

ETI Tool Tech 2018

Thursday May 3, 2018



A futuristic wireframe car, rendered in glowing blue lines, is positioned on a dark blue grid. The car is surrounded by glowing blue circles and lines, suggesting motion or a digital environment. The background features a complex, glowing blue circuit board pattern. The overall aesthetic is high-tech and digital.

Emerging Technology and It's Effect on the Aftermarket

What Are Emerging Technologies?





The Center for Automotive Research

Mission:

CAR's mission is to conduct independent research and analysis to educate, inform and advise stakeholders, policy makers, and the general public on critical issues facing the automotive industry, and the industry's impact on the U.S. economy and society.

Emerging Vehicle Technologies

■ Intelligent Mobility Technologies

- Over the past 5-10 years the industry has demonstrated increased advancement in several key enabling technologies
- Advancing to fully automated vehicles requires continued technological advancement, while overcoming challenges posed by safety regulations, policy, and consumer acceptance.

■ Light Duty Vehicle Propulsion

- Light duty vehicle propulsion systems have rapidly progressed in part due to increasingly stringent emission and fuel economy regulations.
- Manufacturers are investing in a broad portfolio of different propulsion technologies for the next several years, such as Internal Combustion Engines (ICE), Battery Electric Vehicles (BEV), Hybrid Electric Vehicles (HEV), Plug-in Hybrid Vehicles (PHEV), and Fuel Cell Vehicles (FCV).

■ Materials and Manufacturing

- The trend of new materials and manufacturing processes is expected to accelerate due in part to regulatory pressure on fuel economy, emissions, and safety requirements.
- Forming and joining new materials and an increasingly complex mixture of materials remains a significant challenge for the automotive industry.

Source: Center for Automotive Research

Intelligent Mobility Technologies

■ Automotive Driver Assistance Systems

- embedded systems for electronic stability control, anti-lock brakes, lane departure warning, adaptive cruise control and traction control, etc.

■ Vehicle Automation

- mechatronics, artificial intelligence, and multi-agent systems

■ Vehicle Connectivity

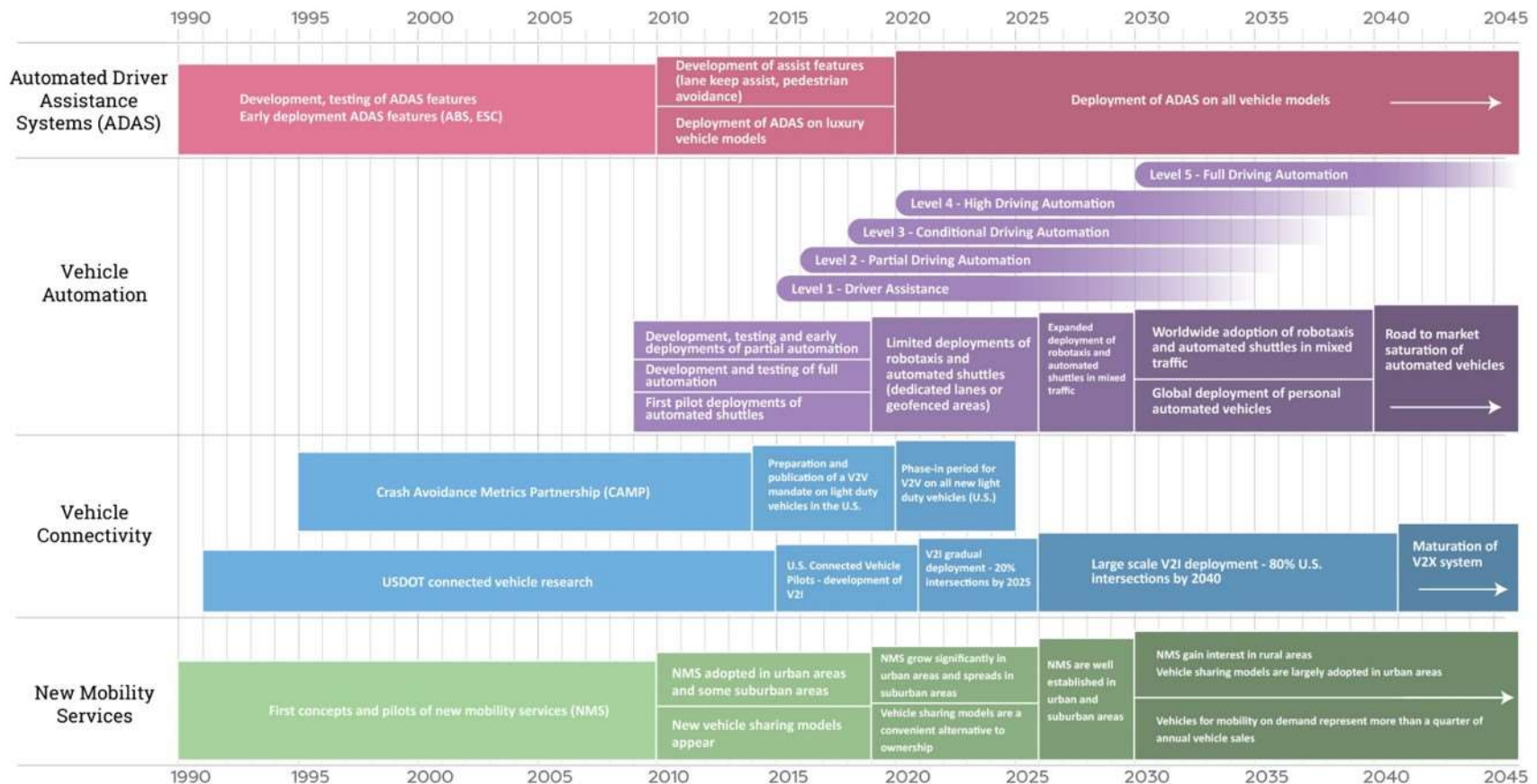
- includes internet access and typically, one or more wireless local area network(s), to access devices inside and outside the vehicle

■ New Mobility Services

- carsharing, ridehailing, ridesharing, microtransit, mobility-as-a-service

Source: Center for Automotive Research

Emerging Technology Roadmap



Source: Center for Automotive Research

***Aside from Legislative Advocacy, How
Participate in the Development
Can the Aftermarket Influence Emerging
of Vehicle Standards!
Technologies?***



The progress of innovation requires a balance between collaboration and competition. Standards provide a foundation to achieve this balance and help enable new technologies.

European Telecommunications Standards Institute (ETSI)



***We Ask the Aftermarket to Speak as
One Voice to Tell Us What You Want,
Not What You Don't Want!***

Alliance of Automobile Manufacturers & Global Automakers



***So Who's Working to Ensure the
Aftermarket's Requirements Are
Reflected in International Standards?***



An International Coalition of Associations & Standards Developing Organizations



Technical Benefits in Standardization

Safety and reliability – Adherence to standards helps ensure safety, reliability and environmental care. Users perceive standardized products and services as more dependable, this in turn raises user confidence, increasing sales and the take-up of new technologies.

Support of government policies and legislation – Standards are frequently referenced by regulators and legislators for protecting user and business interests, and to support government policies.

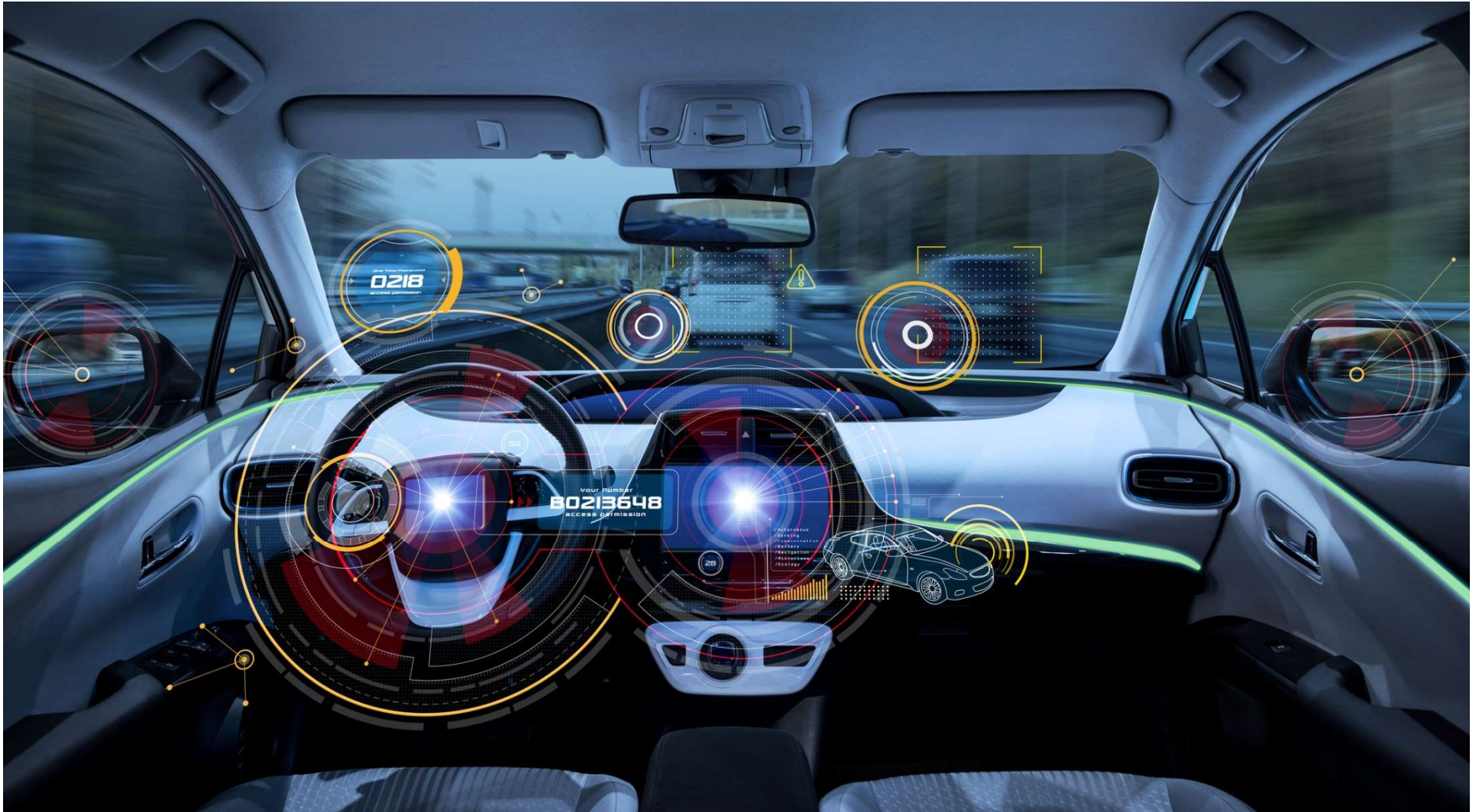
Interoperability – the ability of devices to work together relies on products and services complying with standards.

Business Benefits in Standardization

Standardization provides a solid foundation upon which to develop new technologies and to enhance existing practices. Specifically standards:

- Open up market access
- Provide economies of scale
- Encourage innovation
- Increase awareness of technical developments and initiatives

Consumer choice - standards provide the foundation for new features and options, thus contributing to the enhancement of our daily lives. Mass production based on standards provides a greater variety of accessible products to consumers.



Vehicle Connectivity

How Connectivity-Enabled Services Can Impact Aftermarket Productivity and Efficiency

- **Manufacturers**
 - Part fault and early wear-out information
 - Earlier and more precise geolocation demand statistics
- **Retailers/Distributors**
 - Refine assortment planning operations
 - Optimize geographic stocking locations
- **Service Providers**
 - Predictive maintenance, prognostics & remote diagnosis
 - Coordinate JIT hot-truck delivery with ad hoc service



***Which Standards Developing
Organizations (SDO) are Responsible
for Defining Transportation
Communication Standards?***





Standardization of information, communication and control systems in the field of urban and rural surface transportation, including intermodal and multimodal aspects thereof, traveller information, traffic management, public transport, commercial transport, emergency services and commercial services in the intelligent transport systems (ITS) field.



Responsible for managing the preparation of standards in the field of Intelligent Transport Systems (ITS) in Europe. It serves as a platform for European stakeholder to exchange knowledge, information, best practices and experiences in ITS.

New CEN / ISO WIP

ISO 21177, *Intelligent transport systems — ITS-station security services for secure session establishment and authentication between trusted devices*

ISO 21184, *Intelligent transport systems — Management of messages containing information of sensor and control networks specified in data dictionaries*

ISO 21185, *Intelligent transport systems — Communication profiles for secure connections between trusted devices*

Standardized Secure Access to Sensor and Control Networks

The ISO 21217 ITS station architecture standard is designed around the system requirement to be able to establish trusted communications internal to and between ITS-Ss.

While establishment of trust for some information dissemination services such as broadcast of CAMs, DENMs, and BSMs is well-understood and standardized, to date there are no standardized means to establish trust internal to an ITS-SU or in sessions between ITS-SUs.

CEN/ISO TS 21177 fills this gap!

Sensor and Control Networks (SCN)

Sensors and actuators as typically available in sensor and control networks are essential for ITS and autonomous vehicles.

SCNs can be located...

- at the roadside, referred to as *Infrastructure / Roadside Networks* (IRN)
- in vehicles, referred to as *In-Vehicle Networks* (IVN),
- In others applications

CEN/ISO TS 21184 specifies means for building and maintaining “universal” databases for message exchange!

Applications and Hybrid Communications

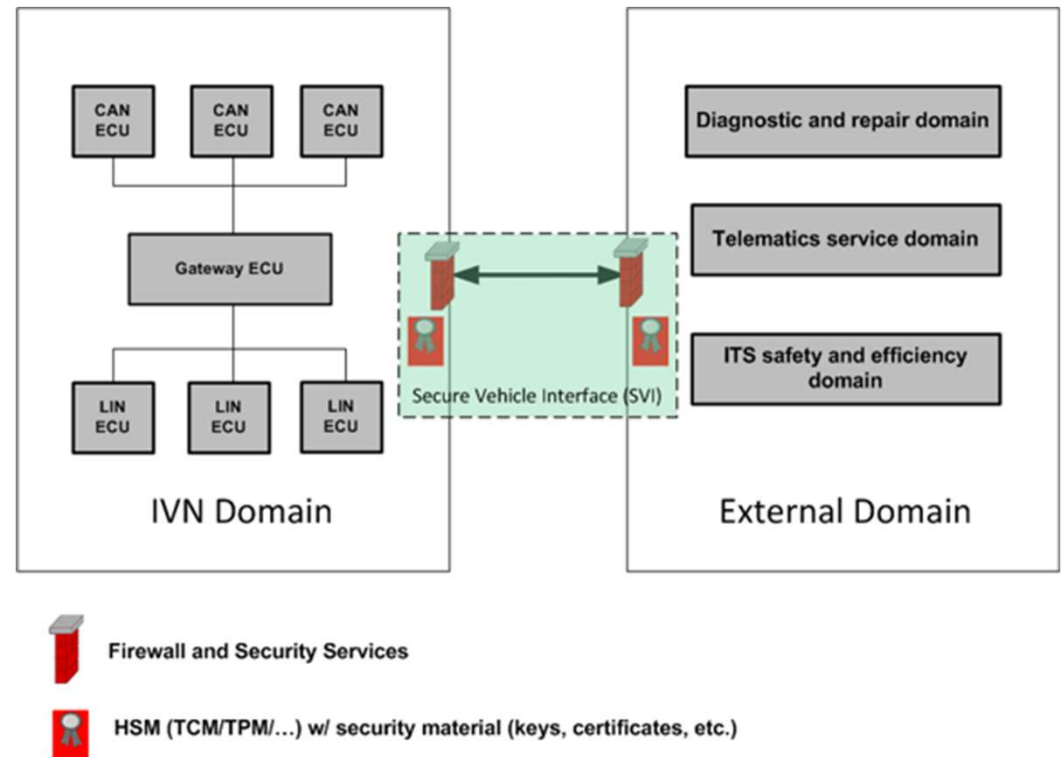
EN ISO 17423 and ISO 24102-6 standardize means for making applications agnostic to any particular communication profile along with the means for managing those profiles.

ITS-S application processes present their communication needs by means of functional requirements (which can include indication of a specific communication profile).

CEN/ISO TS 21185 specifies means for establishing communication profiles using the methodology standardized in EN/ISO 17423!

SVI = In-Vehicle Trusted ITS Station

- SVI is an interface between internal vehicle networks (IVN) and external devices, networks, and applications, enabling secure information exchange between the two.
- A single firewall protects wired and wireless connections.
- Identity and access are managed using standardized internet techniques (PKI & digital certificates).
- **SVI refers to the collection of 20+ international standards defined by ISO, SAE, IEEE, CEN, DIN, etc.**



Existing Foundational Standards

Note: the following documents refer to SVI as the Vehicle Station Gateway (VSG)

ISO 7498-1, <i>Information processing systems; Open Systems Interconnection; basis reference model</i>	ISO 22901 (all parts), <i>Road vehicles — Open Diagnostic data eXchange (ODX)</i>	SAE J2186, <i>E/E Data Link Security</i>
ISO 13184-2, <i>Intelligent transport systems (ITS) — Guidance protocol via personal ITS station for advisory safety systems — Part 2: Road guidance protocol (RGP) requirements and specification</i>	ISO/IEC 10731:1994, <i>Information technology — Open Systems Interconnection — Basic Reference Model — Conventions for the definition of OSI services</i>	VG 95287 (all parts), <i>Design of testable products</i>
ISO 13185-2, <i>Intelligent transport systems (ITS) — Vehicle interface for provisioning and support of ITS services — Part 2: Unified gateway protocol (UGP) requirements and specification for vehicle-ITS-station gateway (V-ITS-SG) interface</i>	ISO 27145 (all parts), <i>Road vehicles — Implementation of WWH-OBD communication requirements</i>	VG 95916 (all parts), <i>Electrical Systems for Land Vehicles</i>
ISO 13209 (all parts), <i>Road vehicles — Open Test sequence eXchange (OTX)</i>	DIN EN 61508, <i>Functional safety of electrical / electronic / programmable electronic safetyrelated systems</i>	SAE J2186, <i>E/E Data Link Security</i>
ISO 13400-4, <i>Road vehicles — Diagnostic communication over Internet Protocol (DoIP) — Part 4: Ethernet-based high-speed data link connector</i>	SAE J1930-DA, <i>Digital Annex of Electrical/Electronic Systems Diagnostic Terms, Definitions, Abbreviations, and Acronyms</i>	VG 95287 (all parts), <i>Design of testable products</i>
ISO 14229 (all parts), <i>Road vehicles — Unified diagnostic services (UDS)</i>	SAE J1979-DA, <i>Digital Annex of E/E Diagnostic Test Modes</i>	VG 95916 (all parts), <i>Electrical Systems for Land Vehicles</i>
ISO 15031-3, <i>Road vehicles — Communication between vehicle and external equipment for emissions-related diagnostics — Part 3: Diagnostic connector and related electrical circuits: Specification and use</i>	SAE J2012-DA, <i>Digital Annex of Diagnostic Trouble Code Definitions</i>	

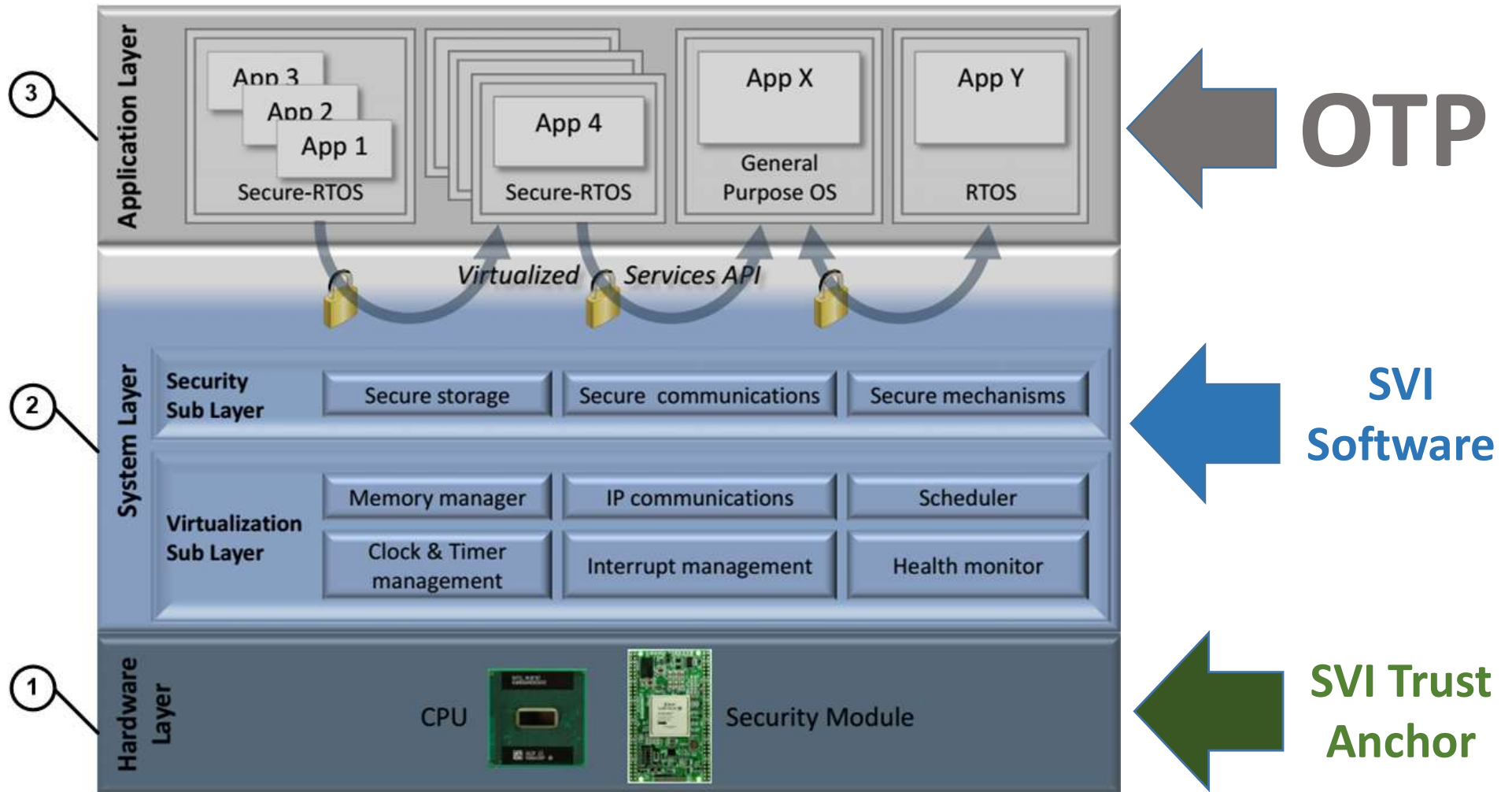
References Courtesy of Concepts & Services Consulting

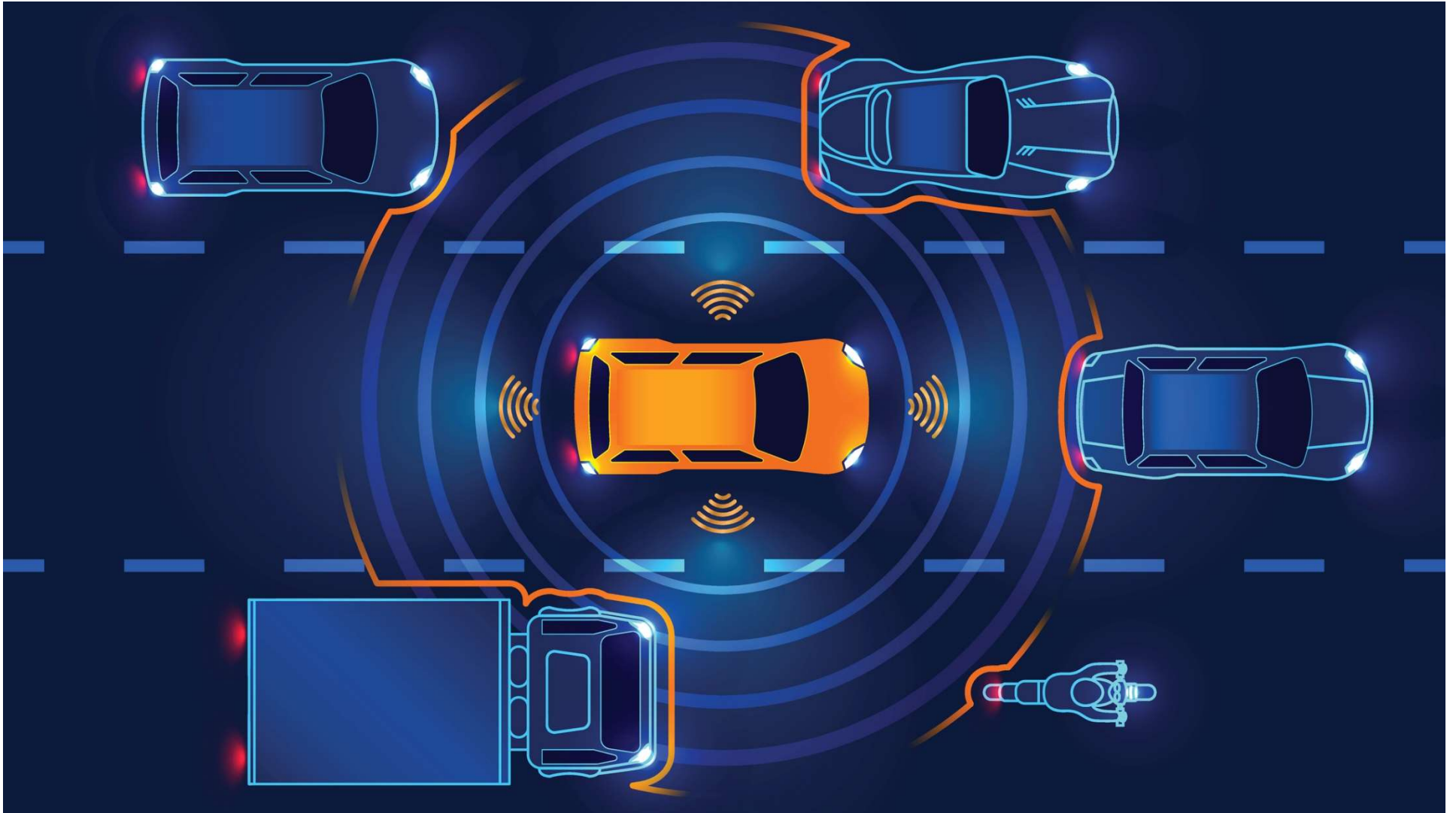
SVI Supports Vehicle Application Layers

Example: The Open Telematics Platform offers...

- the ability to securely download (open source) applications to your vehicle
- the creation of a new market for vehicle independent automotive applications
- a basis for new services and products
- the hosting of applications with security issues inside of the vehicle
- a faster, cheaper and easier development of innovative automotive applications

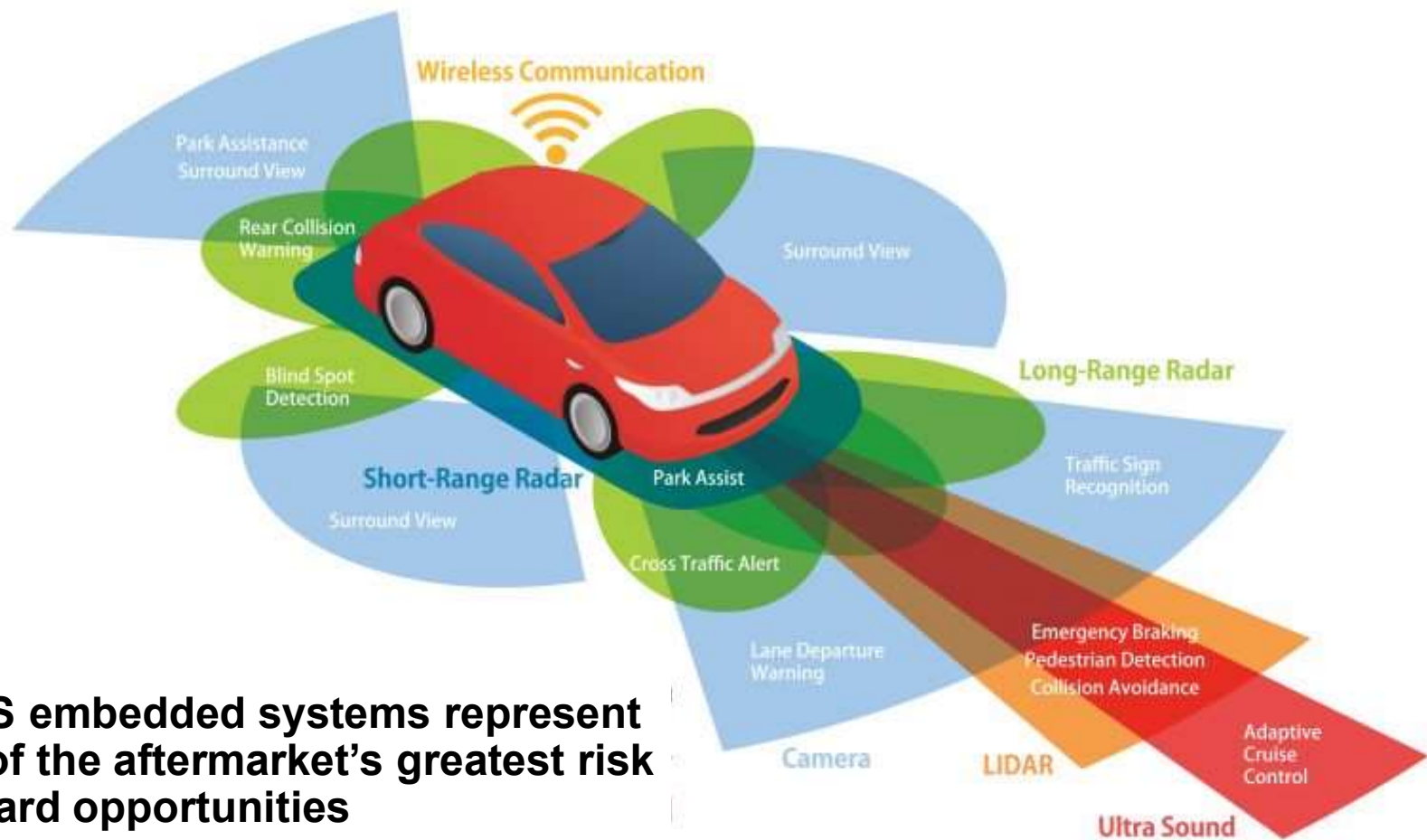
SVI & OTP Application Layer





Automated Driver Assistance Systems

ADAS Systems Maintenance & Repair



ADAS embedded systems represent one of the aftermarket's greatest risk / reward opportunities

Impact on Shops

- Locate and acquire accurate repair and maintenance information
- Investment – ADAS service requires ~\$20K of specialty tools and equipment
- Bay space – calibration of some ADAS sensors requires significantly more space around the vehicle than most shops can accommodate
- Consumer ‘Sticker Shock’ – the price of a wheel alignment can be an order of magnitude more expensive than a non-equipped if the manufacturer prescribes sensor recalibration with an alignment
- Training – training technicians to professionally maintain any brand of vehicle will be time consuming and expensive

Potential Approach to Standardization

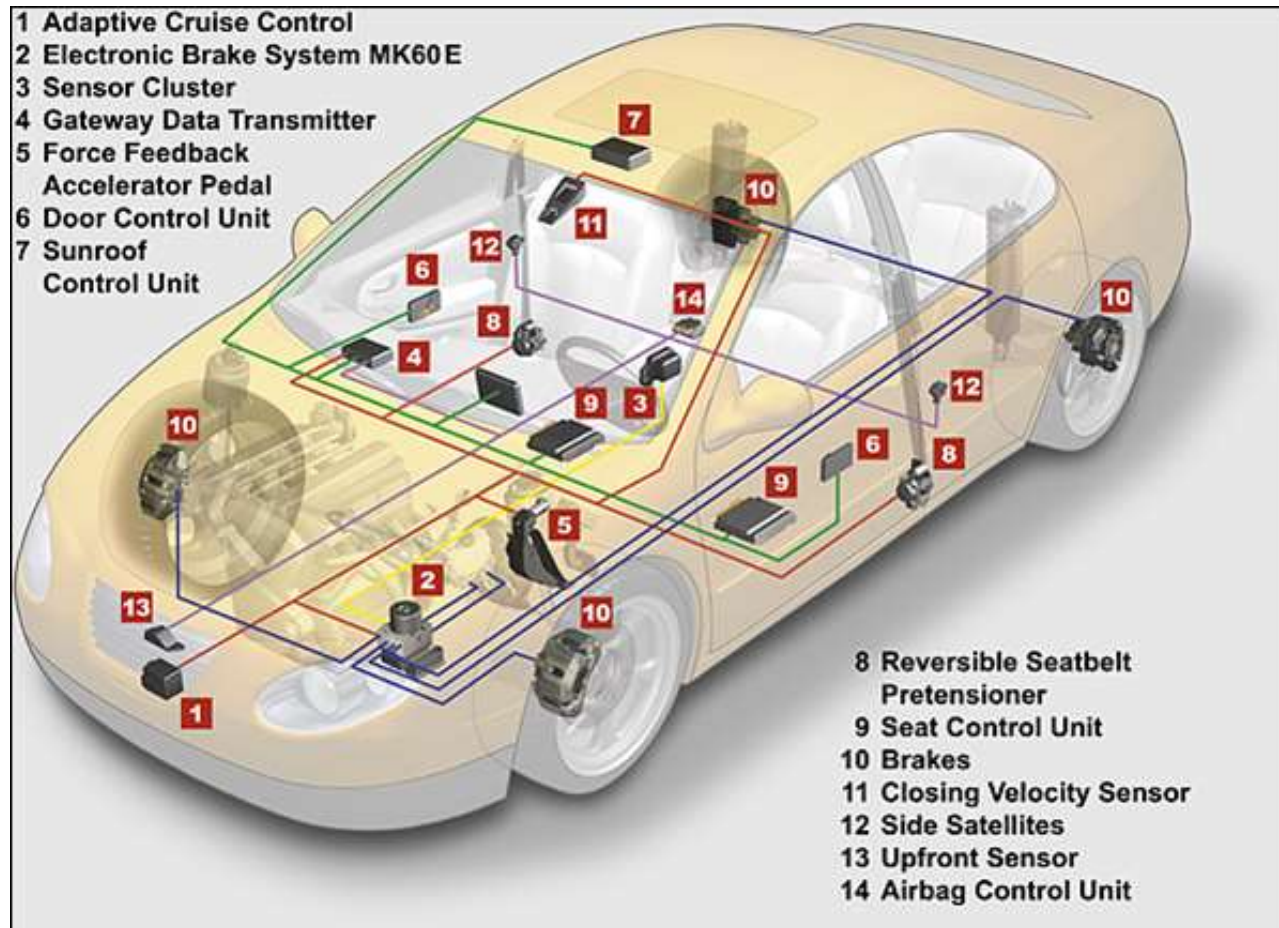
- Develop a standardized maintenance process framework flexible enough to accommodate all vehicle manufacturers
- Framework would include generic descriptions of the information categories and content required to perform the maintenance process
- OE dealers and aftermarket shops should perform the identical processes
- Process certification could be identical but managed separately

ADAS Embedded Systems

Aftermarket Manufacturers Struggle with OE Strategy

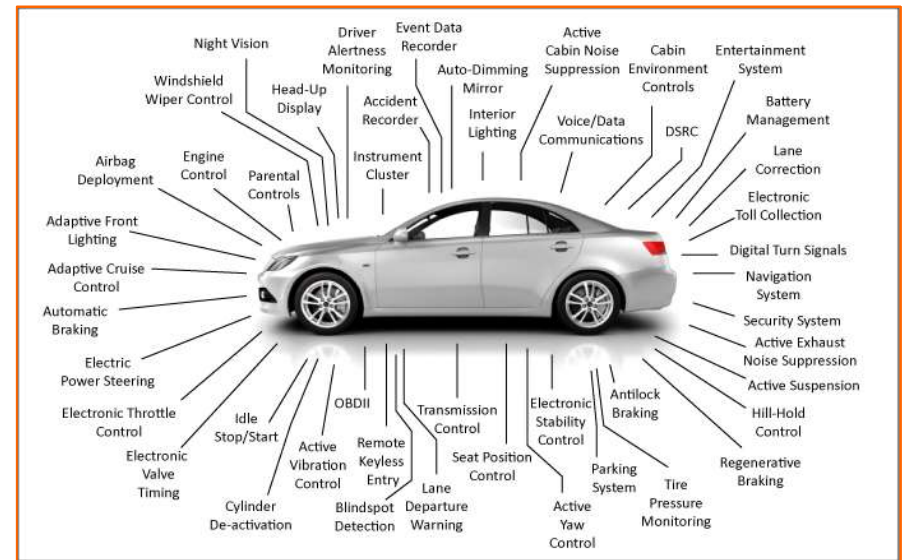


System Components



Aftermarket Manufacturer Perception

- A lack of OEM / Aftermarket collaboration regarding embedded systems
 - may negatively impact vehicle owners
 - stifles innovation
 - restricts part availability
 - limit the ability to correct design failure modes
- Dealer only parts may result in:
 - fewer service options, resulting in revenue and/or margin loss for independent repair facilities
 - Increased total cost of vehicle ownership
 - Decreased vehicle service life
 - Loss of vehicle component ownership
- Recent trends are moving away from a customer-centric market



Potential Approach to Standardization

- OEM and Aftermarket collaborate to define criteria for a standardized trusted partner program
- Trusted partner would be granted access to device functions and features, but not software IP
- The vehicle owner could receive a software license implicit with the vehicle title
- Agree to fair use/copyright exemption for remanufacture and repair, not to modify the software



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