



Red Hat Software Defined Vehicle and In-Vehicle OS

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The world's leading provider of open source enterprise IT solutions

More than
90%
of the
Fortune
500
use
Red Hat
products and
solutions¹

~19,000
employees

105+ offices
40+ countries

The first
\$4
billion
open
source
company
in the world²

#1 Enterprise Linux Distribution
72.3%

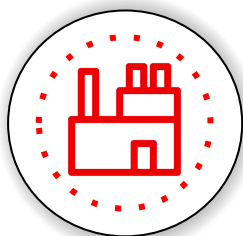
#1 Enterprise Container Platform
47.9%

#1 Cloud Automation Software
41%

#2 Private Cloud Stack
35%

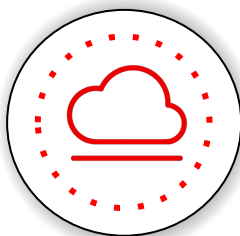
We make Open Source Software **consumable** for Enterprise Customers
by **preserving the advantages** of Open Source and **eliminating the disadvantages**

CASE requirements are the core for digital transformation of automotive



**INDUSTRIAL
INTERNET**

Process Optimization
& Operational
Excellence



**ENTERPRISE
IT**

Traditional IT:
Hybrid Cloud Platform,
SAP Transformation,

...

Industry paradigm for Vehicle Onboard and Offboard



The Advent of "CASE/ACES"

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

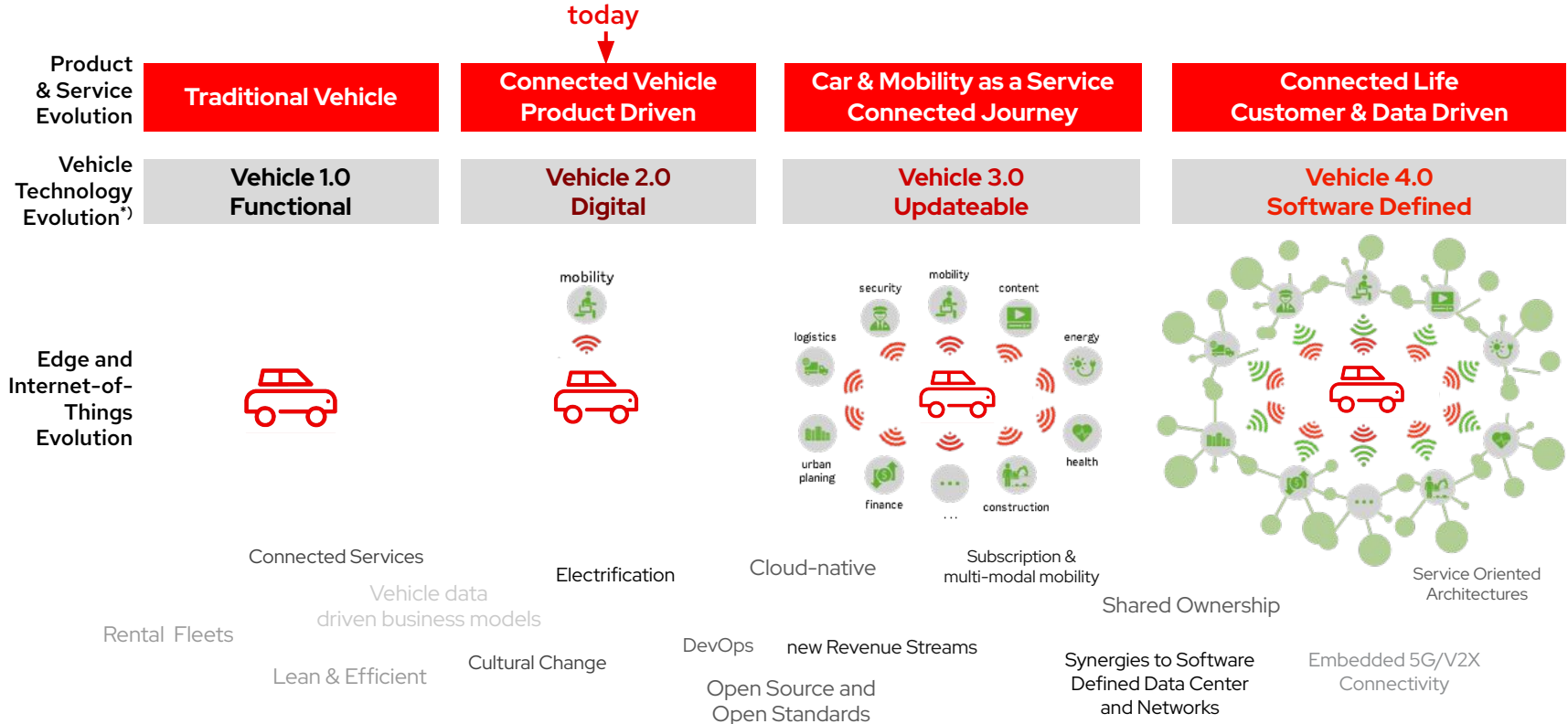
Virtualization and containerization are getting common within today's OS. With the success of open source, **Linux** is getting traction in the Automotive Industry.



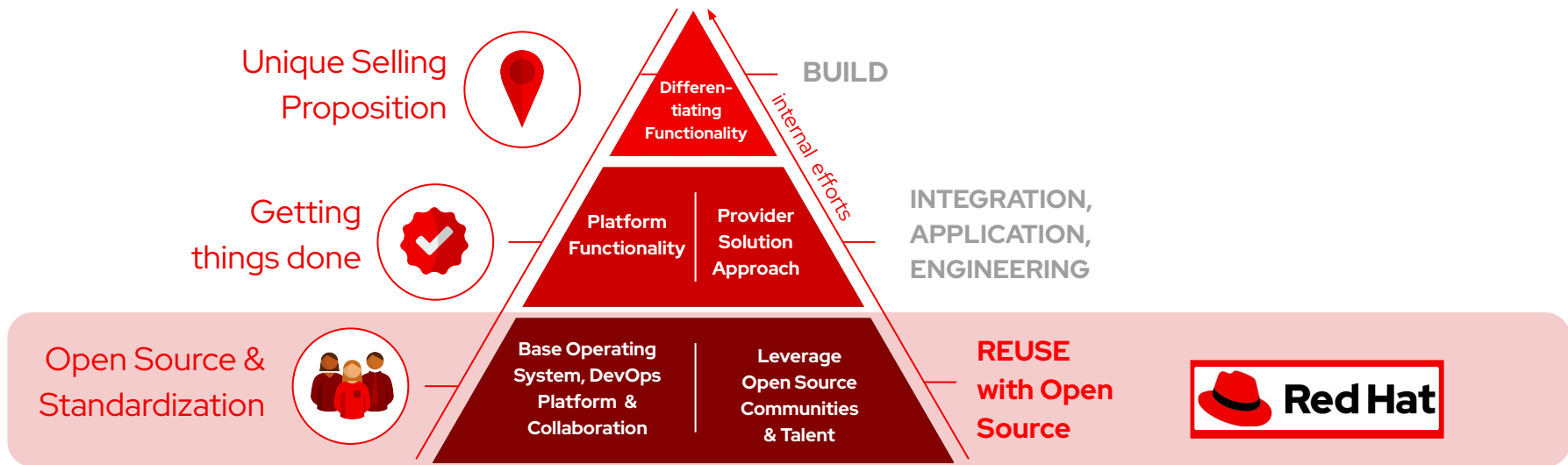
New tech players vs established OEMs

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



Standardization is a basis for differentiating business functionality



- 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

Hybrid, Multi-Cloud Evolution

Yesterday-Today-Tomorrow

Private Datacenter to
Public Cloud



**DATACENTER-
CENTRIC IT**



Today-Tomorrow

Public Cloud to
Hybrid Cloud & Multi Cloud



**SERVICES-CENTRIC
SOLUTIONS**



Moving Forward

Multi-Hybrid Cloud extends to
Enterprise Edge Infrastructure



**Vehicle
Edge**



**SERVICES ON
DISTRIBUTED EDGE**



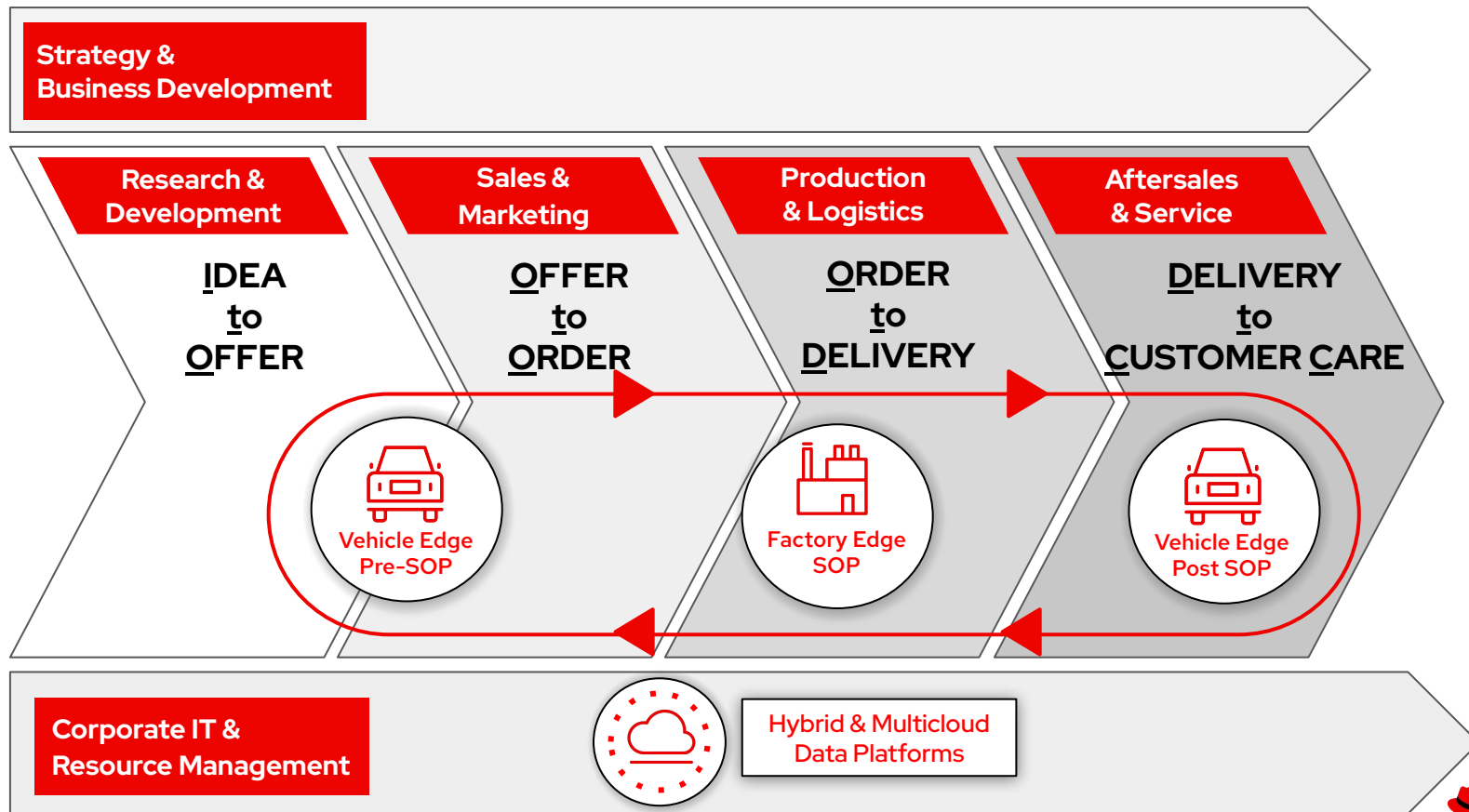
**Factory
Edge**

Red Hat's strategy

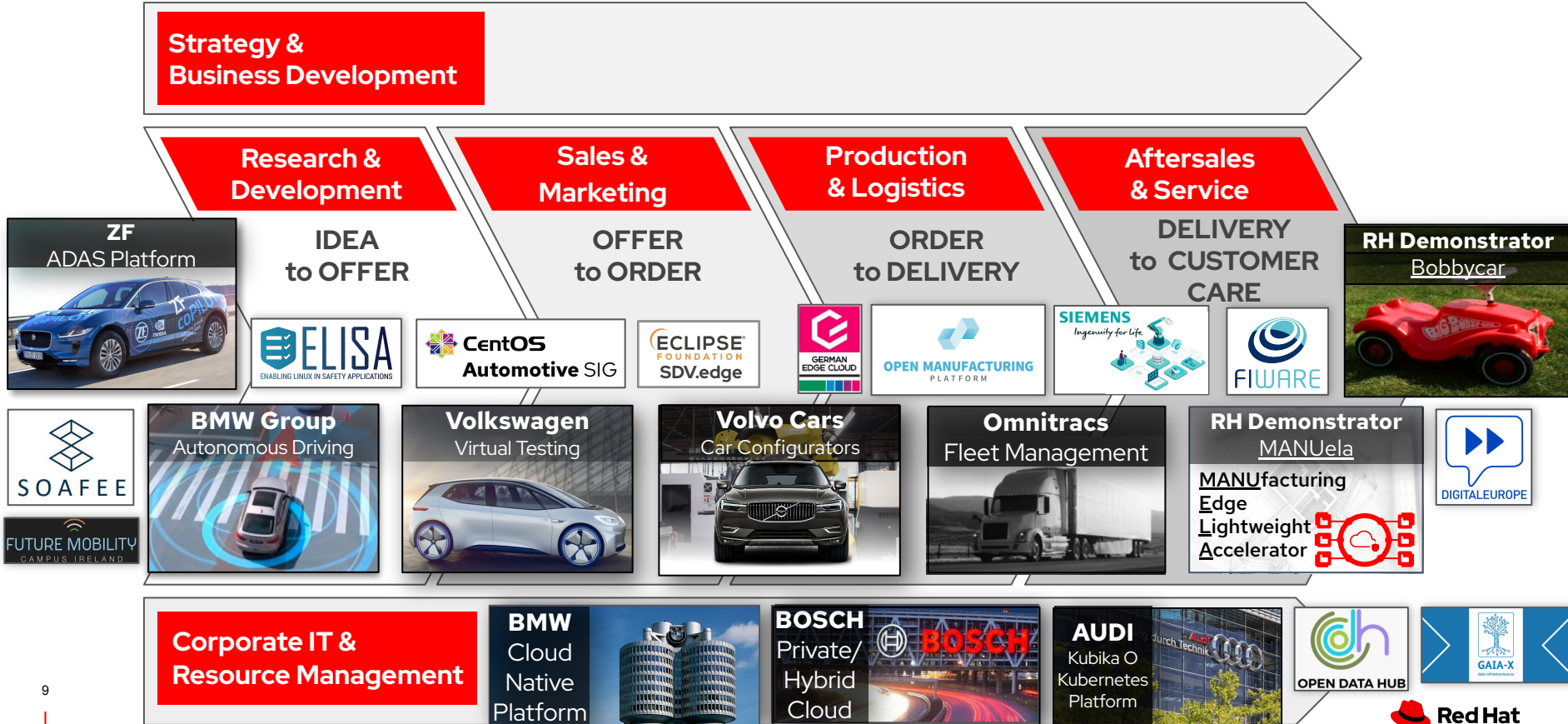
Delivering the hybrid,
multi-cloud via consistent
platforms and services on
every footprint

Empower and Enable
developers, operators, and
partners

Automotive/Manufacturing Value Chain



Automotive Value Chain with Success Stories





“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

VOLKSWAGEN Autonomous Vehicle Testing

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 \(Project Manager Testing & Simulation R&D\)](#)

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



Press Release 27th April 2021:

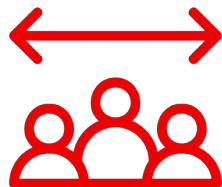
<https://www.redhat.com/en/about/press-releases/red-hat-sets-sights-delivering-first-continuously-certified-linux-platform-vehicles>

Red Hat's Approach to In-Vehicle OS



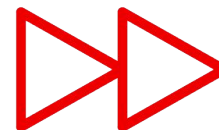
Bring Open Source to the Car

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](https://commons.openshift.org/gatherings/OpenShift%20Commons%20Gathering%20on%20Automotive.html)



Red Hat Summit in planning
10th - 11th May

<https://www.redhat.com/en/summit>



Thank you!