



Driving the Future Connected Vehicle with Eclipse Kuxsa

Robert Höttger

Eclipse IoT Day Grenoble, France 19.02.2019



Outline

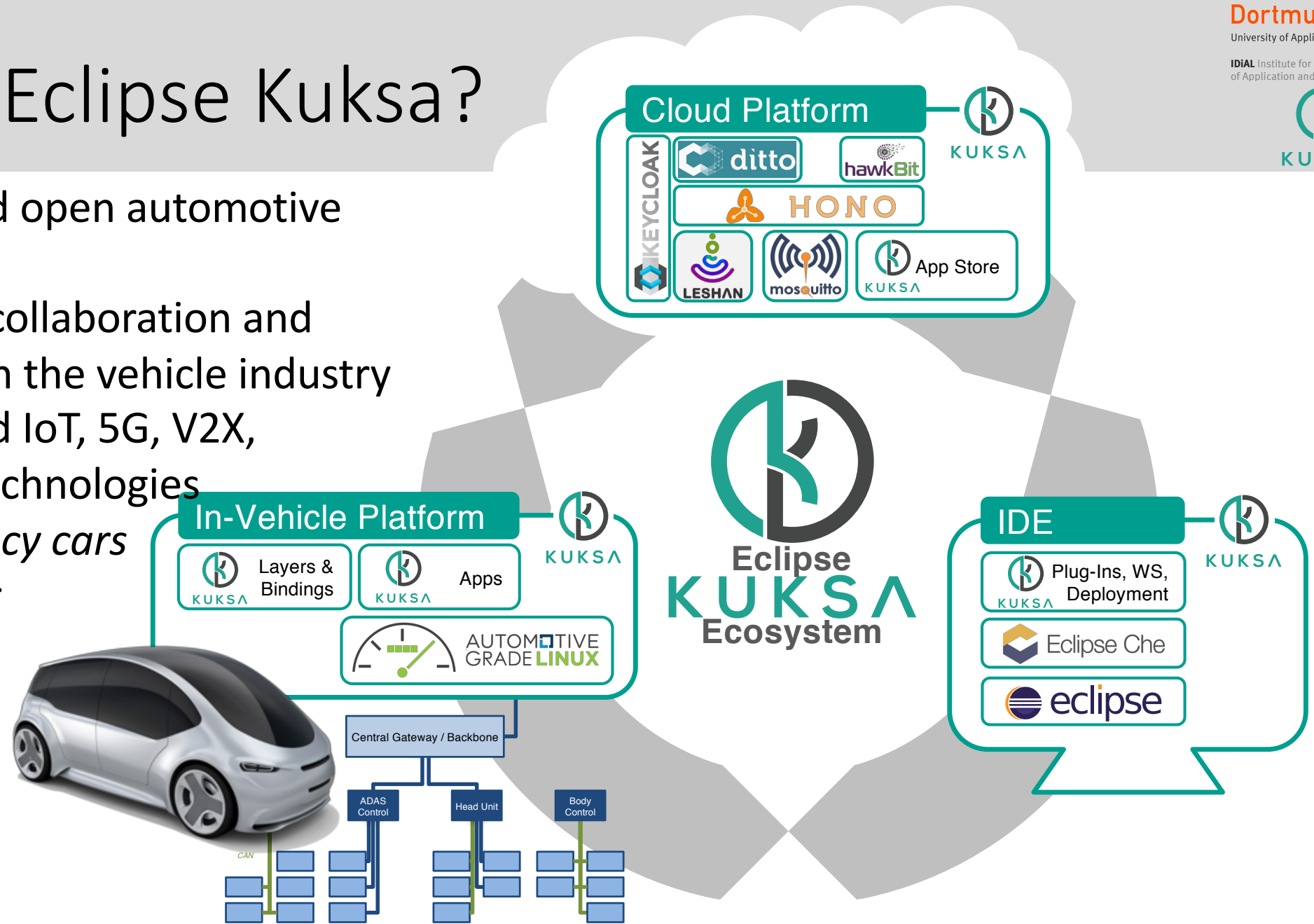
- What is Eclipse Kuksa?
- Who is Eclipse Kuksa?
- Why do we need Eclipse Kuksa?
- What can you do with Eclipse Kuksa?
 - Cloud Platform
 - In-Vehicle Platform (2 demo videos)
 - IDE (Demo video)
- Where is Eclipse Kuksa heading?



What is Eclipse Kuxsa?

What is Eclipse Kuxsa?

- A secure and open automotive ecosystem
- Strengthen collaboration and innovation in the vehicle industry
- Standardized IoT, 5G, V2X, and cloud technologies
- *Making legacy cars smart traffic compliant*





Who is Eclipse Kuksa?



Who is Eclipse Kuksa?

- “open standard **AP**plication **P**latform for **carS** and **TrAN**sportation **vehICLES**”

- Open source software
- Car-to-cloud connectivity
- External applications
- Security



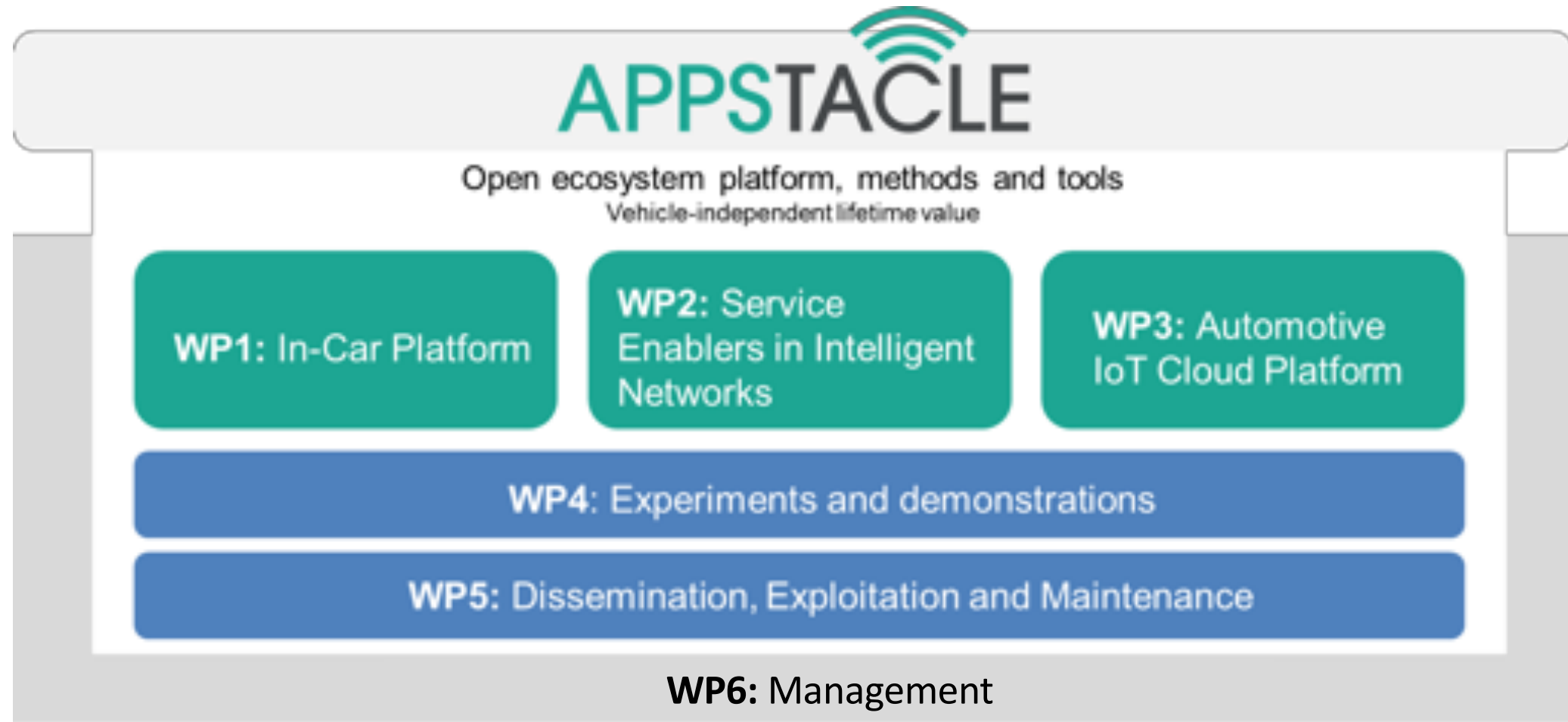
- Key figures:

- **3** Years (until 12.2019)
- **4** Countries
- **20** Partners
- **146.62** Person-Years
- **18,8** M€ Budget





Who is Eclipse Kuksa?





Why do we need Eclipse Kuksa?



Why do we need Eclipse Kuksa?

Figures not approved

New Apps, Updates and Upgrades for Vehicles* (thr. HMI)

***Not safety related**

Adaptive Cruise Control

Active Parking Assistant

Active Lane Keeping Assistant

Figures not approved

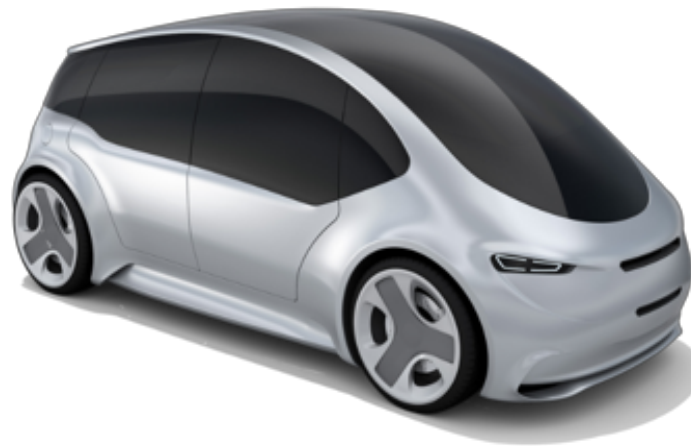
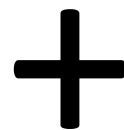
Cloud-based wrong-way driver warning

Community-based parking



Why do we need Eclipse Kuxsa?

... to create a ***cross-vendor*** connected vehicle ecosystem that relies on ***open standards*** and uses ***open source software*** to leverage the potential of a ***large developer community!***



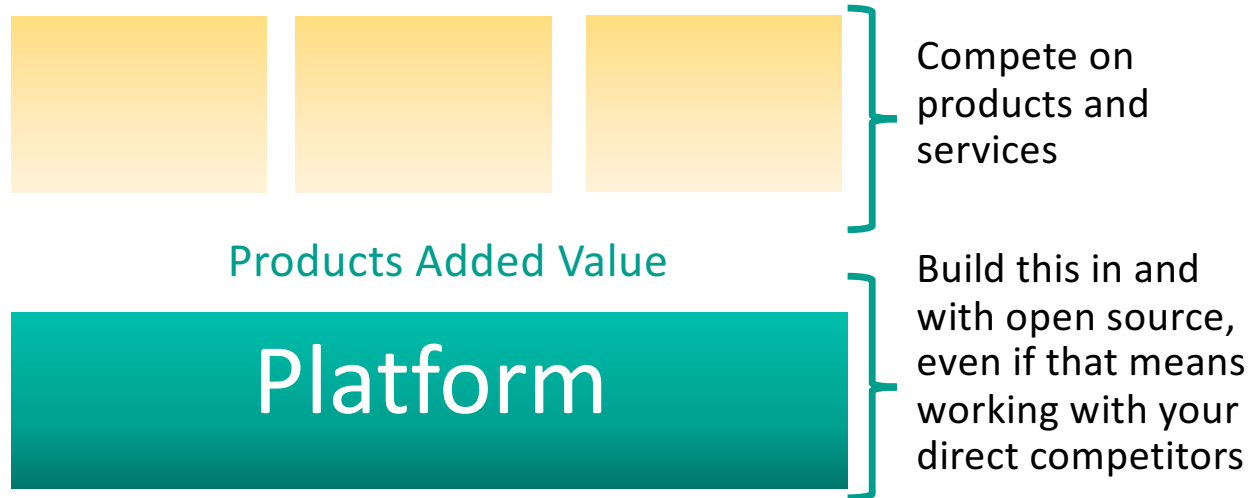


Varying Market Access

- OEMs & BEs
 - Domain knowledge
 - In-Car data access
 - Fast innovation cycle
 - Protect existing business
 - Extend existing business
- Large Cloud Players
 - No in-car data access
 - Software and Cloud knowledge
 - Experience with data and domain value
- SMEs, newcomers
 - No market (without OS) access
 - Innovation



Why Open Source





Market Value

“The Global Connected Car Market is estimated to be USD 72.89 Billion in 2017 and is projected to reach USD 219.21 Billion by 2025.”

Connected Car Market - Global Forecast 2025, ResearchAndMarkets.com

In 2017, there were 107 million connected cars out on the road. This number is expected to increase to 358 million connected cars in 2022

Connected Car Report 2018, statista, June 2018

“The overall revenue pool from car data monetization at a global scale might add up to USD 450 - 750 billion by 2030”

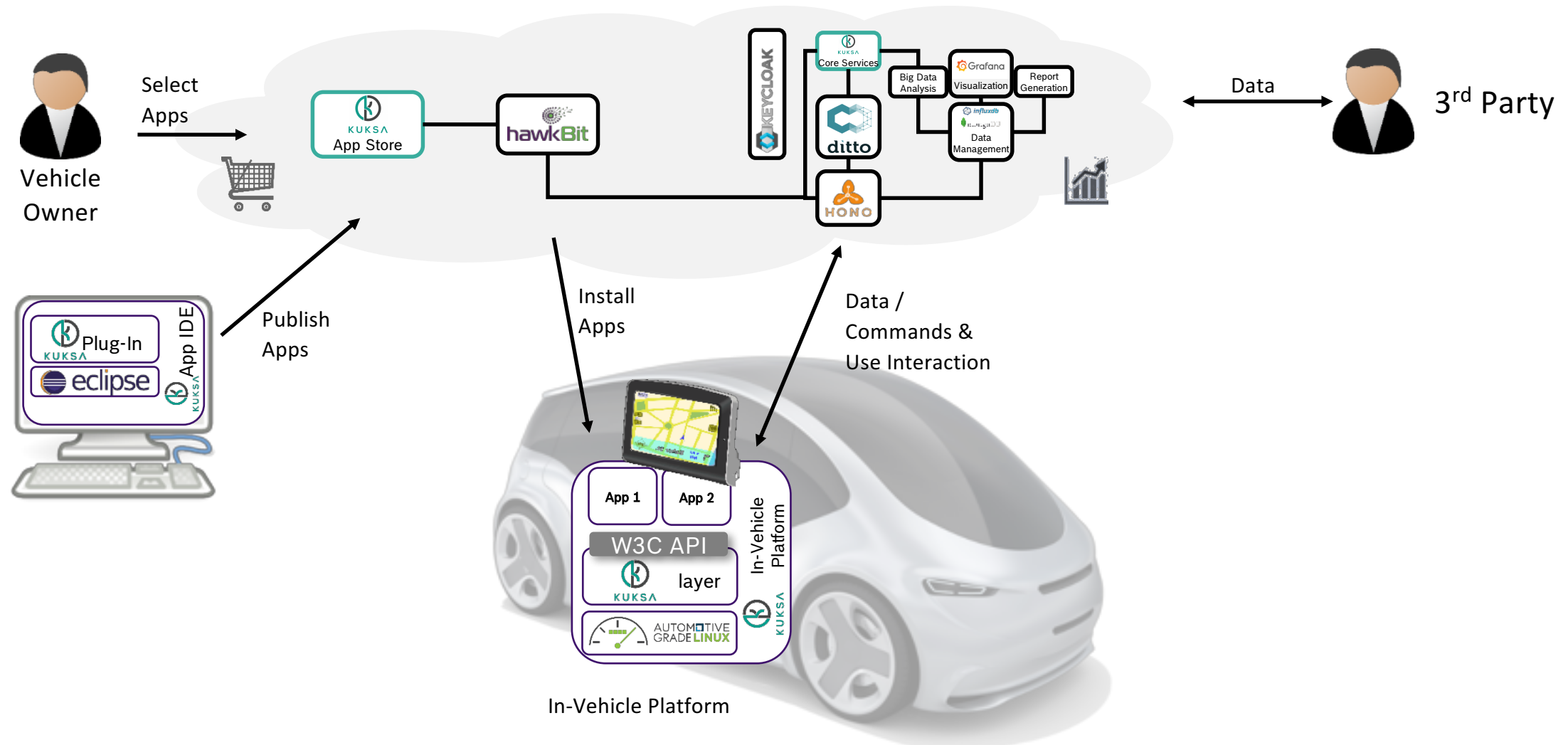
Source: Monetizing car data- McKinsey Study, September 2016



What can you do with Eclipse Kuksa?

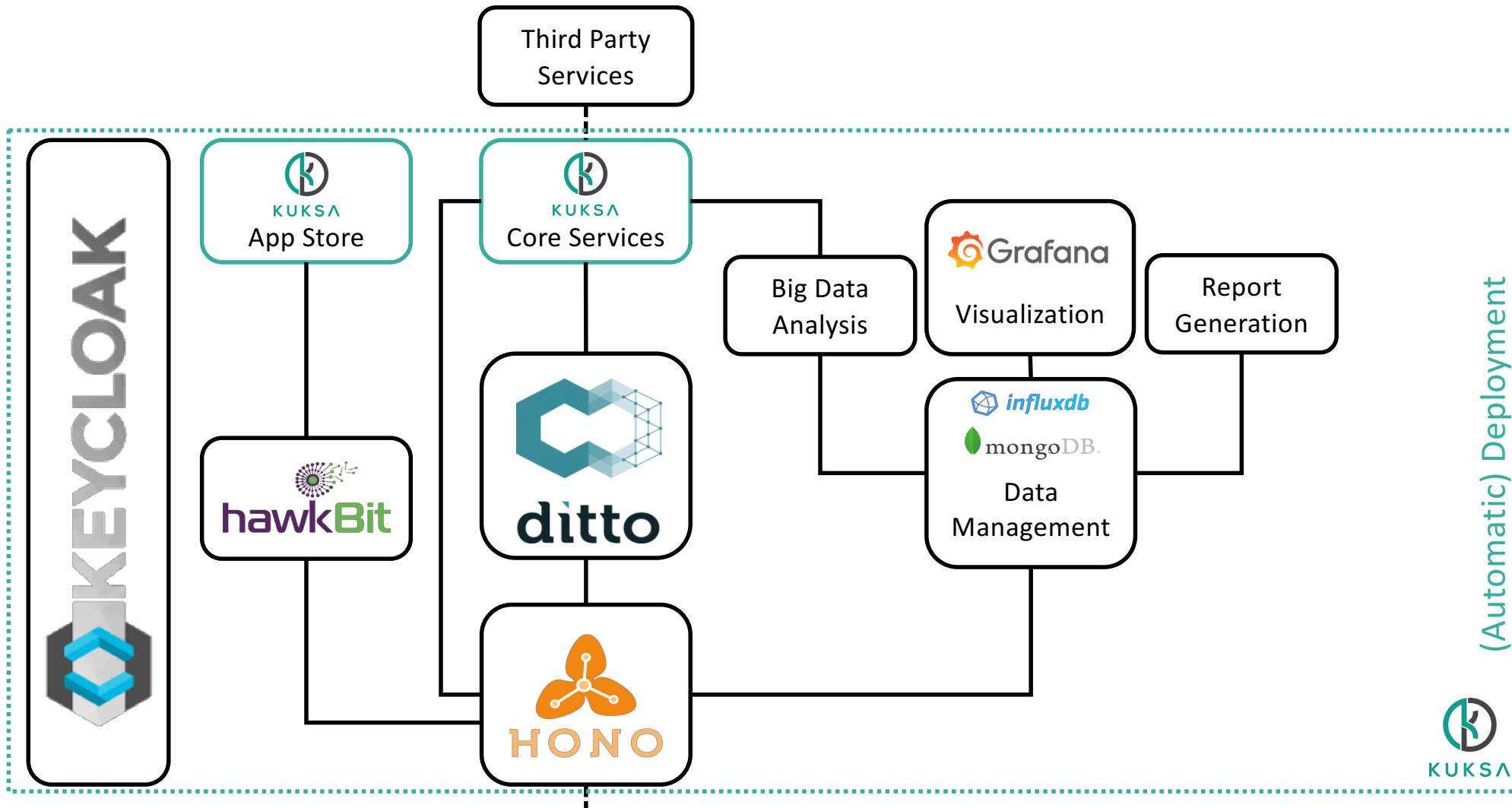
Cloud, In-Vehicle, and IDE platforms

Eclipse Kuksa - General Overview



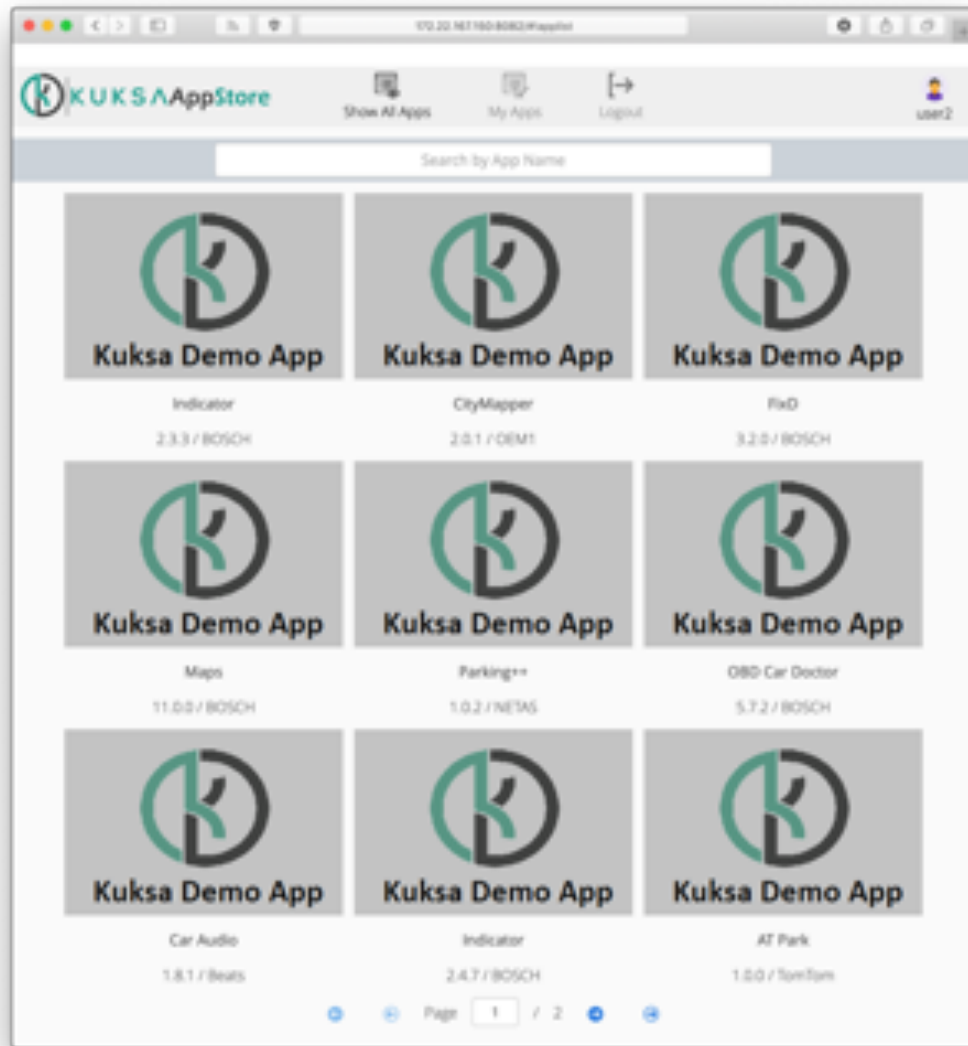


Eclipse Kuksa - Cloud Platform





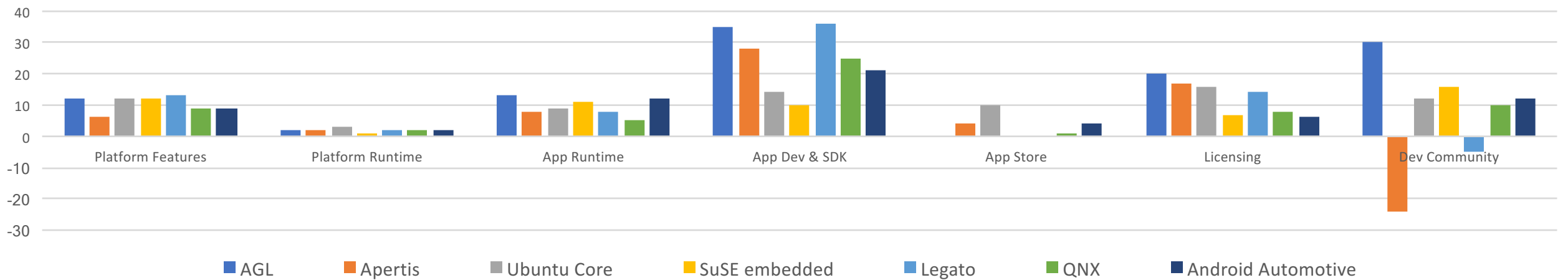
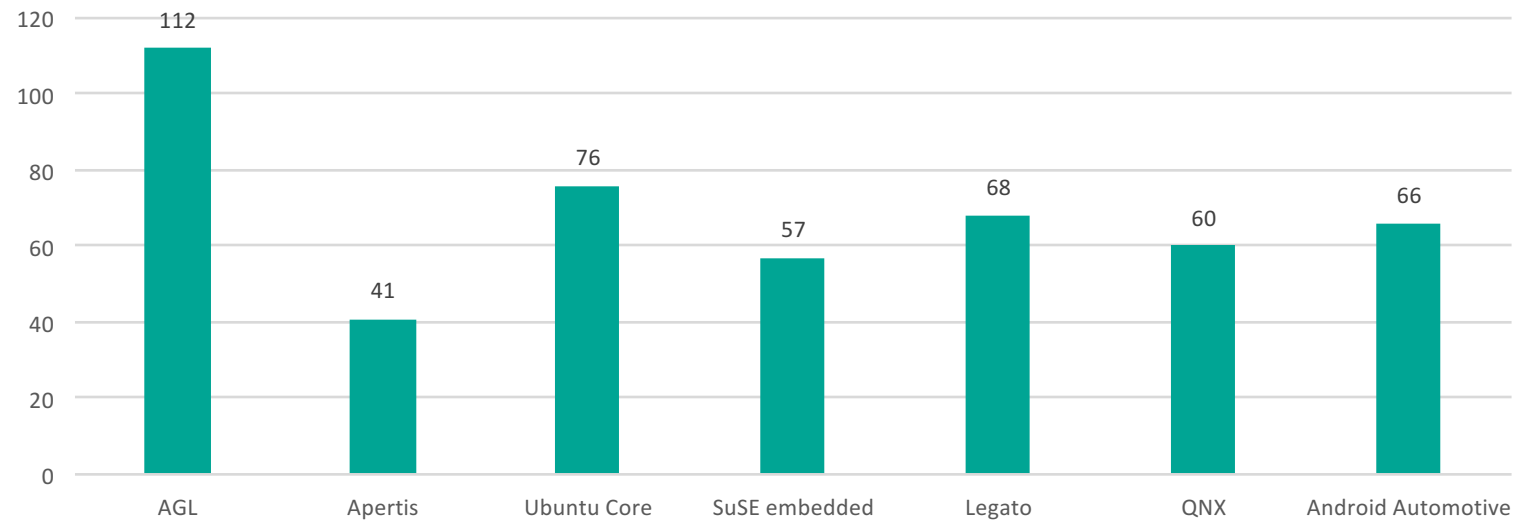
Eclipse Kuksa - Appstore





Eclipse Kuksa - In-Vehicle Platform

- What can we use that already exists?





In-Vehicle Platform: Current State

- Created
 - bitbake recipes
 - custom (cmake & bash) scripts
 - various AGL layers, and services
 - Raml2Agl tool
- to provide
 - **App installation (Demo video)**
 - *MQTT messaging (Eclipse Paho)*
 - *Eclipse HawkBit communication*
 - *RPI image setup*
- **Traccar client (Demo Video)**
- *MQTT / HTTP data logger*
- *W3C Visserver API*
- Direct Access API
- AGL websocket communication generation
- ...



KUKSA



AUTOMOTIVE
GRADE LINUX

yocto .
PROJECT



openembedded



In-Vehicle Platform App Manager Demo

**AppManager
Video**



In-Vehicle Setup Example

- ELM 327 OBD-II Adapter to get data:
 - Speed (vehicle, motor rpm)
 - Temperatures
 - Distance (ultrasonic data)
 - GPS
 - Error Codes ...
- RPI collects data, translates data to W3C standard, and sends it to the Kuksa Cloud (Hono → InfluxDB → Grafana)
- Email notification app
- W3C = Vehicle information service specification (websocket based)

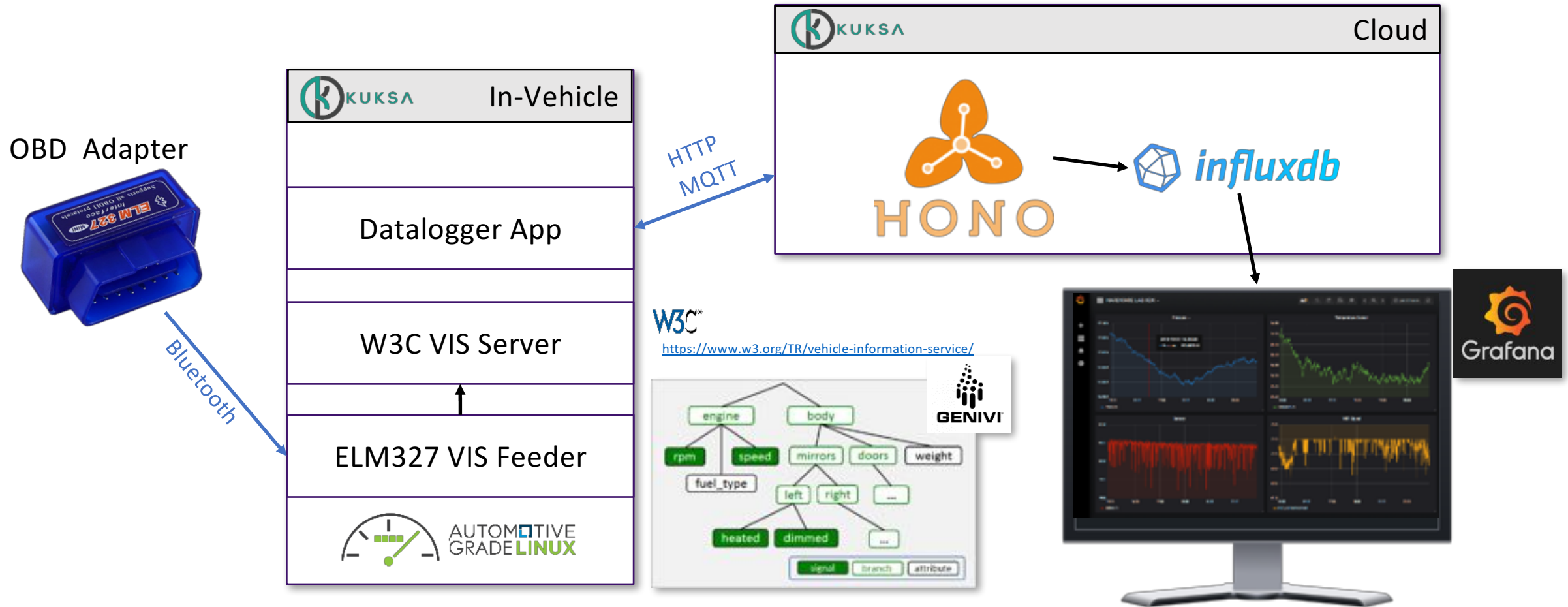


BOSCH

Invented for life



In-Vehicle Setup Example



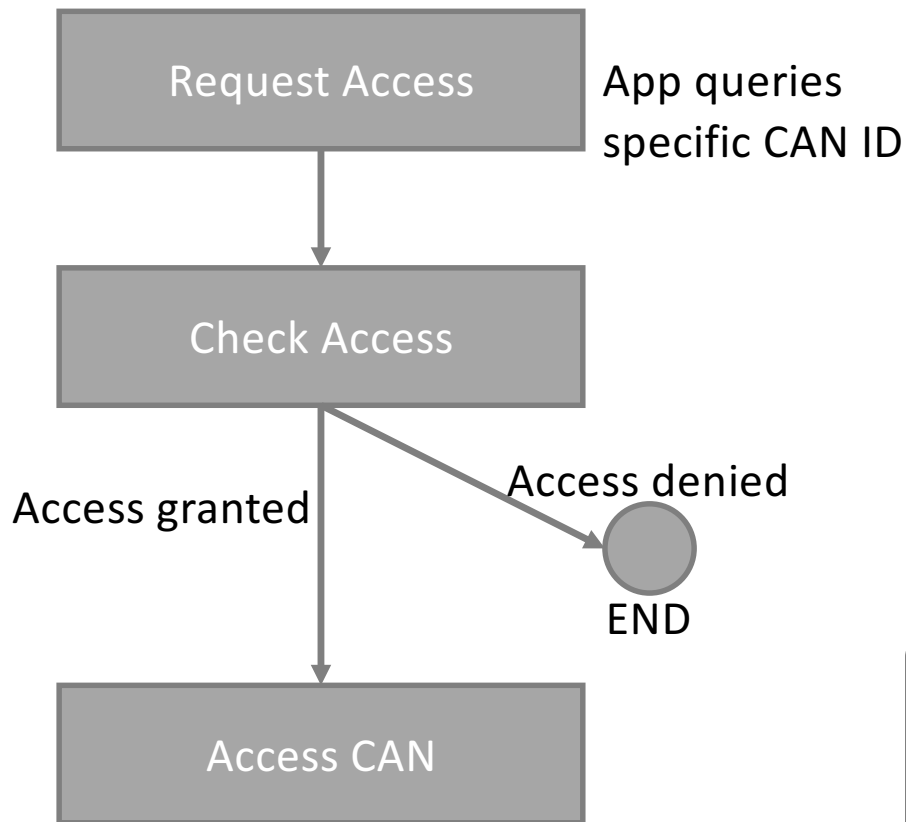


OBD Video



Eclipse Kuksa - Direct Access API

- Secure access to in-vehicle busses for authenticated applications



Standard linux sockets

Black / White list, rules

Real CAN device



Eclipse Kuksa– Use Cases

2.3. User Story: Vehicle Tracking

Idea

The owner of a car or a third party need to track the position of a specific vehicle. Such scenario may occur for several reasons (e.g. for fleet management, stolen vehicle tracking, pay-per-drive insurance)

2.8. User Story: Driver Seat Configuration

Idea

Cars used by several drivers can store the configuration of each driver. Car fleets (e.g. bus or truck)

2.4. User Story: Wrong Way Driver Warning

Idea

A vehicle takes part in a wrong way driver warning system in order to increase its own and other

2.5. User Story: Augment vehicle functionality

Idea

This user story describes a scenario where a vehicle will be enhanced by a specific functionality in order to adjust to special equipment. For example, adding a roof rack or a trailer to a vehicle might

2.2. User Story: Roadside Assistance

Idea

The technology developed in APPSTACLE helps a driver in the case his car breaks down. The basic idea is to have Roadside Assistance installed on the vehicle that allows Roadside Assistance

2.12. User Story: Car Theft Registration, Car Vandalism Registration

Idea

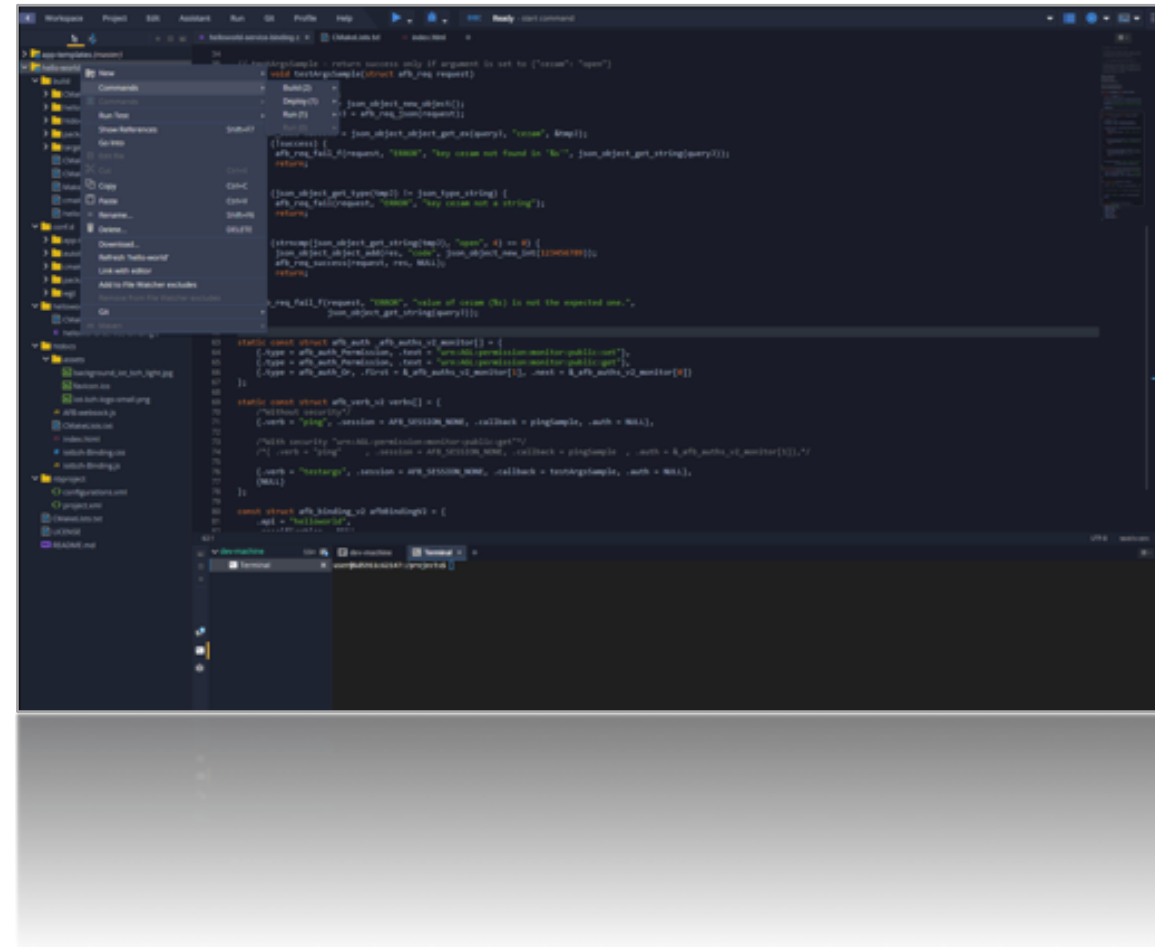
"Dash Cam" videos may upload the current seconds preceding and during a car theft to the cloud.

<https://itea3.org/project/workpackage/document/download/4464/15017-APPSTACLE-WP-1-SpecificationofIn-carSoftwareArchitectureforCar2XApplications>



Eclipse Kuksa IDE

- Based on Eclipse Che
- Allows Cloud and In-Vehicle Application development
- Platform independent
- AGL stack
- Yocto SDK
- Target specification
- Shared workspaces
- Almost configuration free
- Docker-based

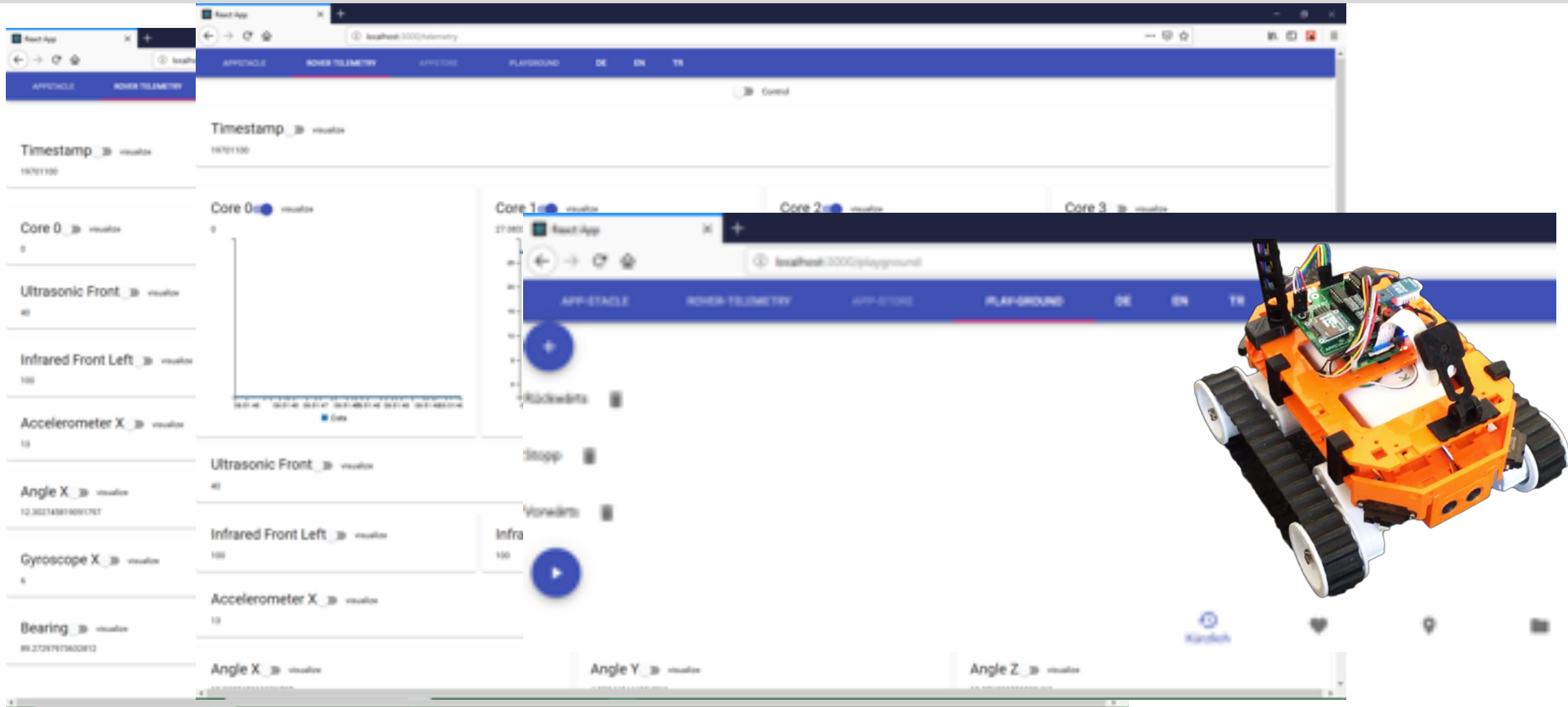




IDE Video



New Telemetry UI

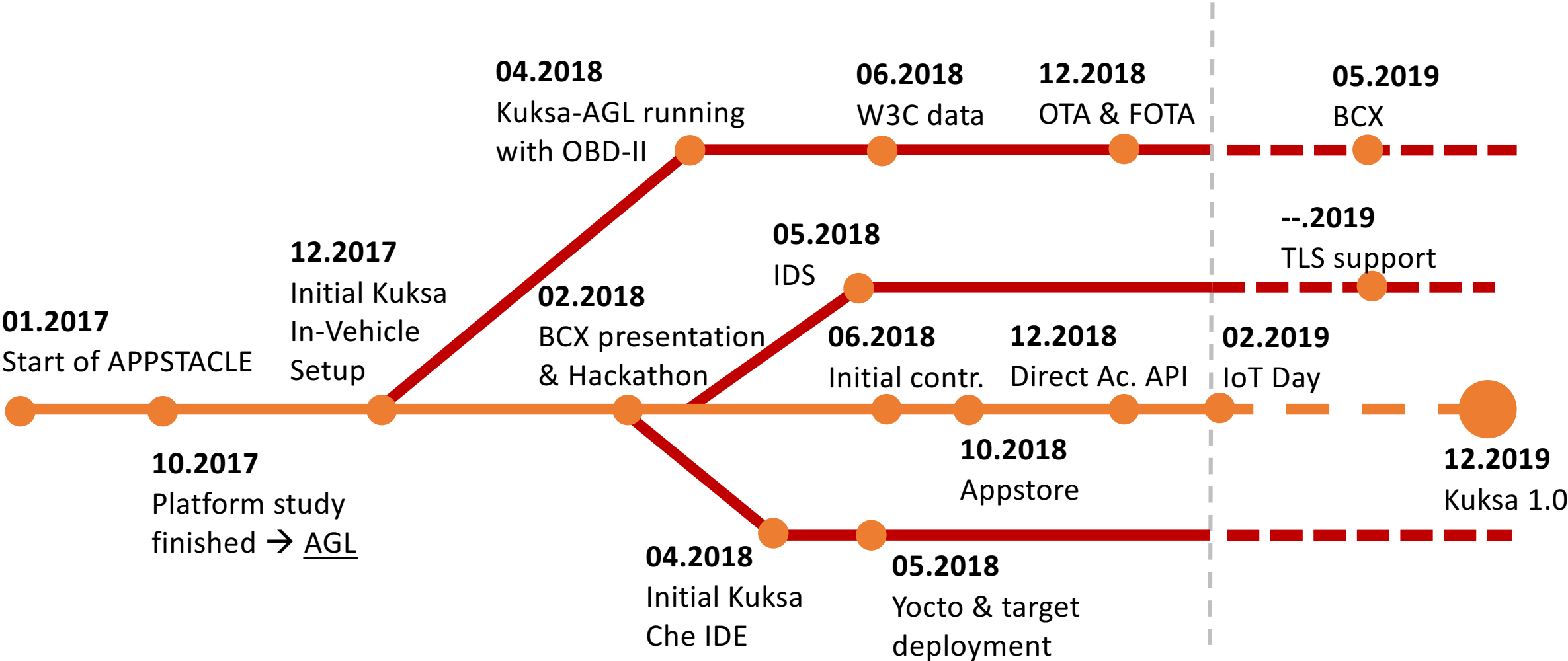




Where is Eclipse Kuxsa heading?



Eclipse Kuksa Roadmap





Thank you for your attention

robert.hoettger@fh-dortmund.de

kuksa-dev@eclipse.org

eclipse.org/kuksa

