More than 90% of the Fortune 500 use Red Hat products and solutions.  

~19,000 employees

105+ offices

40+ countries

The first $4 billion open source company in the world.

Sources: 1- *Red Hat client data and Fortune 500 list, October 2019.  2 - Red Hat SEC filings prior to the acquisition by IBM. Note: Currency in U.S. dollars.
CASE requirements are the core for digital transformation of automotive

**CONNECTED**

**AUTONOMOUS**

**SHARED/SERVICES**

**ELECTRIFIED**

Software Defined Vehicle

**INDUSTRIAL INTERNET**

Process Optimization & Operational Excellence

**ENTERPRISE IT**

Traditional IT: Hybrid Cloud Platform, SAP Transformation, ...

Red Hat

AUTOMOTIVE VEHICLE IT

Red Hat
The software content of modern **Autonomous, Connected, Electrified and Shared vehicles** grows exponentially, making feature-rich & high-performance operating systems necessary.

**New E/E in-vehicle architectures**

OEMs are moving towards a centralized E/E architecture with only a few powerful central computers supplemented by re-usable and rapidly integrated software components that are driving standardization of the underlying platform.

**New OS, middleware & cloud technologies**

Virtualization and containerization are getting common within today's OS. With the success of open source, **Linux** is getting traction in the Automotive Industry.

**New tech players vs established OEMs**

Nowadays, established OEMs are trying to significantly expand the capabilities of their own vehicle software development, following the example of new software-driven players like **Tesla**.
The Software Defined Vehicle will be part of Connected Life and Vehicle Edge

**Product & Service Evolution**

- **Traditional Vehicle**
- **Connected Vehicle**
  - **Product Driven**
  - **Digital**
  - **Updateable**
- **Car & Mobility as a Service**
  - **Connected Journey**
- **Connected Life**
  - **Customer & Data Driven**

**Vehicle Technology Evolution**

- **Vehicle 1.0**
  - Functional
- **Vehicle 2.0**
  - Digital
- **Vehicle 3.0**
  - Updateable
- **Vehicle 4.0**
  - Software Defined

**Edge and Internet-of-Things Evolution**

- Connected Services
- Electrification
- Cloud-native
- Subscription & multi-modal mobility
- Shared Ownership
- Service Oriented Architectures

**New Revenue Streams**

- Lean & Efficient
- Cultural Change
- Open Source and Open Standards
- DevOps
- New Revenue Streams
- Synergies to Software Defined Data Center and Networks
- Embedded 5G/V2X Connectivity

**Source:** SBD Automotive Software Defined Vehicle

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* Source: SBD Automotive Software Defined Vehicle
Standardization is a basis for differentiating business functionality

- **Unique Selling Proposition**
- **Getting things done**
- **Open Source & Standardization**

### Benefits of Standardization:
- Avoid vendor lock-in & dependencies → increase flexibility & scalability
- Reduce bottlenecks in resources → increase availability & attractiveness of talent
- Support cooperation and handle antitrust law → increase standardization, reuse & efficiency
- Support digital transformation by open source → increase innovation speed by maintaining legacy integration

**Build**
- **Integration, Application, Engineering**
- **Leverage Open Source Communities & Talent**
- **Platform Functionality**
- **Differentiating Functionality**
- **Provider Solution Approach**

**Open Source**
- **Base Operating System, DevOps Platform & Collaboration**
Hybrid, Multi-Cloud Evolution

Yesterday–Today–Tomorrow
Private Datacenter to Public Cloud

Today–Tomorrow
Public Cloud to Hybrid Cloud & Multi Cloud

Moving Forward
Multi-Hybrid Cloud extends to Enterprise Edge Infrastructure

Red Hat’s strategy
Delivering the hybrid, multi-cloud via consistent platforms and services on every footprint
Empower and Enable developers, operators, and partners
Automotive/Manufacturing Value Chain

Strategy & Business Development

Research & Development

IDEA to OFFER

Sales & Marketing

OFFER to ORDER

Production & Logistics

ORDER to DELIVERY

Aftersales & Service

DELIVERY to CUSTOMER CARE

Corporate IT & Resource Management

Hybrid & Multicloud Data Platforms

Vehicle Edge Pre-SOP

Factory Edge SOP

Vehicle Edge Post SOP
“We got the idea to have all these tests we do with hardware on virtual test environments, and that’s why we’ve come to OpenShift and containers.”

Michael Denecke
Head of Test Technology
Volkswagen AG

1. Video: Volkswagen accelerates virtual IT infrastructure with Red Hat OpenShift (2022)
2. Video: Red Hat Summit 2019 presentation by Michael Denecke, Head of Test Technology at Volkswagen
3. Video: OpenShift Commons presentation with Marcus Greul (Project Manager Testing & Simulation R&D)

VOLKSWAGEN
Autonomous Vehicle Testing
Vision for the Software Defined Vehicle

“An enterprise-hardened open source layer to run workloads spanning from vehicle onboard to offboard.”

Vehicle Onboard and In-Vehicle OS
- ADAS/AD
- Digital Cockpit, Infotainment
- Quality Mgmt, Artificial Intelligence

Vehicle Offboard and Cloud
- Backend
- Ecosystem
- Applications

Consistent Platform and Operations for
Linux, Containers, DevOps & Microservices

Vehicle HW Platforms
- Edge
- Public Clouds
- Private Cloud
- On Prem

BUILD ONCE. DEPLOY ANYWHERE.

onboard or cloud related application enables new kind of services and their scalability across any workload – any footprint – any location – any provider
Announcement for Red Hat In-Vehicle OS

Red Hat In-Vehicle Operating System

Delivering a Linux-based foundation for the **Software Defined Vehicle**, enabling cloud-native development, functional safety, and long-term relevancy.

**PRESS RELEASE**

Red Hat Sets Sights on Delivering the First Continuously Certified Linux Platform for Road Vehicles

Open source leader to add predictable Linux platform with ongoing certifications for a variety of in-vehicle, safety-related applications, from infotainment to driver operations.

> With Red Hat’s Linux expertise, services and market position, and the exida leading position in assessment, safety analyses and certification, Red Hat and exida are committed to give automation and automotive companies with functional safety applications access to innovative and high-quality open source software.

JONATHAN MOORE, DIRECTOR, ADVANCED SYSTEMS, EXIDA

Red Hat’s Approach to In-Vehicle OS

Bring Open Source to the Car
Extend Open Source Linux to automotive value-chain for rapid innovation on an enterprise-class platform that supports both safety (ASIL-B) and non-safety applications.

Engage the Automotive Ecosystem
Connect and align with the automotive ecosystem to enhance our platform capabilities and to accelerate solutions development and time-to-market.

Standardize & Advance
Collaborate with automotive and safety communities to achieve better alignment, advance technology rapidly, and foster upstream innovation.
Our SDV Community Engagements

- CentOS Stream Automotive SIG
  - Launched in August 2021: [link](#)
  - Centos Automotive Stream Distribution: [link](#)

- Scalable Open Architecture for Embedded Edge
  - Joined SOAFEE as governing member

- Eclipse Foundation Software Defined Vehicle
  - Parent member and strong Eclipse contributor

- ELISA
  - Presented our Functional Safety approach in November Workshop

- ISO 26262 evolution
  - New routes to certification evidence

- Other relevant Initiatives
  - AGL, Linaro, Eclipse.IoT, Fiware, ...
Invitation to coming Red Hat Automotive relevant Events

OpenShift Commons
at 6th April
https://commons.openshift.org/gatherings/OpenShift_Commons_Gathering_on_Automotive.html

Red Hat Summit in planning
10th - 11th May
https://www.redhat.com/en/summit
Thank you!