

Automotive and Mobility

Taxonomy, Technology and Business Models

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 @tschersich

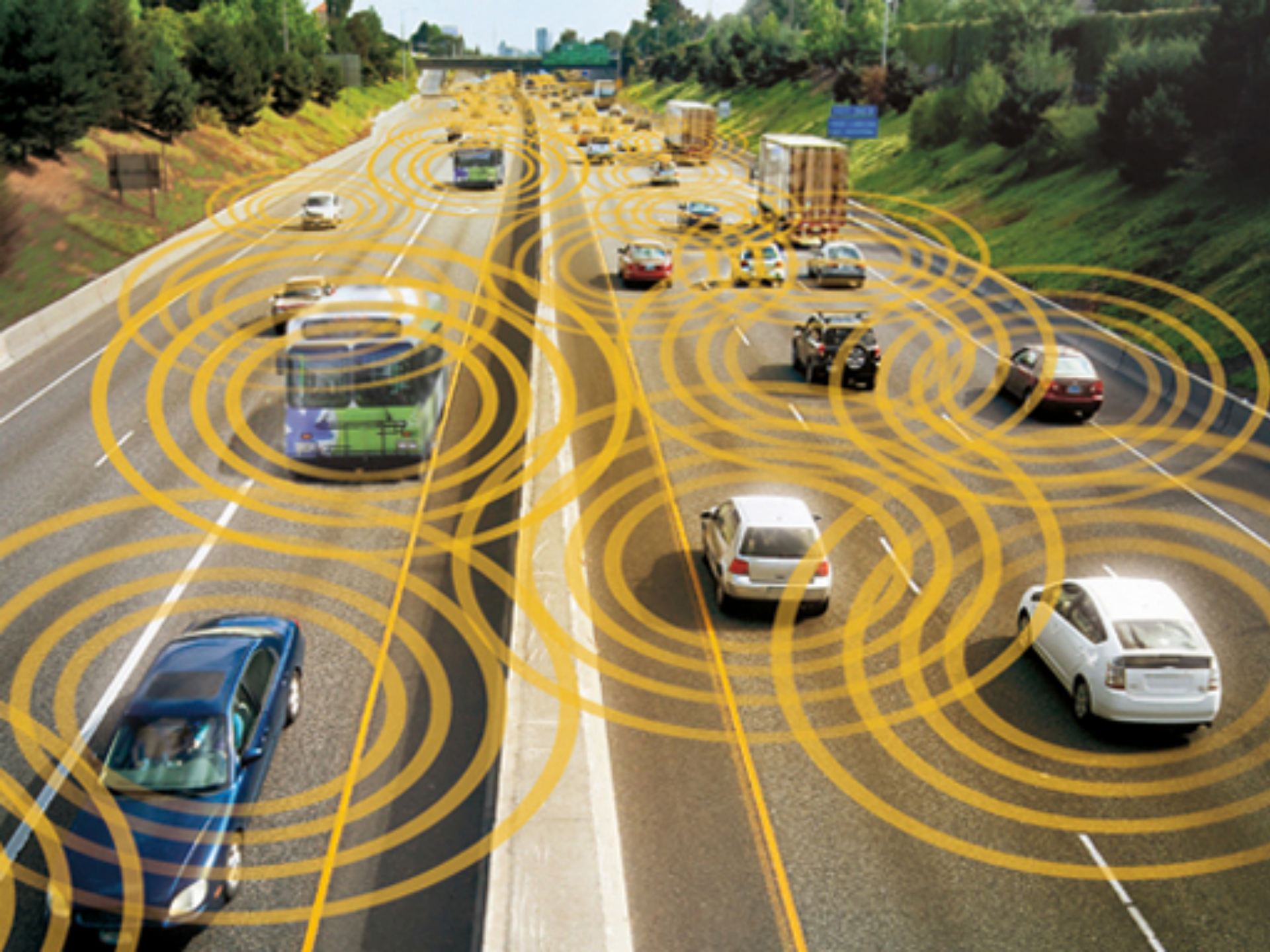
Chair of Mobile Business & Multilateral Security

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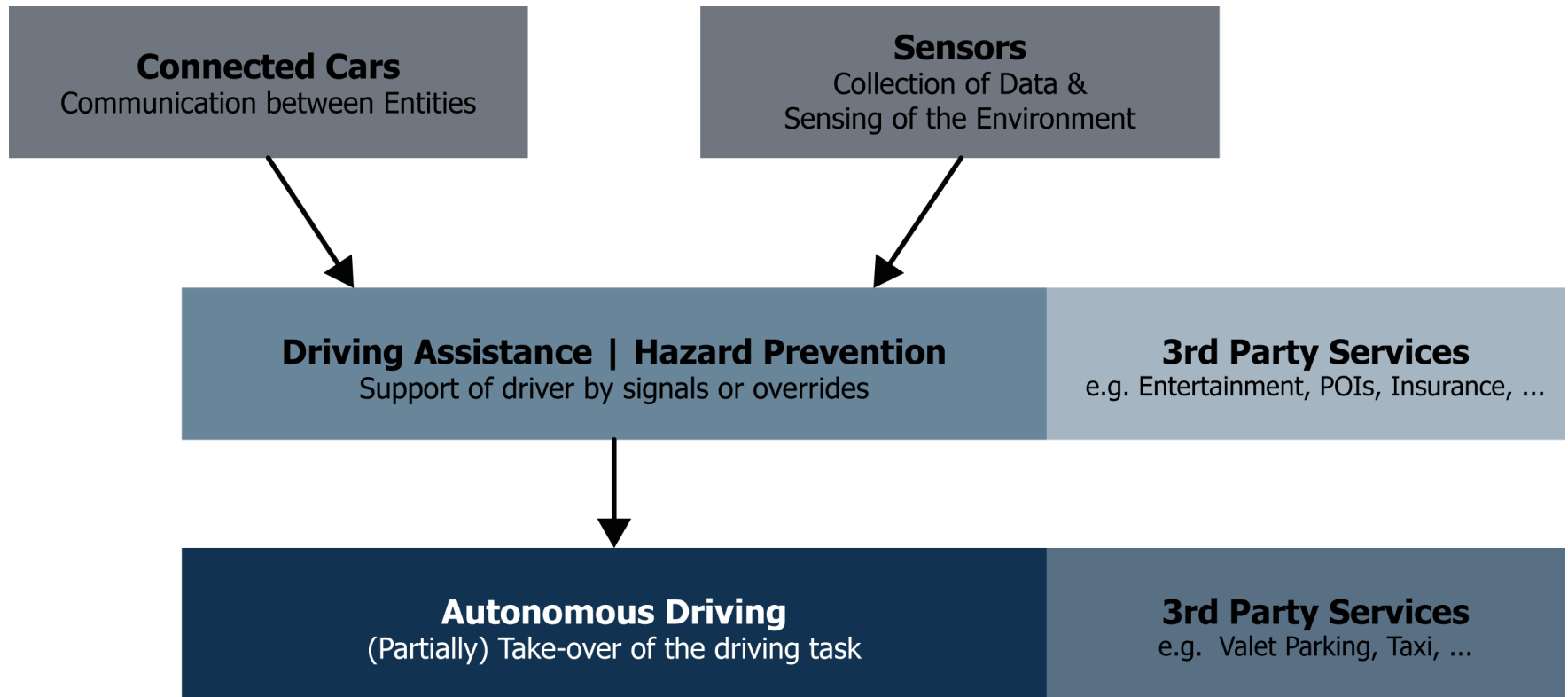




- 1 Terminology
- 2 Connected Cars
- 3 Autonomous Driving
- 4 Business Models

Big field of Connected Cars

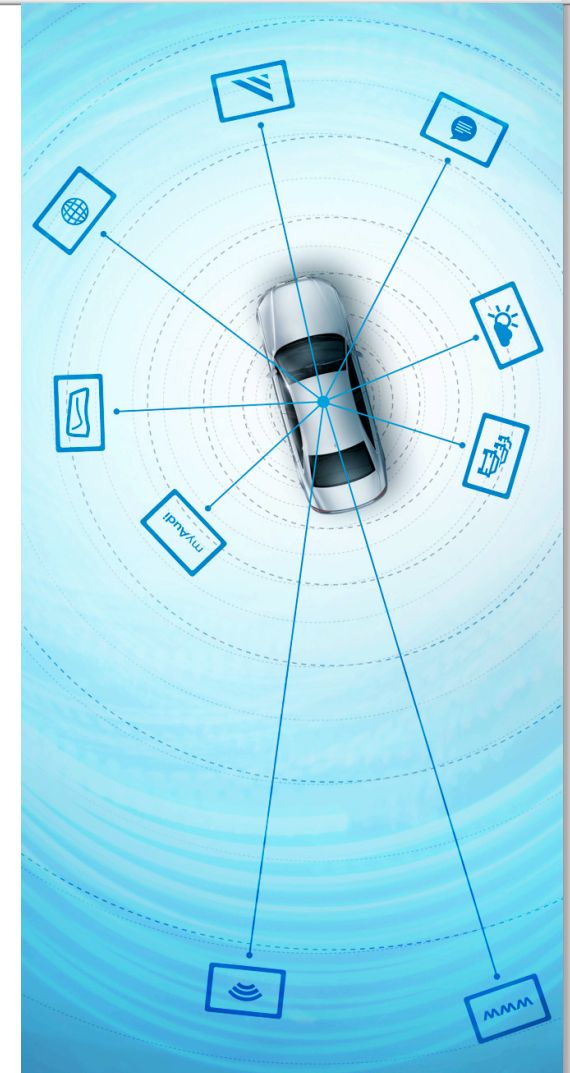




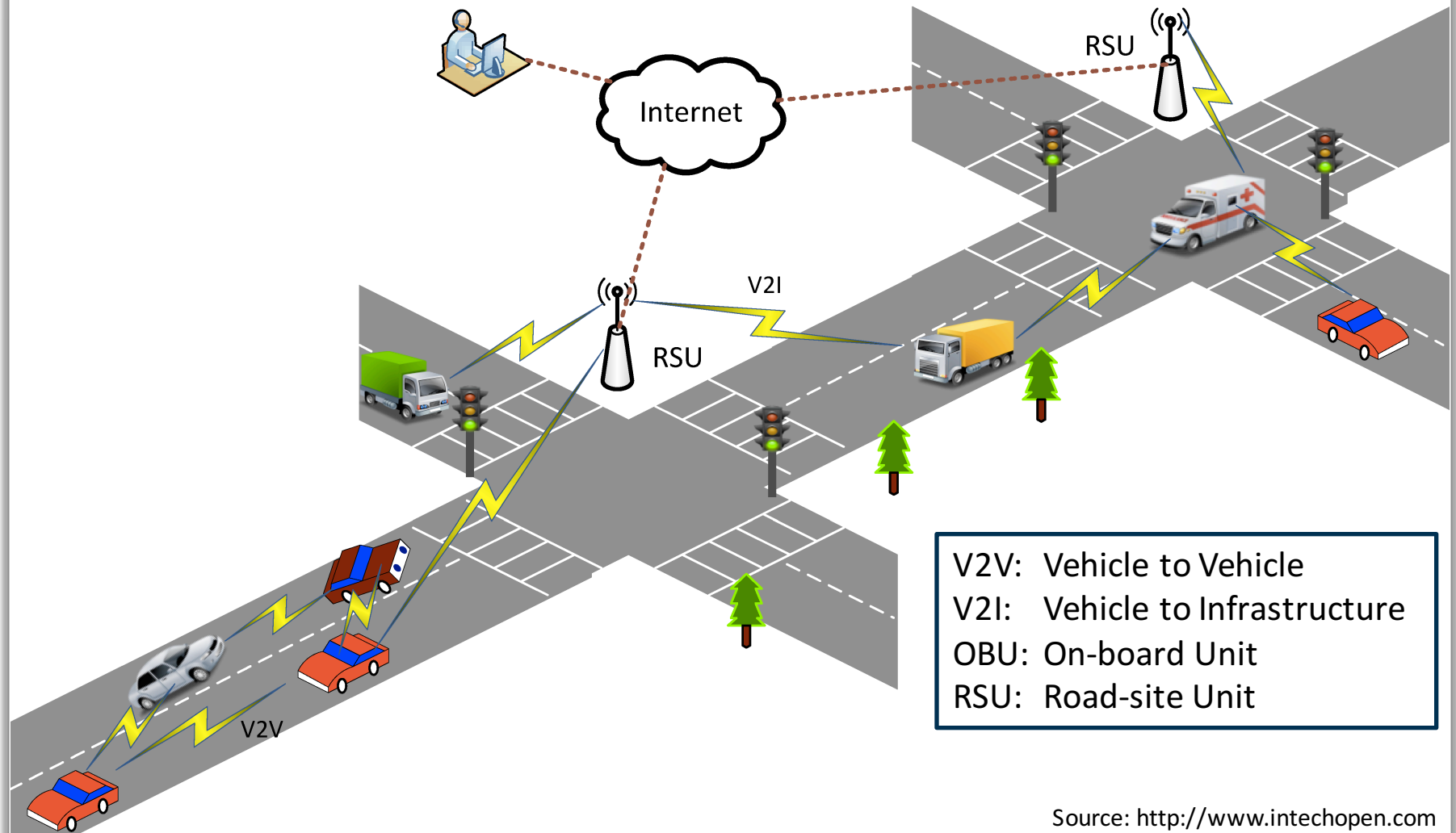
Connected Car

The presence of devices in an automobile that connect the devices to other devices within the car/vehicles and or devices, networks and services outside the car.

Source: www.autoconnectedcar.com



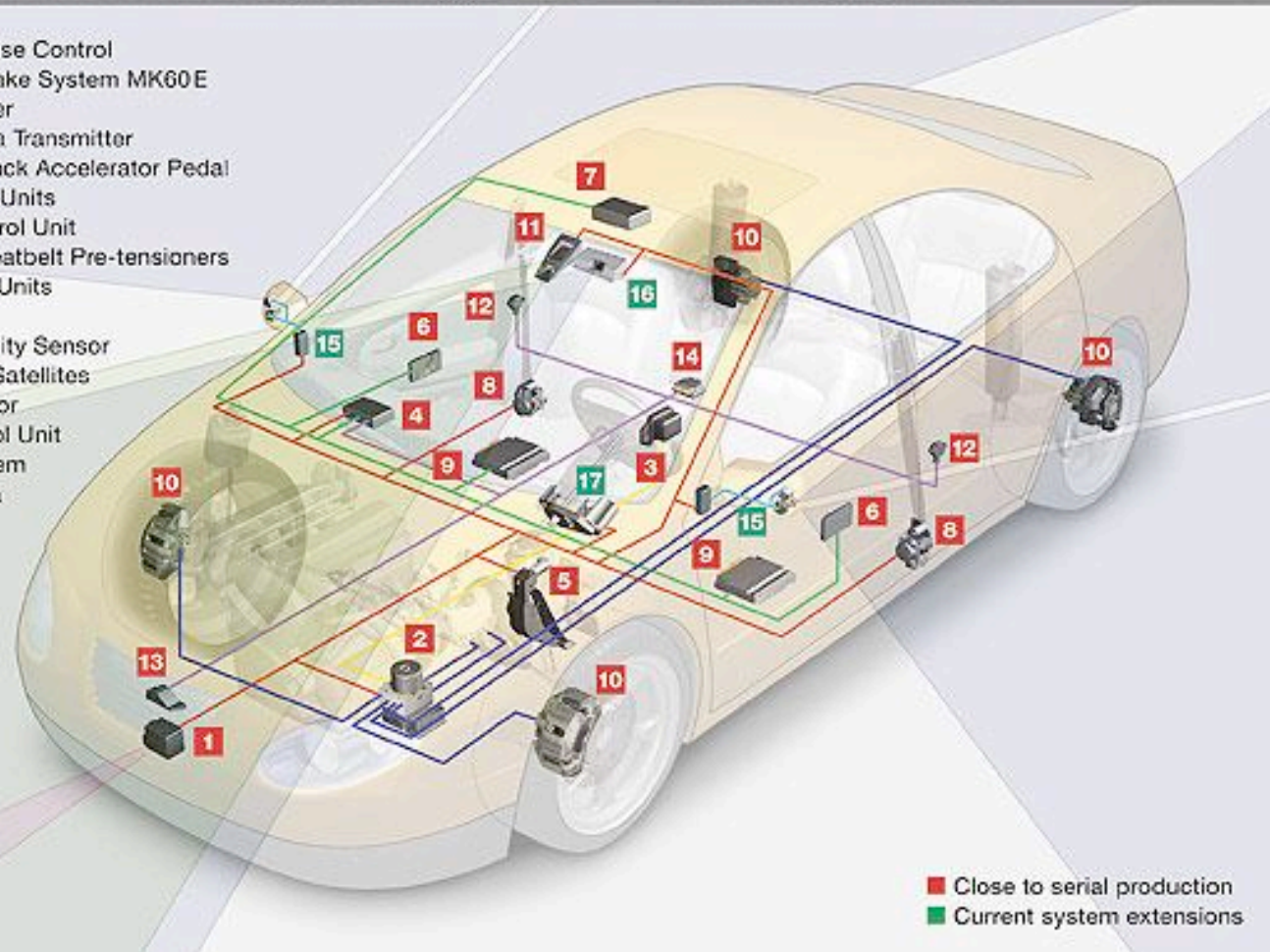
Connected Car Communication & Infrastructure



Source: <http://www.intechopen.com>

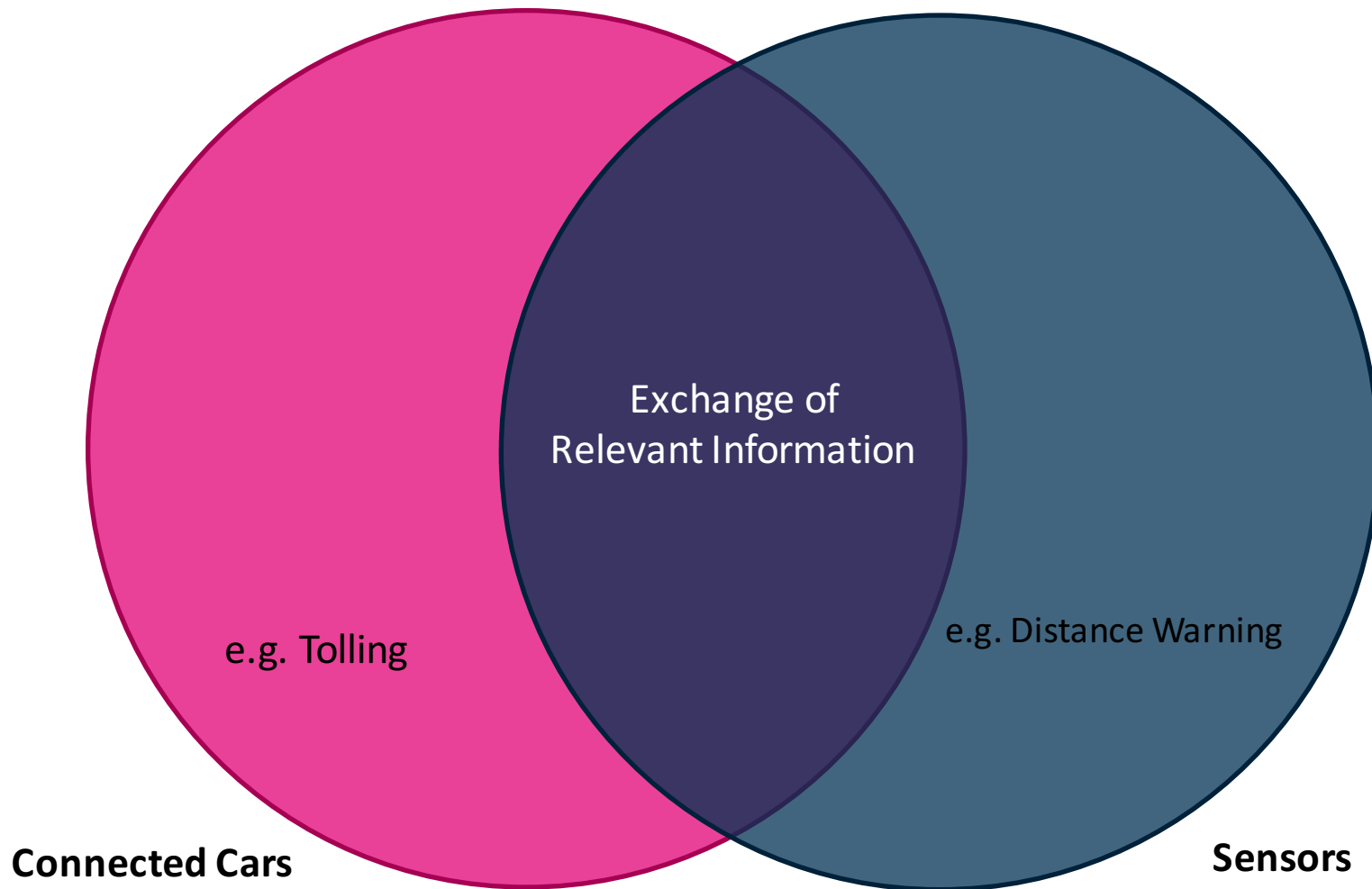
APIA – Active Passive Integration Approach – Networking Systems

- 1 Adaptive Cruise Control
- 2 Electronic Brake System MK60E
- 3 Sensor Cluster
- 4 Gateway Data Transmitter
- 5 Force Feedback Accelerator Pedal
- 6 Door Control Units
- 7 Sunroof Control Unit
- 8 Reversible Seatbelt Pre-tensioners
- 9 Seat Control Units
- 10 Brakes
- 11 Closing Velocity Sensor
- 12 Side Impact Satellites
- 13 Upfront Sensor
- 14 Airbag Control Unit
- 15 Camera System
- 16 Front Camera System
- 17 Electronically Controlled Steering















Source: autonews.com, Continental

Driving Assistance | Hazard Prevention



Demand from ...


Navigation	
Safety	 
Convenience	
Electronic Tolling	
EV Services	  
Infotainment	
Insurance	 
Fleet Management	

 Pervasive	 Customers	 Government
 High Growth	 Car OEMs	 3rd Parties

Mercedes connect me

carl.benz@daimler.com
Ausloggen

Willkommen zu
Mercedes connect me!



S-CO 205

Wartung
Wrench icon

Türverriegelung
ZU
Car icon

Reise
55%
Gauge icon

Standheizung
AN
Fan icon

MB Apps-Konfiguration
Grid icon

+

Wartung

Gute Fahrt!*

* Im Moment liegen keine Fehlermeldungen vor

Details

Bis Service noch **33 Tage**

Wartung

* Im Moment liegen keine Fehlermeldungen vor

Details

Kühlmittel	Ok	Thermometer icon
Wischwasser	Ok	Wiper icon
Bremsen		Brake icon
Bremsbelag	Ok	Brake icon
Bremsflüssigkeit	Ok	Brake icon
Ladezustand	Ok	Battery icon
Reservebatterie	Ok	Battery icon
Generator	Ok	Battery icon
Motor	Ok	Motor icon
Reifendruck	Ok	Tire icon
Vorne links	2,5 bar	Tire icon
Vorne rechts	2,5 bar	Tire icon
Hinten links	2,5 bar	Tire icon
Hinten rechts	2,4 bar	Tire icon

Bis Service noch **33 Tage**

Connected Car Volkswagen's connected Watch



Sensors used for Driver Assistance

Audi A6

Driver assistance systems

01/11



Audi

Front camera:

- Audi active lane assist
- ACC stop&go
- Speed limit display
- Audi pre sense / front / plus
- Audi adaptive light with continuous headlight range control

Ultrasonic sensors at side:

- Park assist

Rear camera:

- Parking system plus with reversing camera
- Park assist with reversing camera

Ultrasonic sensors at rear:

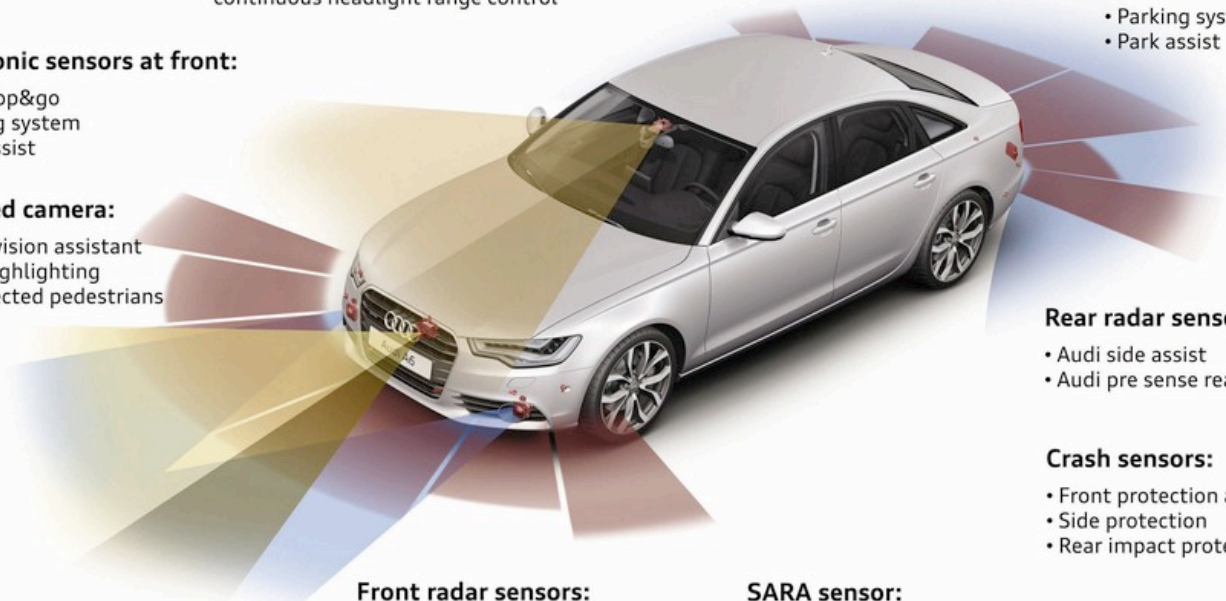
- Parking system
- Park assist

Ultrasonic sensors at front:

- ACC stop&go
- Parking system
- Park assist

Infrared camera:

- Night vision assistant with highlighting of detected pedestrians



Front radar sensors:

- ACC stop&go
- Audi pre sense / front / plus

SARA sensor:

- ESP
- Audi pre sense basic

Rear radar sensors:

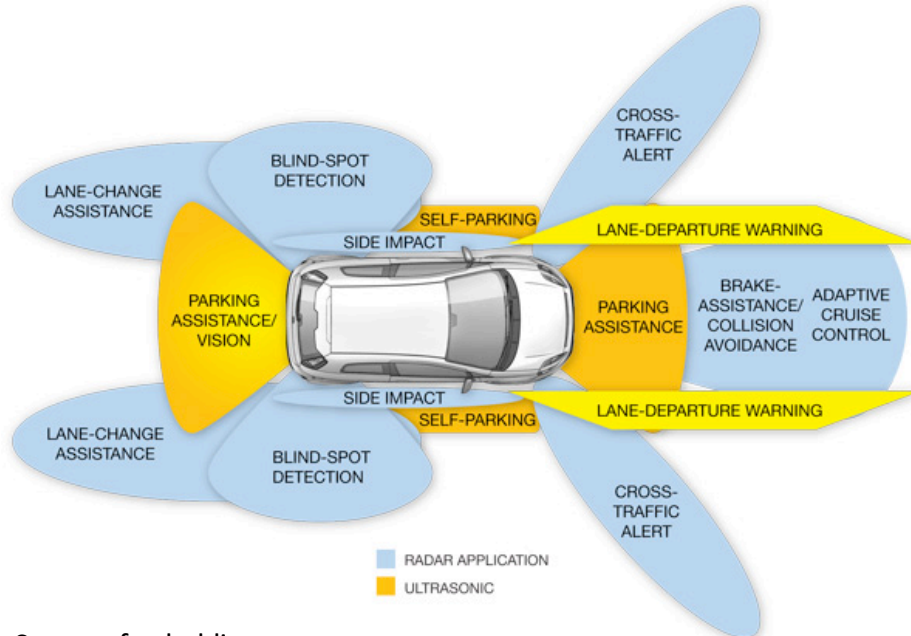
- Audi side assist
- Audi pre sense rear / plus

Crash sensors:

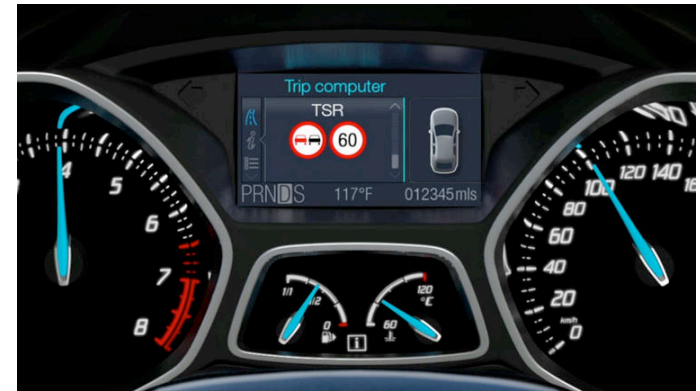
- Front protection adaptivity
- Side protection
- Rear impact protection

Source: Audi AG

Driver Assistance Awareness based on Sensors



Source: fordaddict.com



Driving Assistance & Hazard Protection

Basic Set of Applications

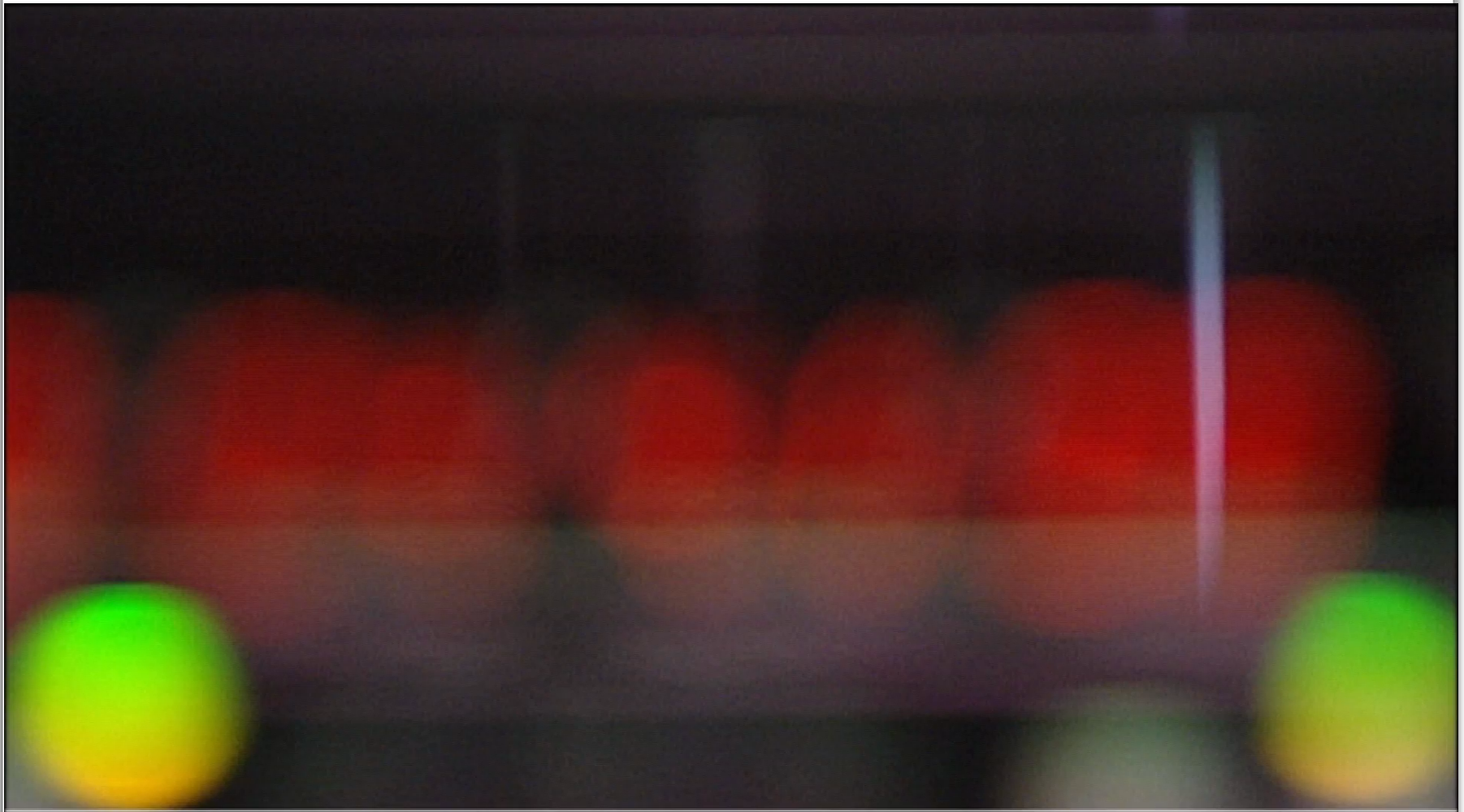
Application Class	Application
Active road safety	Driving assistance – Co-operative awareness
	Driving assistance – Road Hazard Warning
Cooperative traffic efficiency	Speed Management
	Co-operative navigation
Cooperative local services	Location based services
Global internet services	Communities services
	ITS station life cycle management

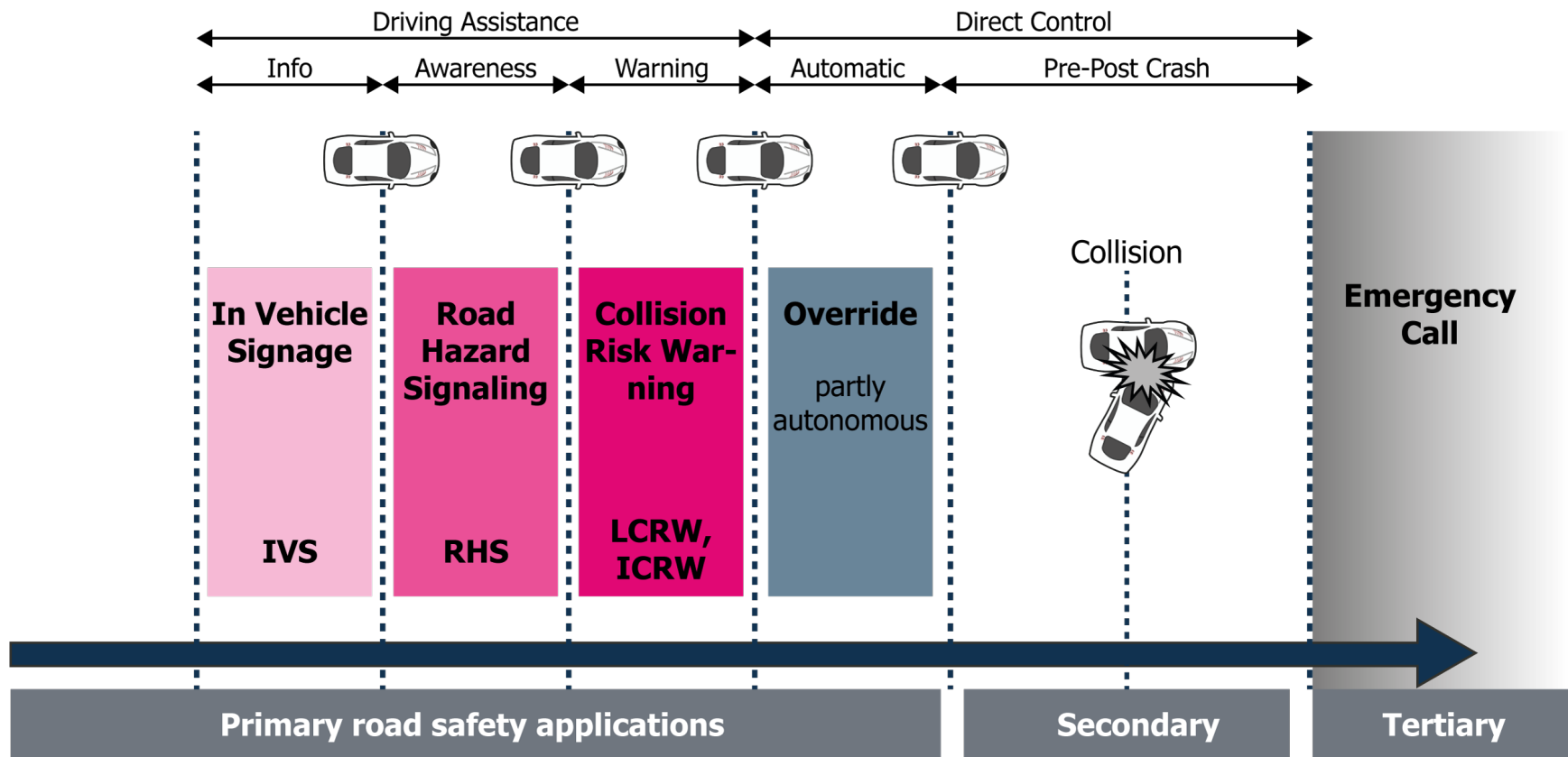
Driving Assistance & Hazard Protection Applications and Use Cases

Application Clases	Application	Use case
Active road safety	Driving assistance - Co-operative awareness	Emergency vehicle warning
		Slow vehicle indication
		Intersection collision warning
		Motorcycle approaching indication
	Driving assistance - Road Hazard Warning	Emergency electronic brake lights
		Wrong way driving warning
		Stationary vehivle - accident
		Stationary vehicle - vehicle problem
		Traffic condition warning
		Signal violation warning
		Roadwork warning
		Collision risk warning
		Decentralized floating car data - Hazardous location
		Decentralized floating car data - Precipitations
		Decentralized floating car data - Road adhesion
		Decentralized floating car data - Visibility
		Decentralized floating car data - Wind
Cooperative traffic efficiency	Speed management	Regulatory / contextual speed limits notification
		Traffic light optimal speed advisory
	Co-operative navigation	Traffic information and recommended itinerary
		Enhanced route guidance and navigation
		Limited access warning and detour notification
		In-vehicle signage
Co-operative local services	Location based services	Point of Interest notification
		Automatic access control and parking management
		ITS local electronic commerce
		Media downloading
Global internet services	Communities services	Insurance and financial services
		Fleet management
		Loading zone management
	ITS station life cycle management	Vehicle software / data provisioning and update
		Vehicle and RSU data calibration

Driving Assistance & Hazard Protection

Use Cases for Hazard Protection







Public

Regulation, EU, Government

Safety and Security, Sustainability, i2010 (Safety and Clean), eSafety (Reduce road deaths)

3Ps

**Road Toll/Road Operator
Web-Companies**

Building Wireless Communication Infrastructure, e.g. Google Wifi-Hotspots in street lights.

Private

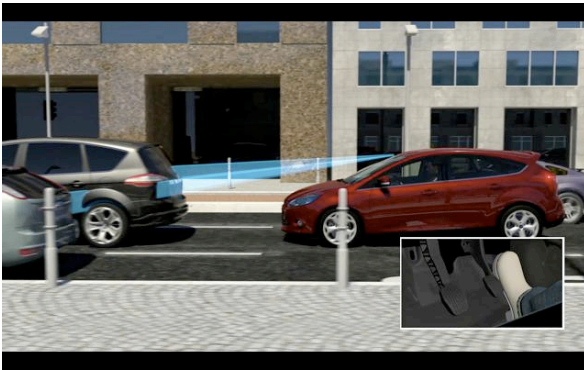
Car Manufactures

Development, Construction and Production of OBUs (e.g. Continental)

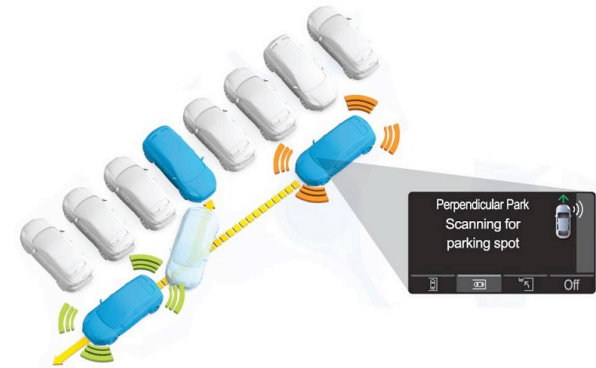
Insurance Companies

Road behaviour (Time, Brake, Acceleration), Acquisition of customers, risk-based insurance premium (e.g. Norwich Union 2005; Kilometer, rush hour)

Partly Autonomous Systems Override for Hazard Protection



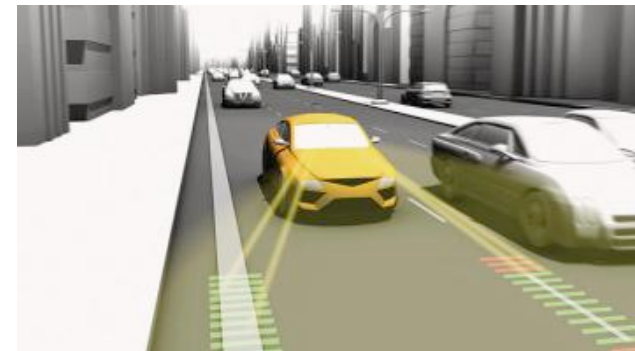
Active City Stop



Park Assistant



Automatic Speed Control



Lane Assistant

Source: Ford Ltd.

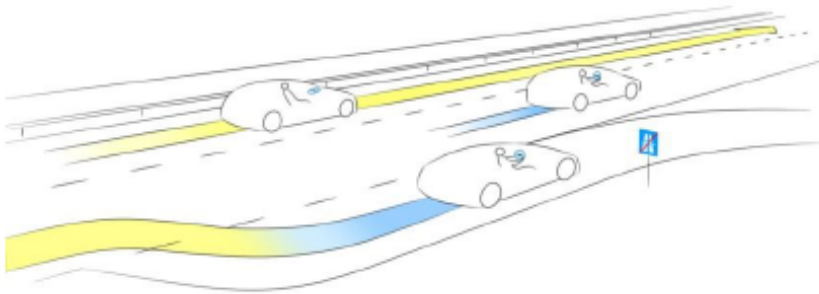
Autonomous Driving

- Auto (gr. autòs) → selbst, persönlich, eigen
- Mobil (lat. mobilis) → beweglich
- Nomous (gr. nomòs) → human system, law set by the human
- Autonomous Driving wants to bring back lost autonomy.
- "Selbstbestimmung im Rahmen eines übergeordneten (Sitten-) Gesetzes" (Kant)

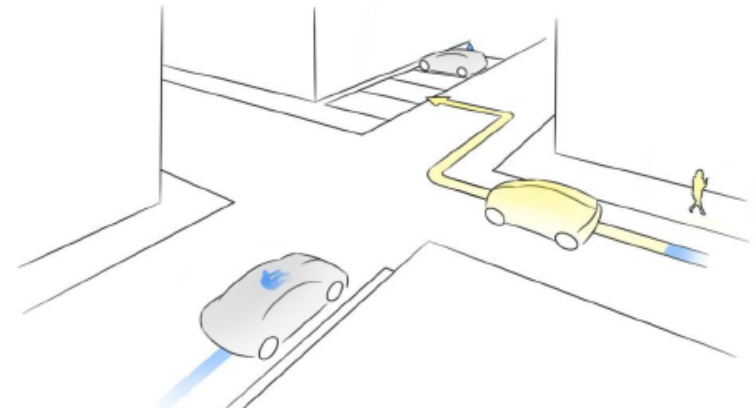
KNIGHT RIDER



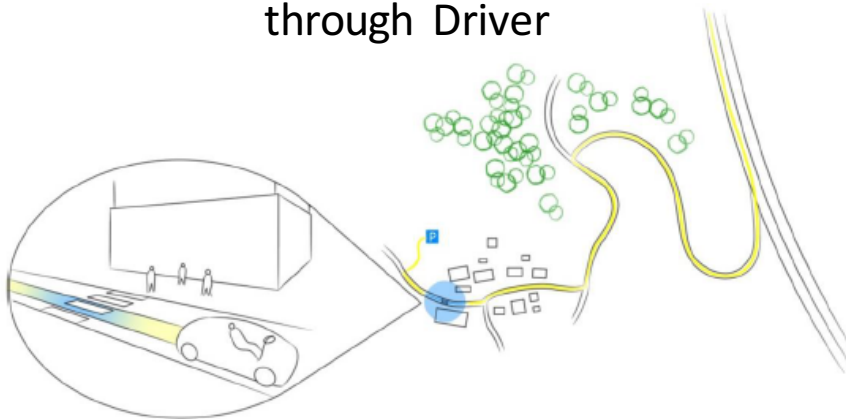
(1) Instant Pilot with Availability
through Driver



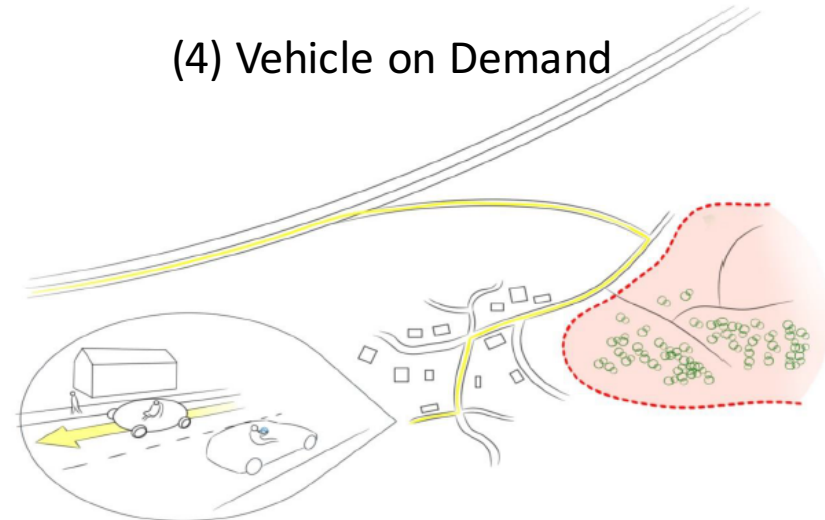
(2) Autonomous Valet Parking

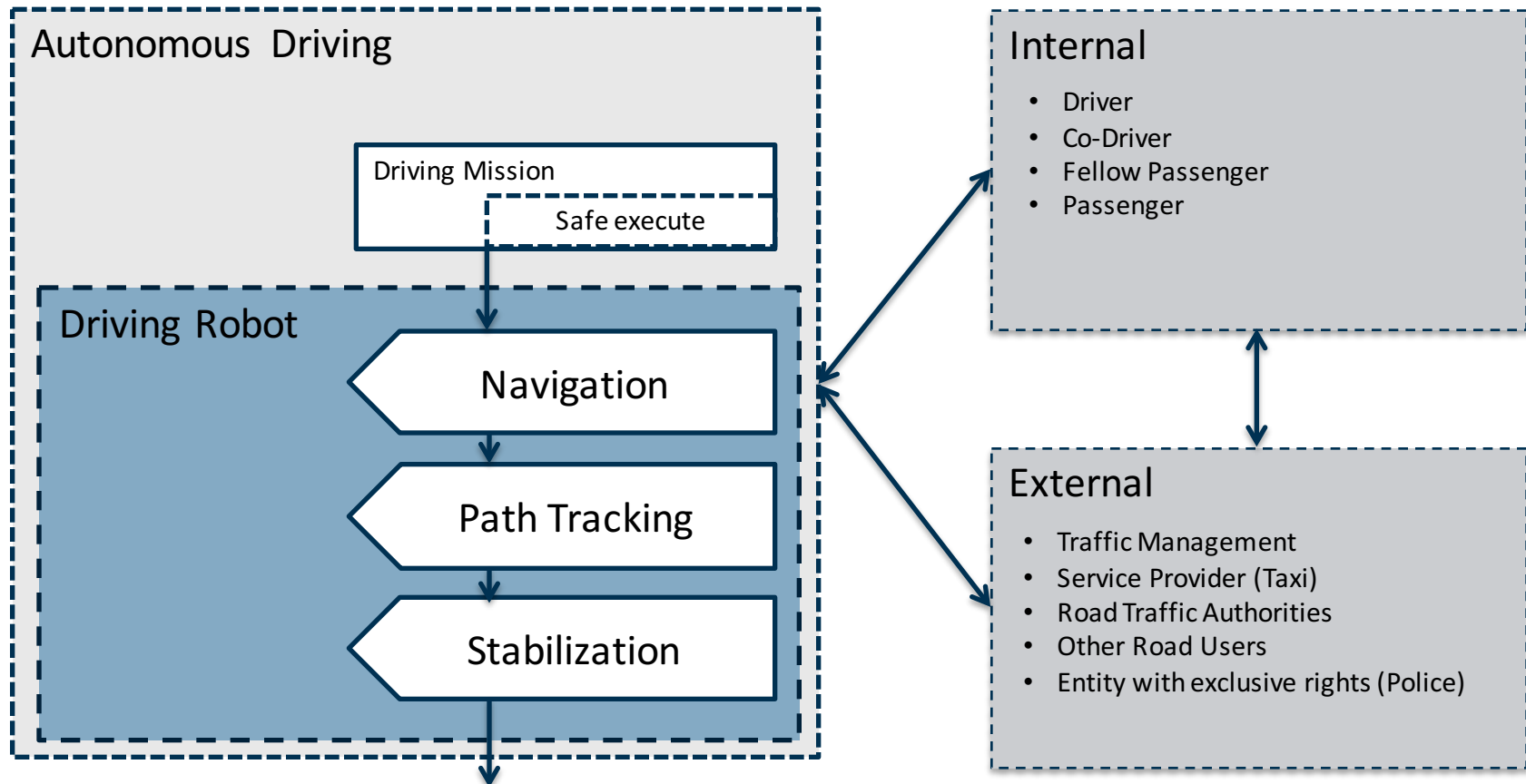


(3) Full Automat with Availability
through Driver

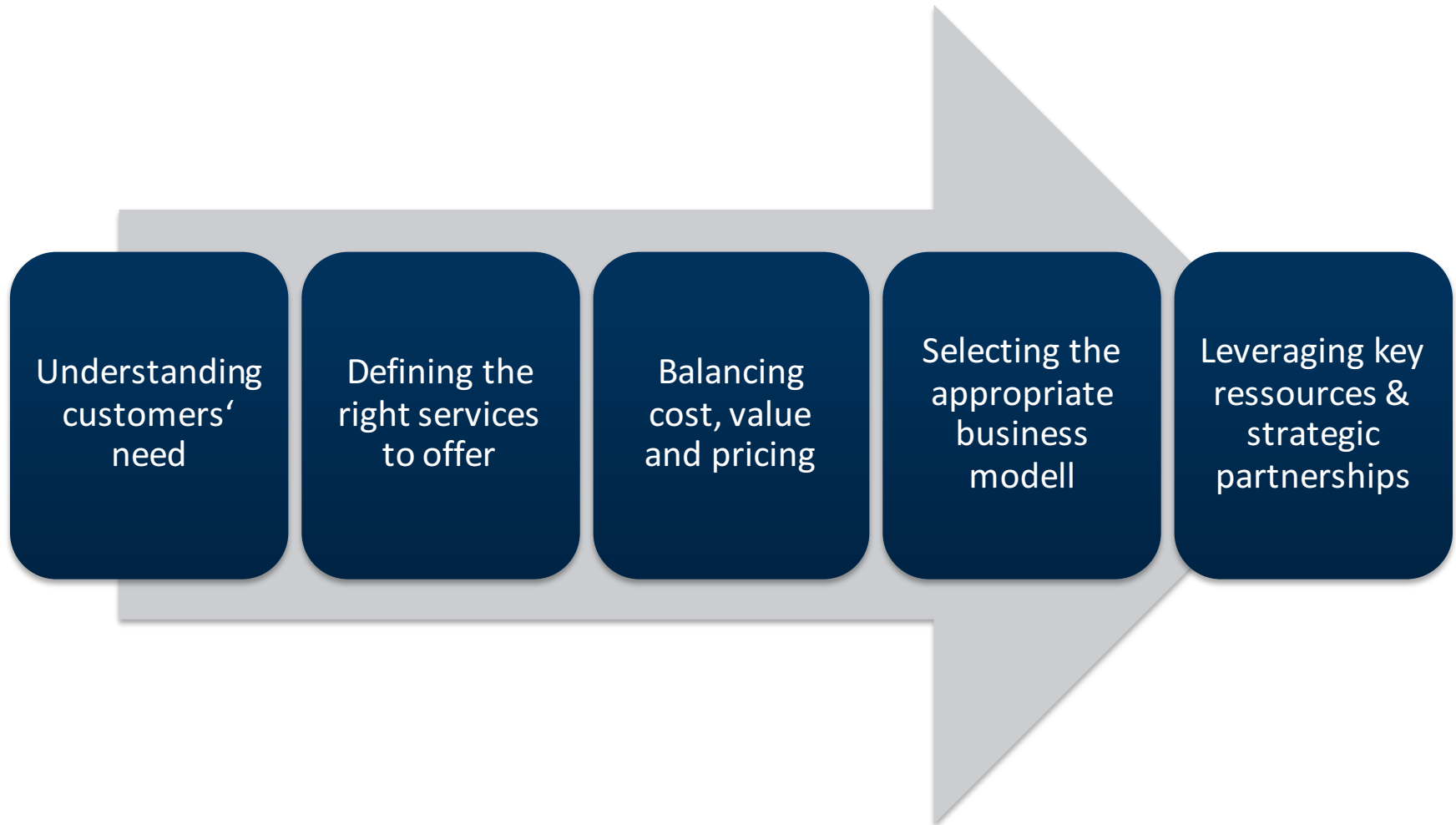


(4) Vehicle on Demand



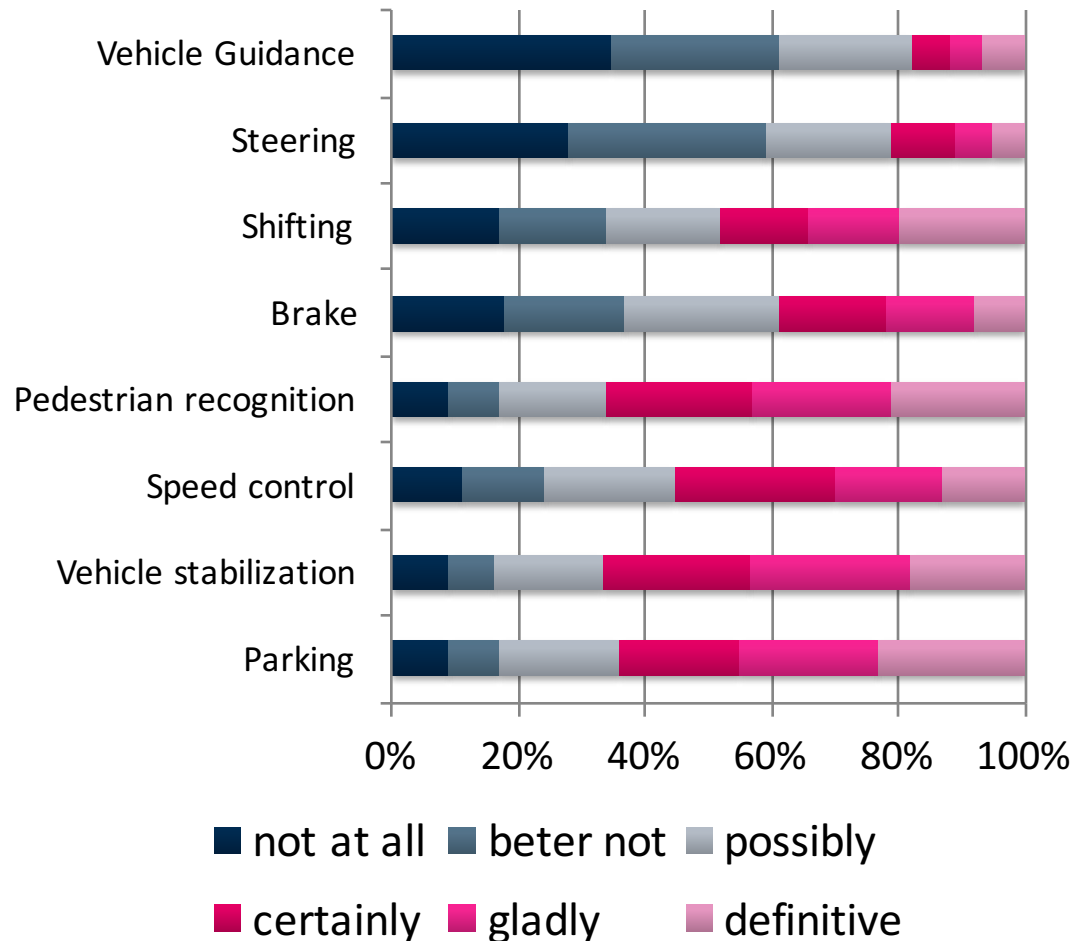


Defining the Value Proposition



Understanding Customers' Needs

- What customer profiles am I targeting?
- What are my customers' needs?
- What relationship do my customers want to establish with us?
- What user experience do I want to provide?



Source: Wolf 2015

- Most important services to to customer.
- Best interest of manufacturer.
- Best delivery to customers.
- External factors as drivers for demand

Market potential (im Bill. Euro)

	2015	2020
Driving Safety	12,18	47,34
Autonomous Driving	7,49	35,66
Entertainment	4,93	13,18
Mobility-Management	3,01	5,22
Well-being	2,13	7,13
Fleet-Management	2,12	6,67
Home-Integration	0,02	0,06

Source: PwC 2014

Balancing Value, Cost and Pricing

Costs

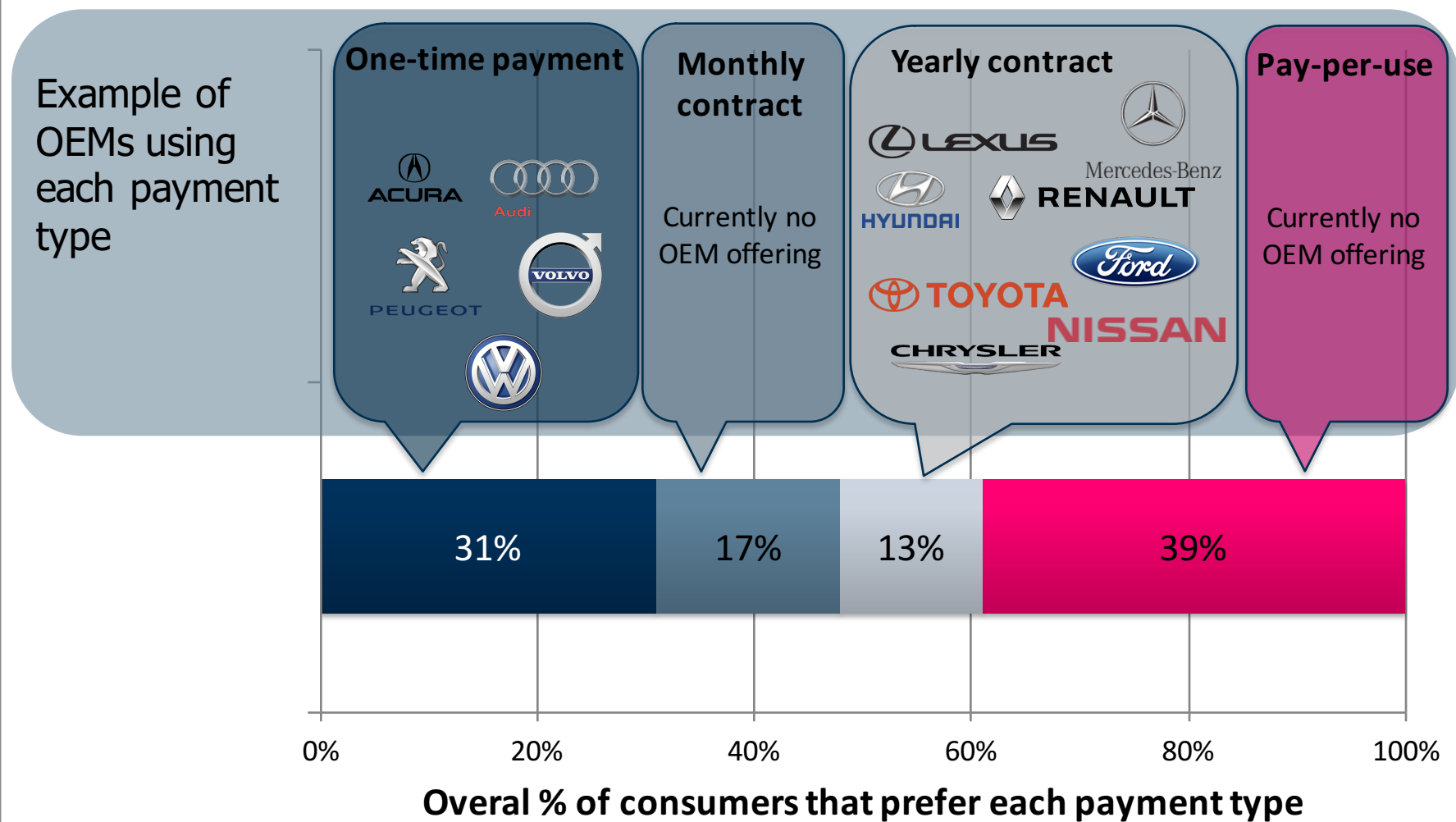
- Costs for providing services often distinct from perceived value by beneficiaries.
- Cost reduction by:
 - Additional beneficiaries for services (offset costs for specific service)
 - New multi-brand services, which increase the volumes (reduce service cost per customer)

Value

- Balancing the actual cost (and the pricing) of the services with the value created in the eye of the customer.
- Consumer value categories:
 - Convenience
 - Savings
 - Peace of Mind
 - Must haves
- E.g. eCall:
 - Perceived insufficient value for both sides
 - Hardware could be leveraged for other services

Business Models

Charging Models for Telematics



Source: SBD, 2011

Selecting Appropriate Models

Potential Revenue Streams

1. Consumer covers the service costs and the perceived value is equivalent to the service price (semi-regular basis).
2. Automaker builds price of service into the price of the car (no upfront costs).
3. Automaker subsidises a subset of services (where perceived value for the automaker is high).
4. Mixed revenue streams (from automakers, third-party players, advertisers, consumers) cover costs for service deployment.

Source: GSMA 2012

12.05.2015



Business Options for Services

Bundles subscription-based services:

- Upfront payment for lifetime services in the vehicle.
- Upfront payment for services valid through the first owner.
- Long-term subscription fees (annual or longer) for services, after an initial free trial period.

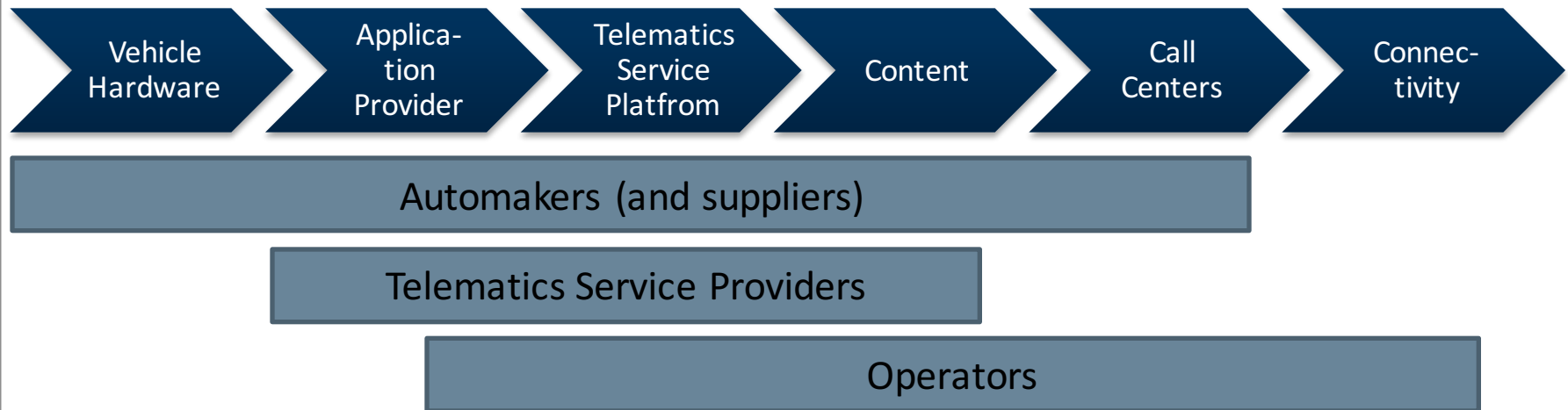
Incremental service subscription:

- Micropayments for single services, based upon one-time purchase of service or usage levels of service.
- Freemium solutions, where:
 - Basic services are provided at no cost, with the purchase of additional functionality.
 - Trial services are available for free, but after a certain time or amount of usage, the service has to be purchased.
 - Promotional offers.

Leveraging additional revenue streams:

- Target advertising:
 - Using location-based information.
 - Using personal data.
- Data sales:
 - Business to Business (e.g. traffic, insurance)
 - Automaker internal
- Cross subsidy:
 - Savings or potential increased revenue offsets the cost of the telematics service provision, generally across the automaker.

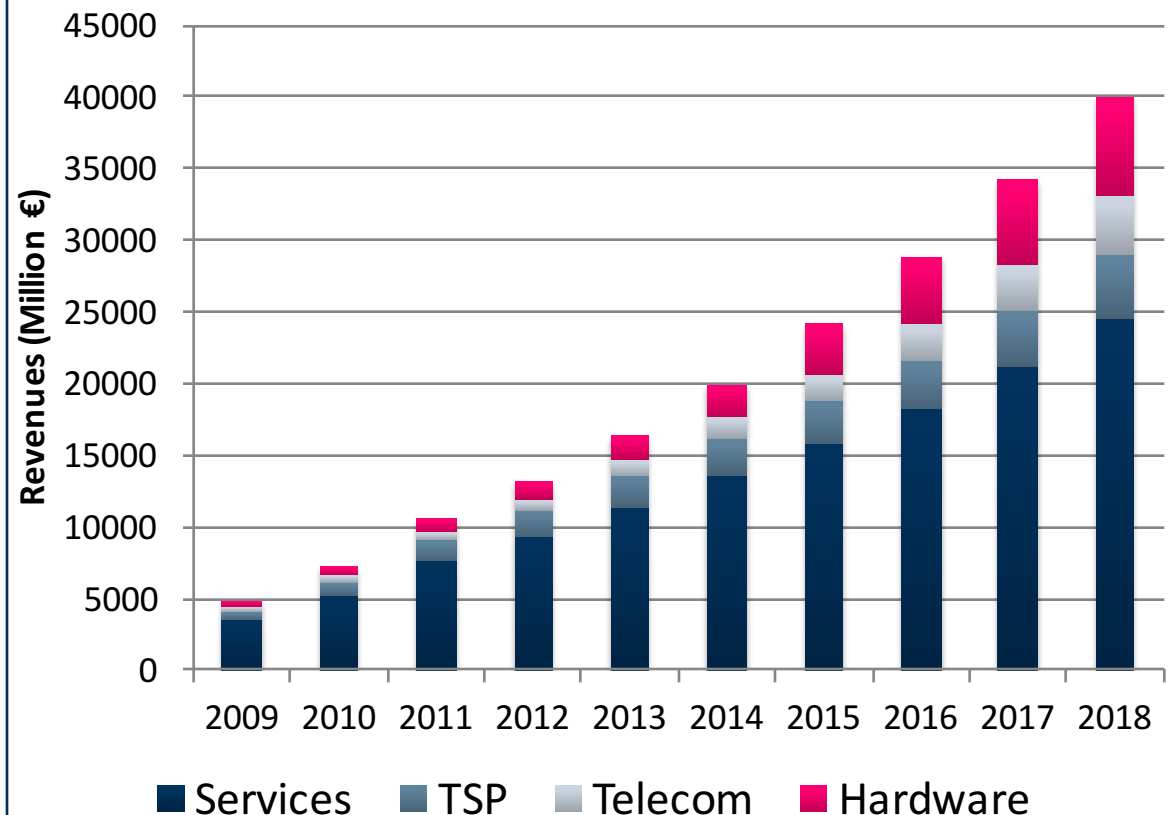
Source: GSMA 2012



Challenges

- Security and Privacy Issues
- Legal foundation for (partly) autonomous driving
- Ethical aspects

Revenue growth and opportunity forecast





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