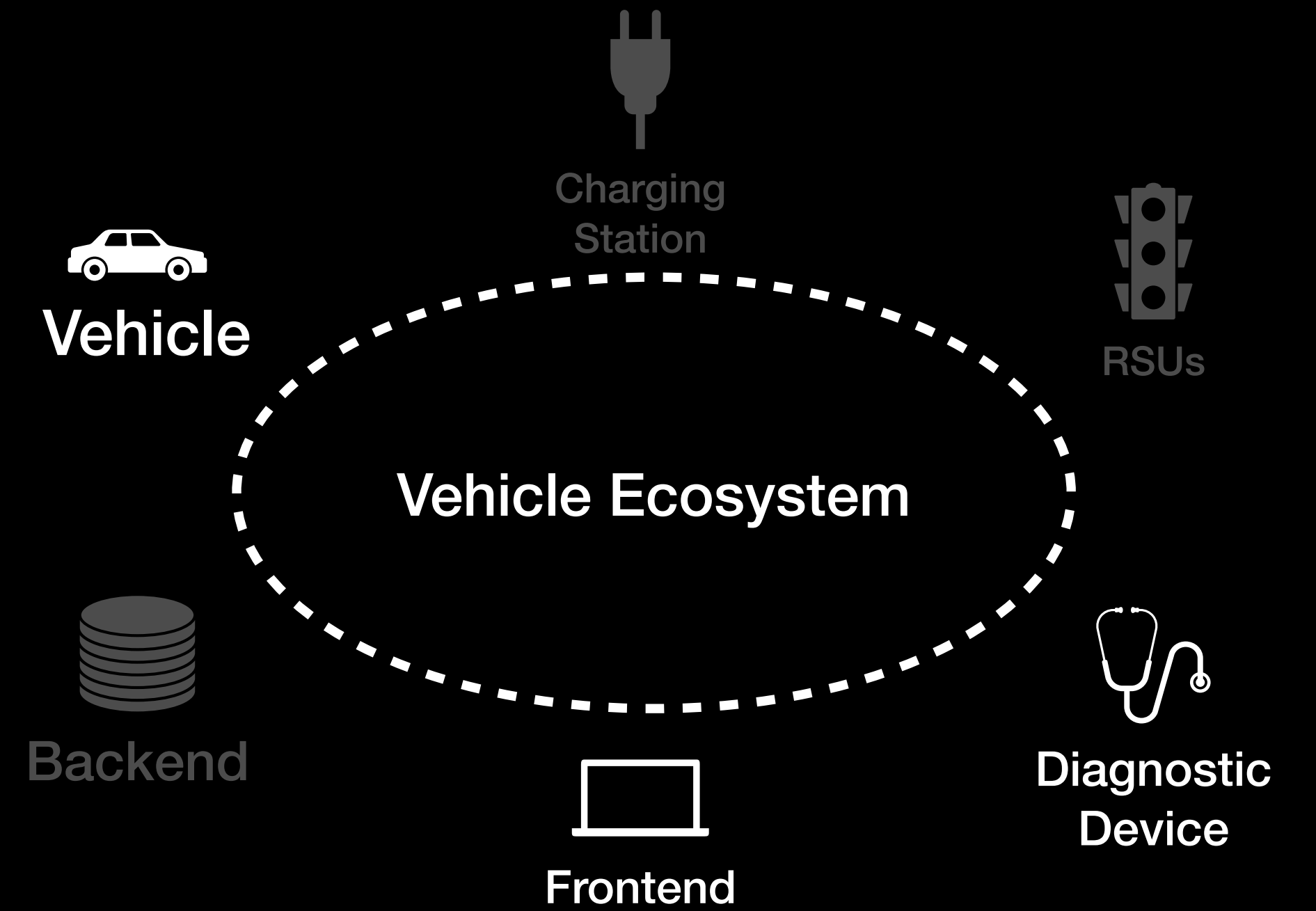


# Workshops

## Lifecycle Phases



## User Agents

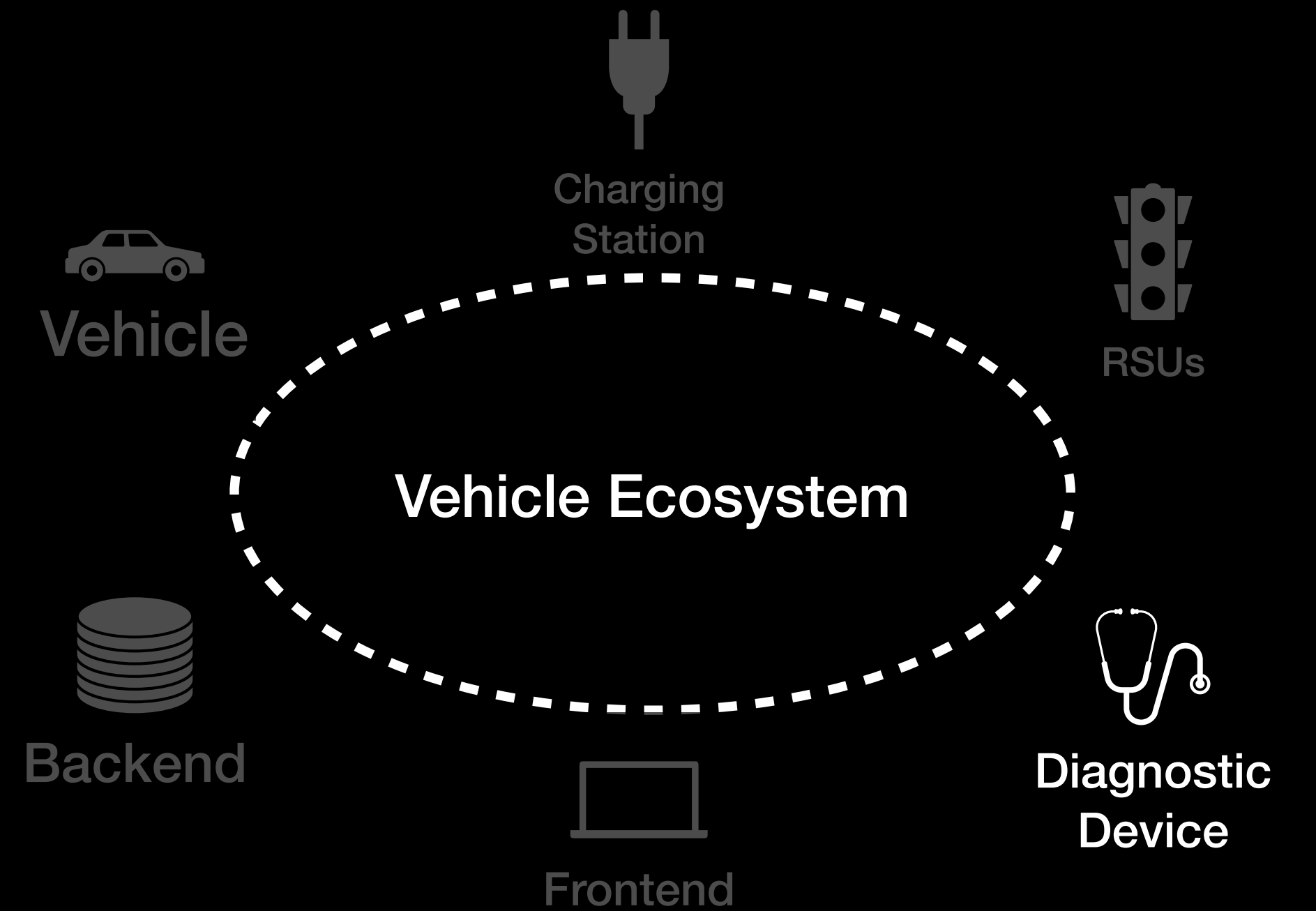


# Authorized Test Organizations

Lifecycle Phases



User Agents



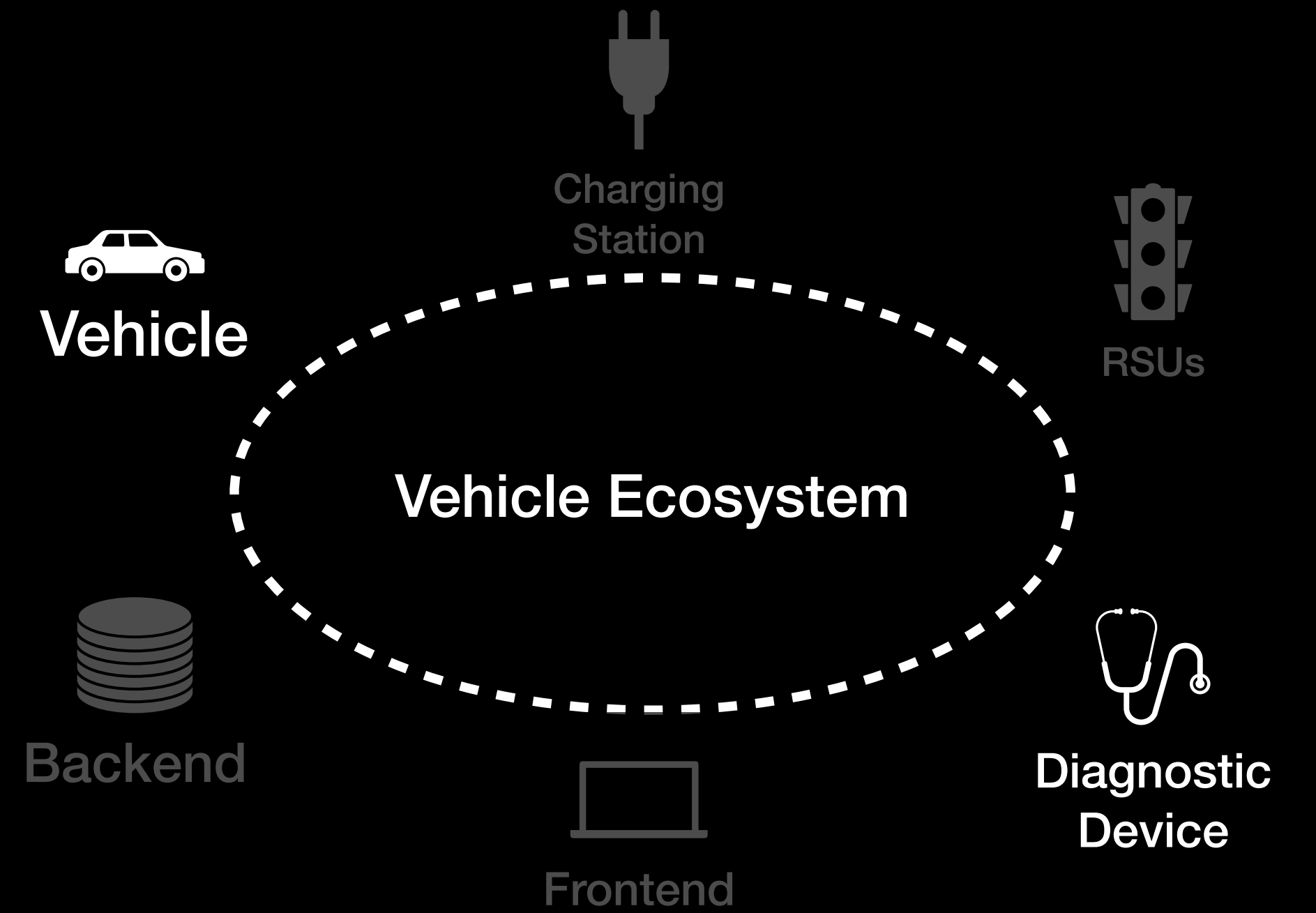


# Recycler

## Lifecycle Phases



## User Agents



# Trust Relations

## Development

OEM governs all access rights

## Production

OEM governs all access rights,  
Service Providers might perform interactions

## Use

Owner has extensive rights and should govern  
interactions with other stakeholders

More complex interactions possible (e.g. workshop)

Possible conflicts (e.g. OEM and workshops)

## End of Life

OEM provides access to necessary functions  
(reuse, disengage pyrotechnics etc.)

# Evaluation

- Online Software Update
  - Creation & Release: OEM is trusted (Backend)
  - Installation: Authorized by Owner (Vehicle / Frontend)
  - Workshops might also be affected (Diagnostic Device)
- Plug and Charge
  - Driver authorizes charging station provider (Vehicle / Frontend, Charging Station) to process payment
- VANETs
  - Direct communication without stakeholders (e.g. CAMs)
  - Data and Service Providers might advertise services (RSUs) to drivers (Vehicle)

# Contributions & Future Work

- Collect and characterize stakeholders for automotive trust management systems with their roles and characteristics
- Distinguish between stakeholders and the utilized devices
- Define relevant lifecycle phases and utilized user agents
  
- Basis for creation and evaluation of automotive trust management systems