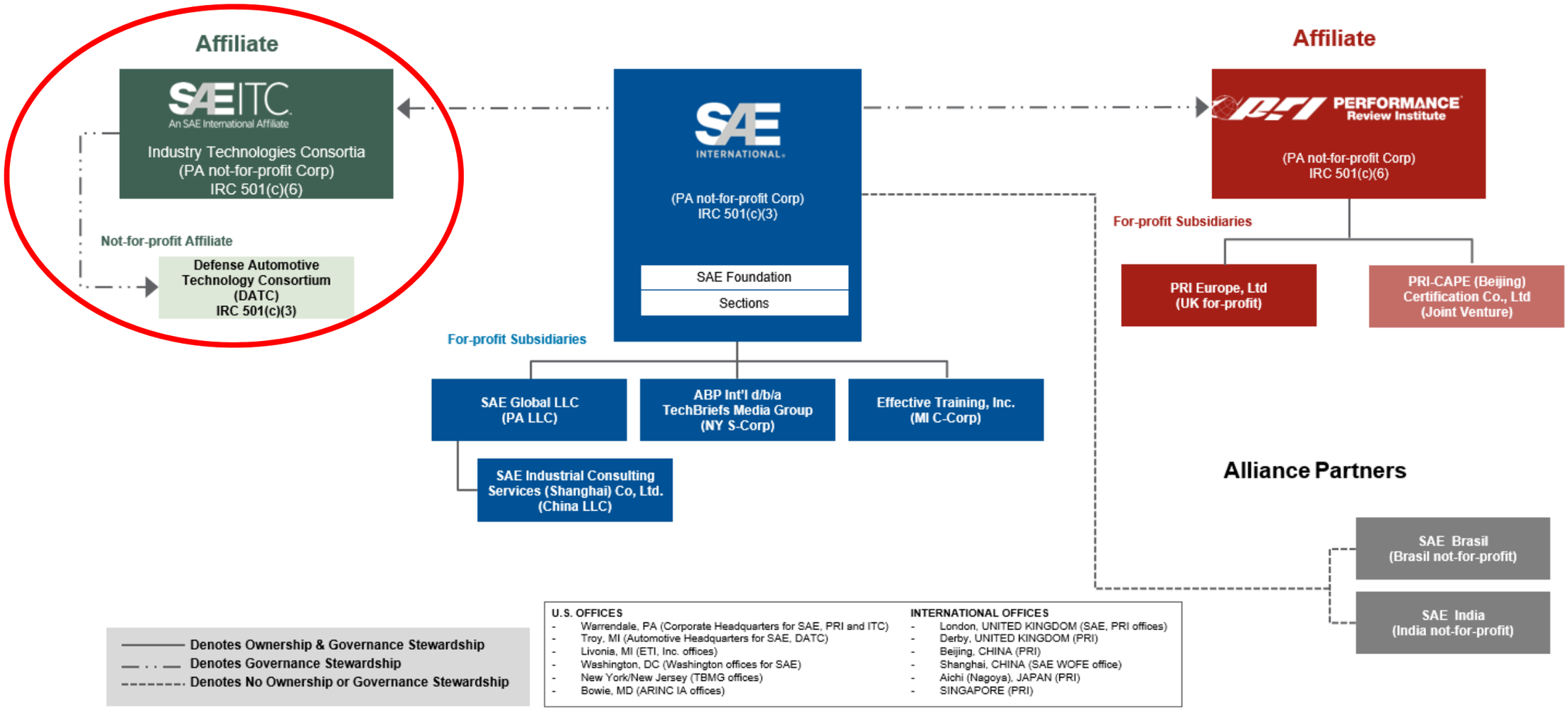
SAE GLOBAL GROUND VEHICLE STANDARDS

JACK POKRZYWA
jackp@sae.org

SAE International Structure



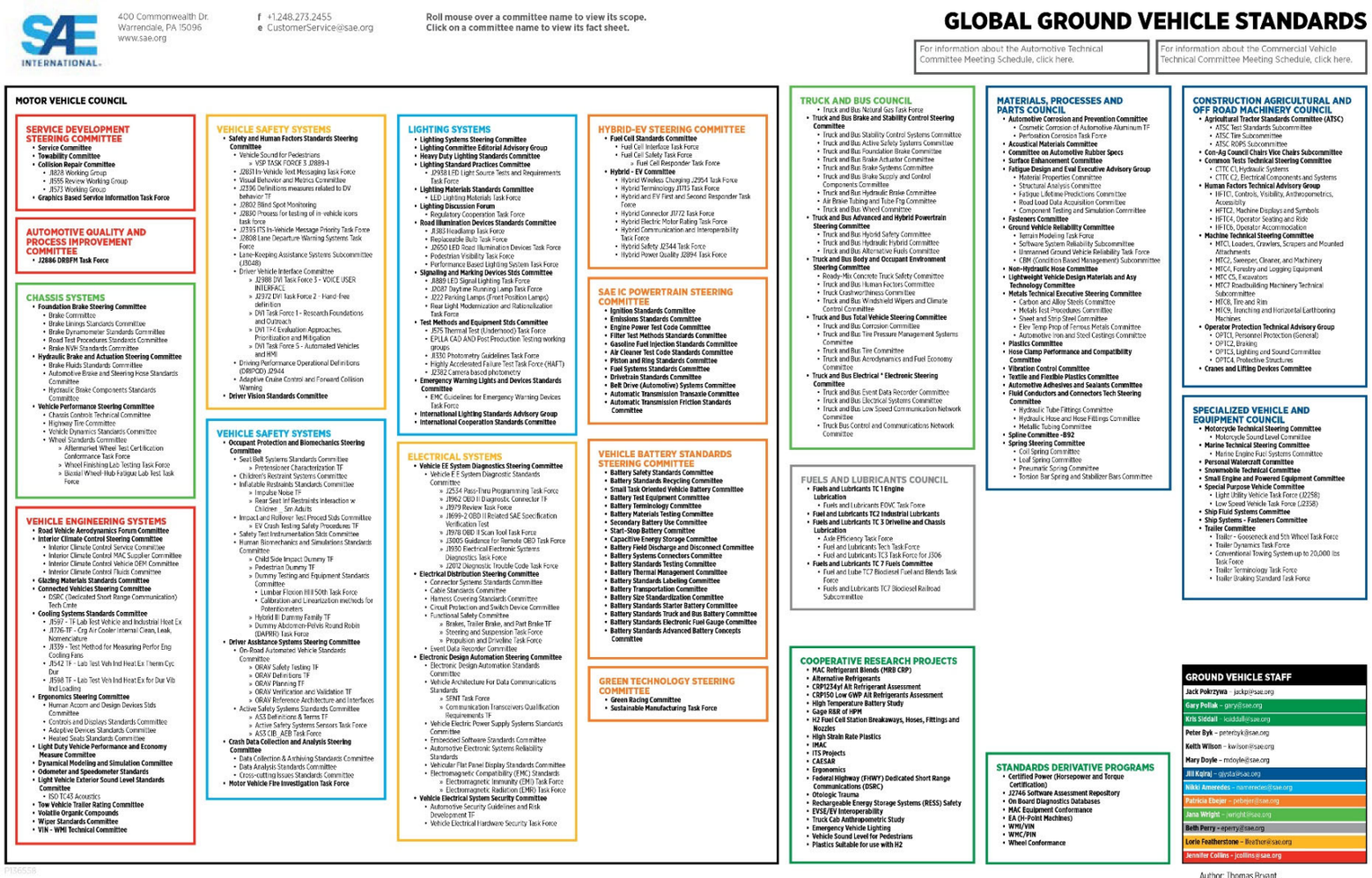
Global industry engagement makes a difference

SAE: International Standards Developer

ANSI Essential Requirements

WTO Requirements for International SDO

SAE Standards Development



560 committees

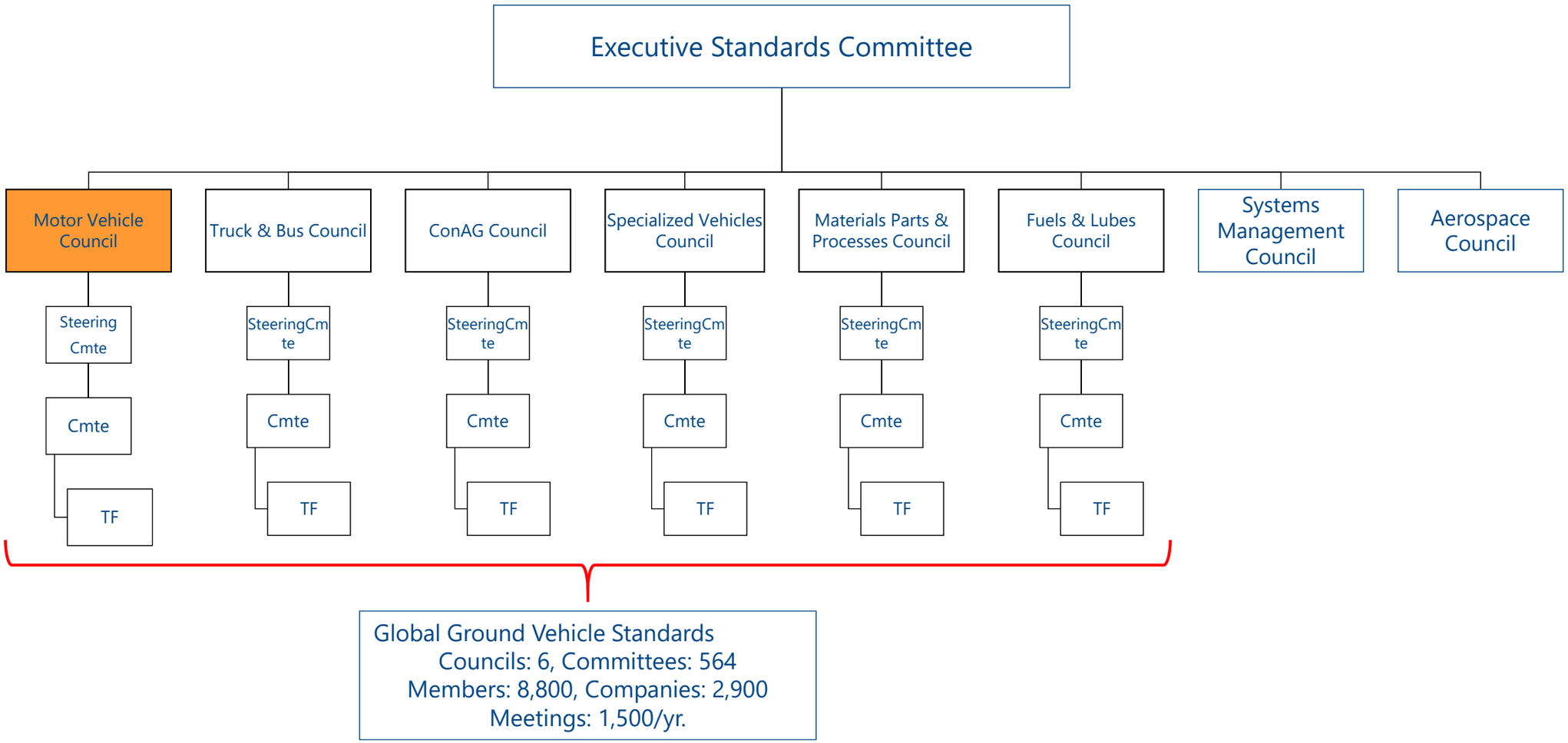
8,800 members

1,500 meetings

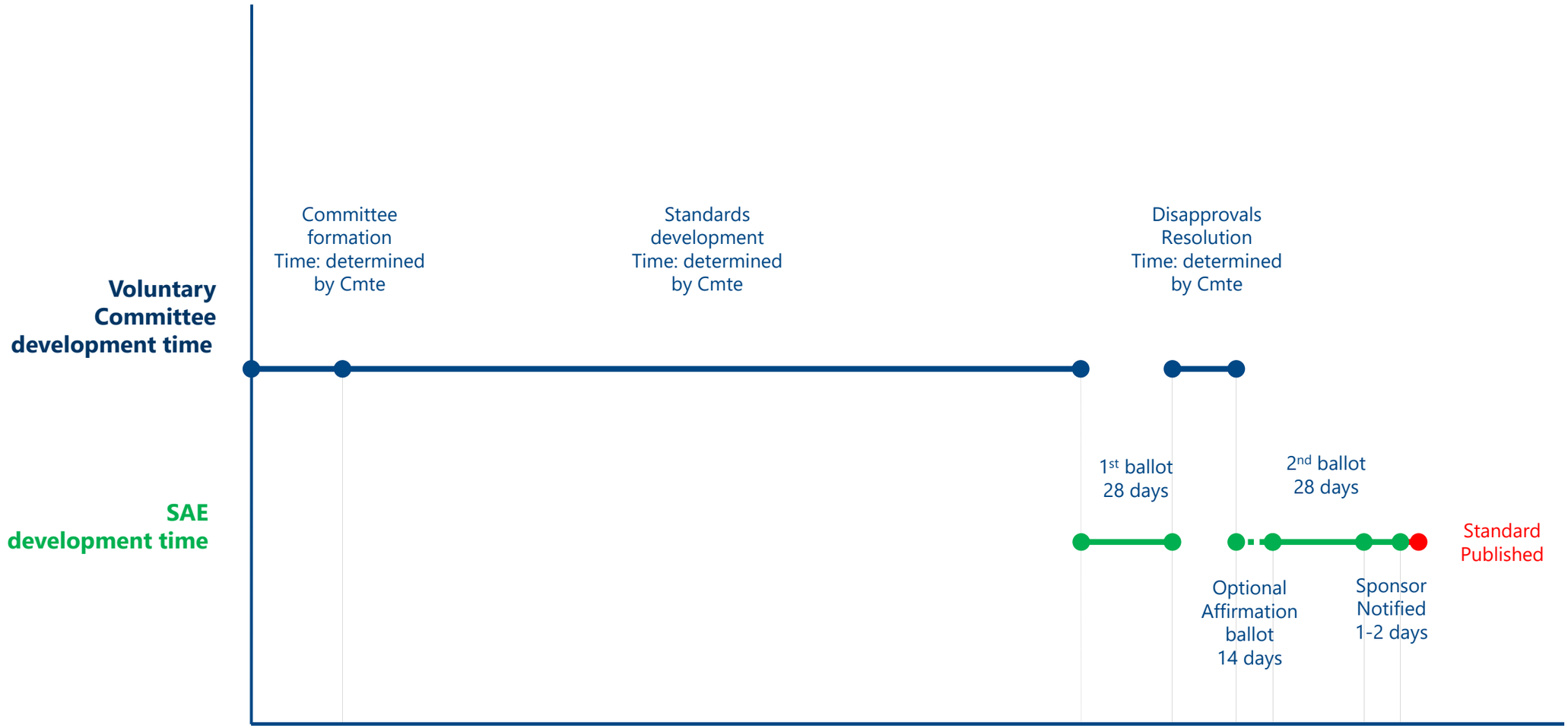
Committee meetings are open to all interested parties, but only committee members vote on draft documents.

Individuals participate on committees as technical experts and not as representatives of their organizations

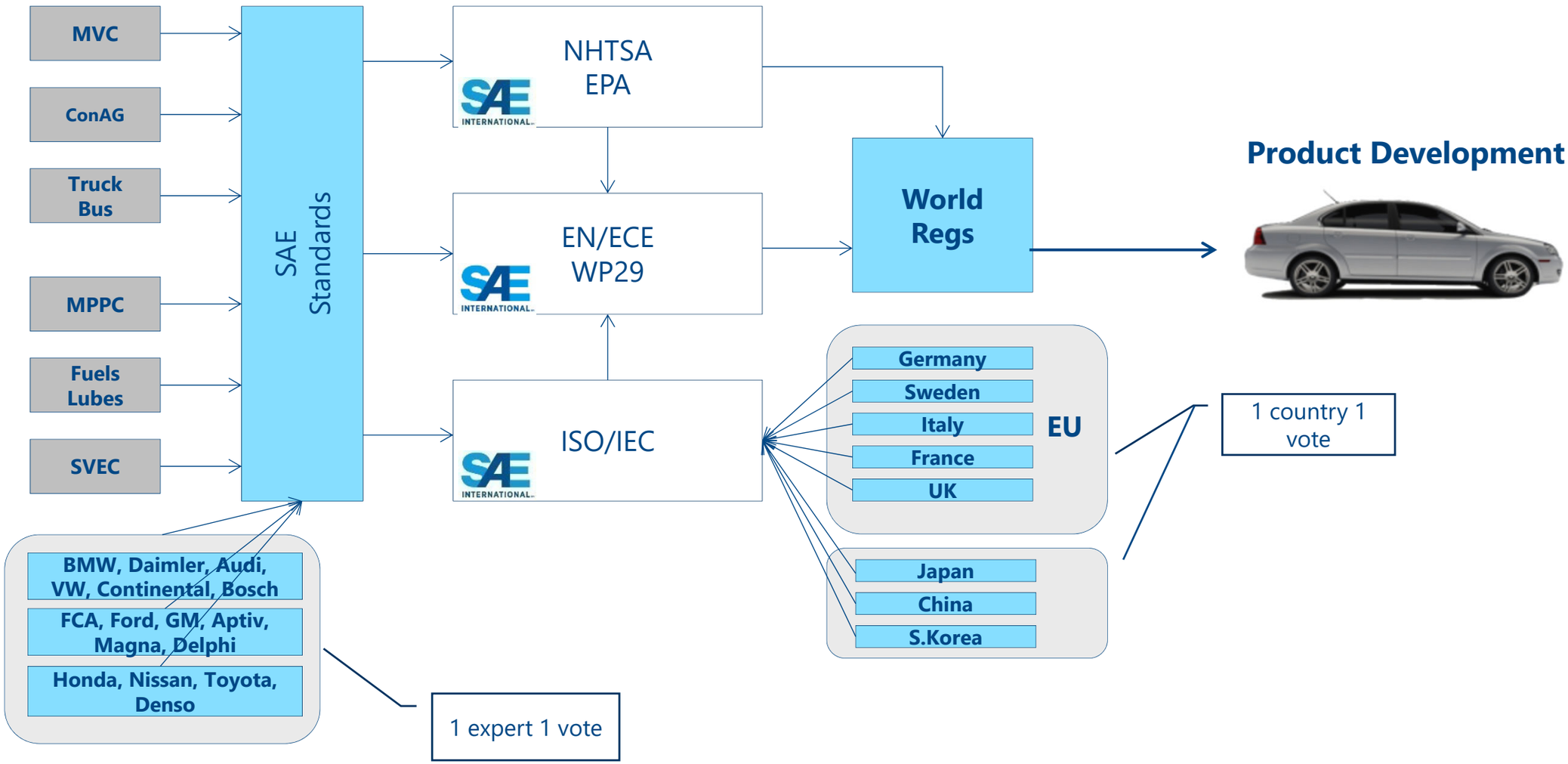
Global Ground Vehicle Standards structure



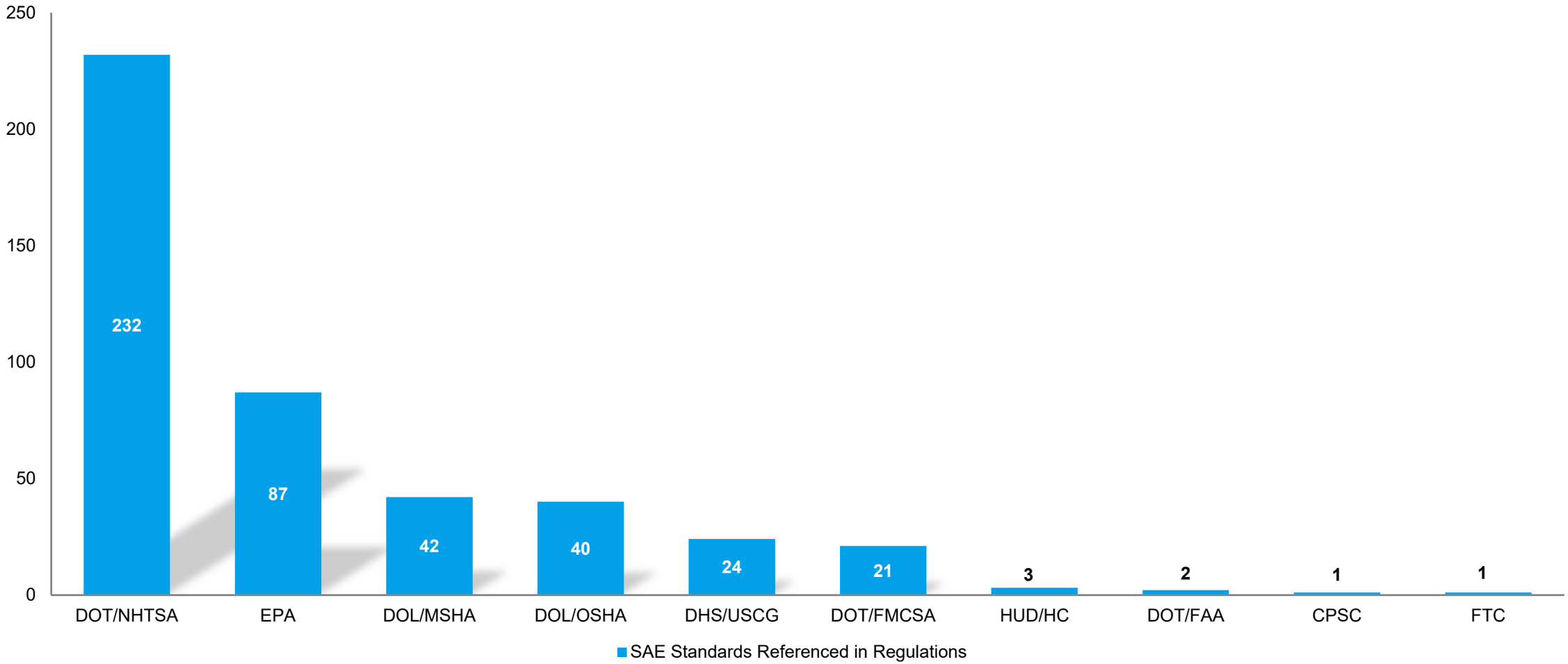
Development Timeline



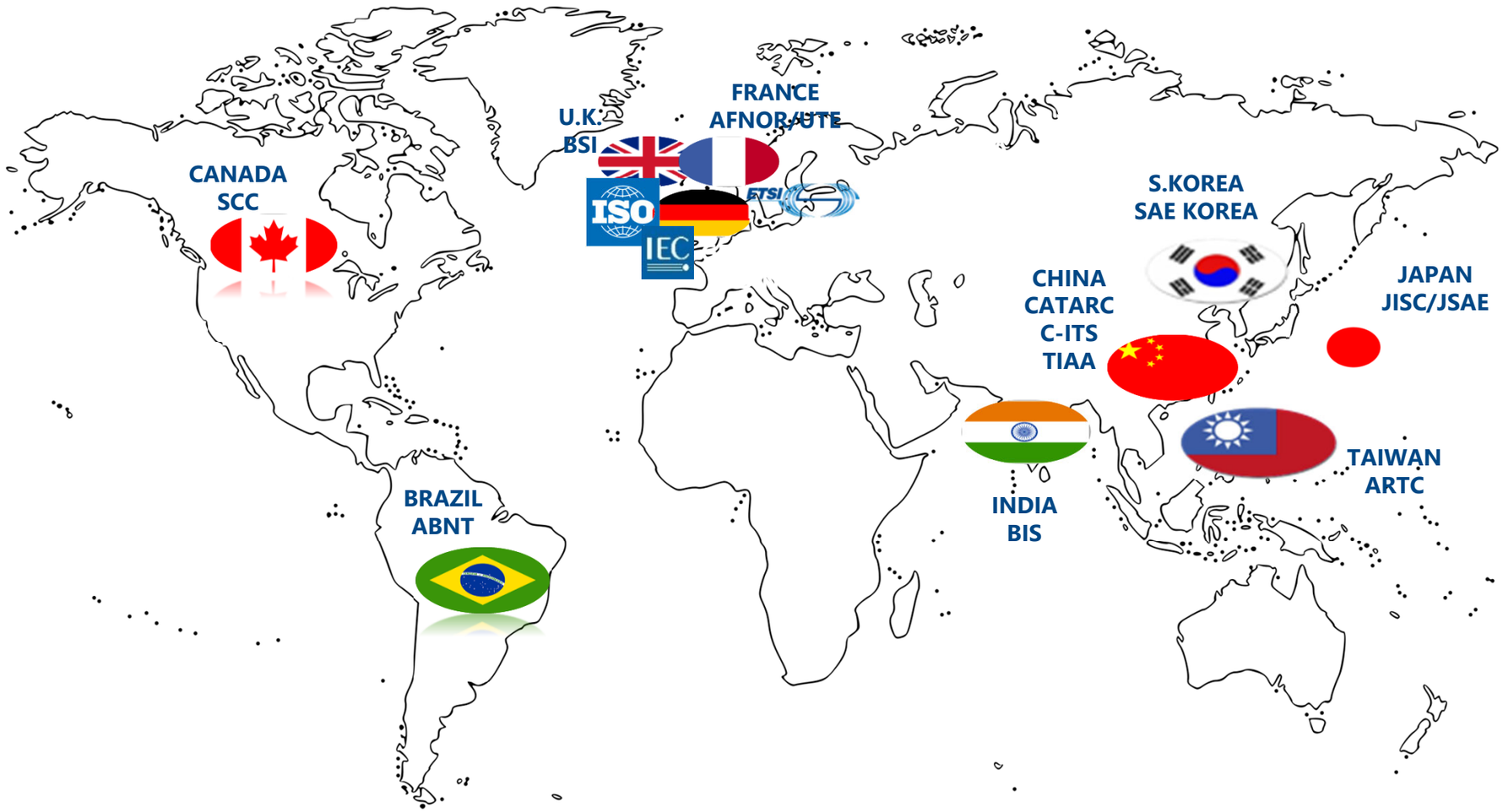
Regulatory and Product Effect of SAE Standards



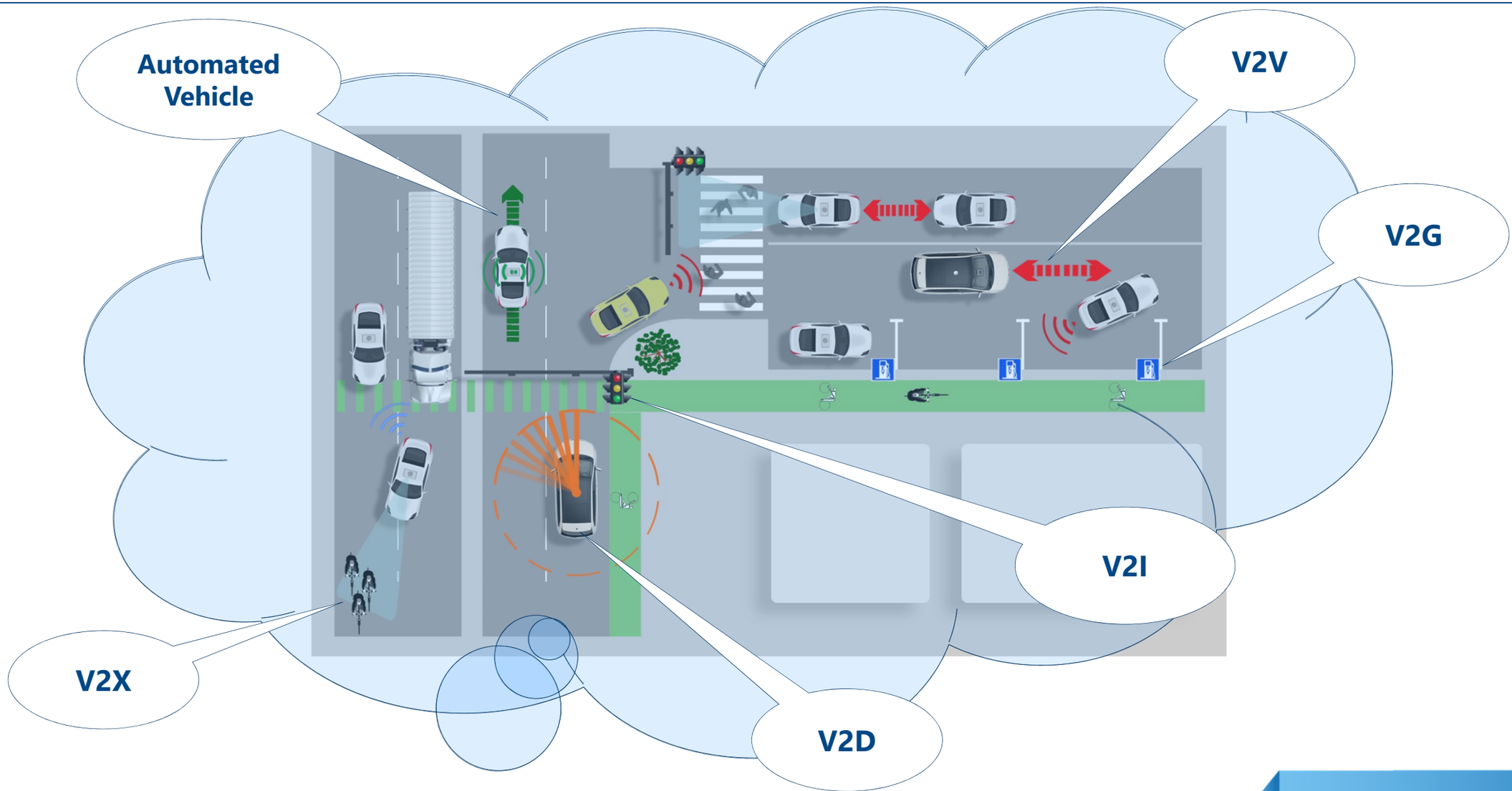
SAE standards cited in the US regulations



SAE Relationships with Other Organizations



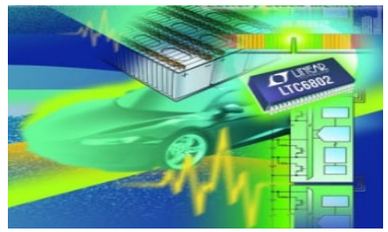
Addressing industry transformation through standards



SAE Standards in advanced technology areas

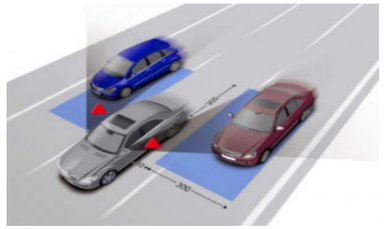
Wireless Charging

Driver-Vehicle Interface



Electronics System Reliability

Driving Automation Systems



Active Safety

Functional Safety

Connected Vehicles

Shared Mobility

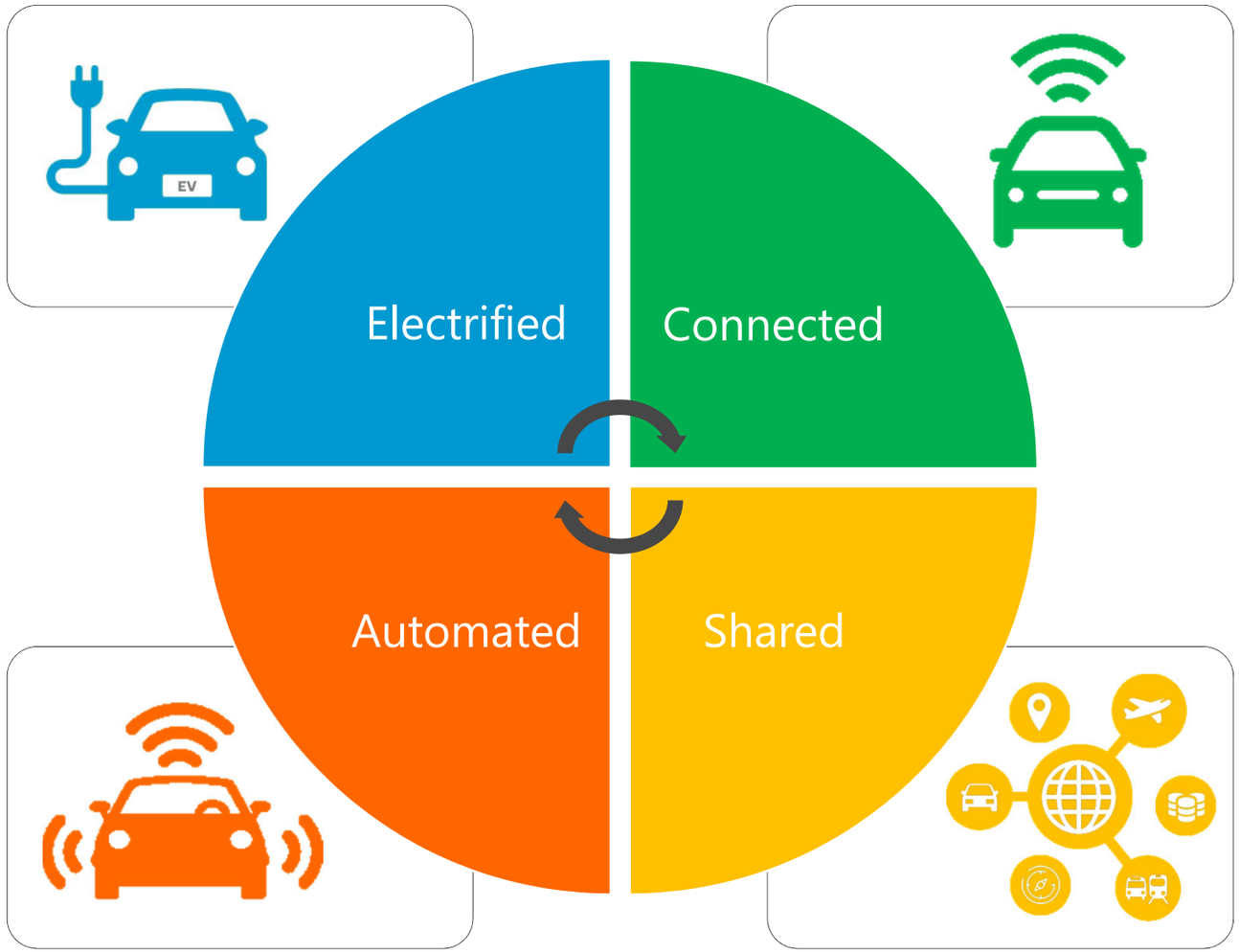
EV/Hybrid/FC Vehicle & Battery

Vehicle Electronics Cyber Security

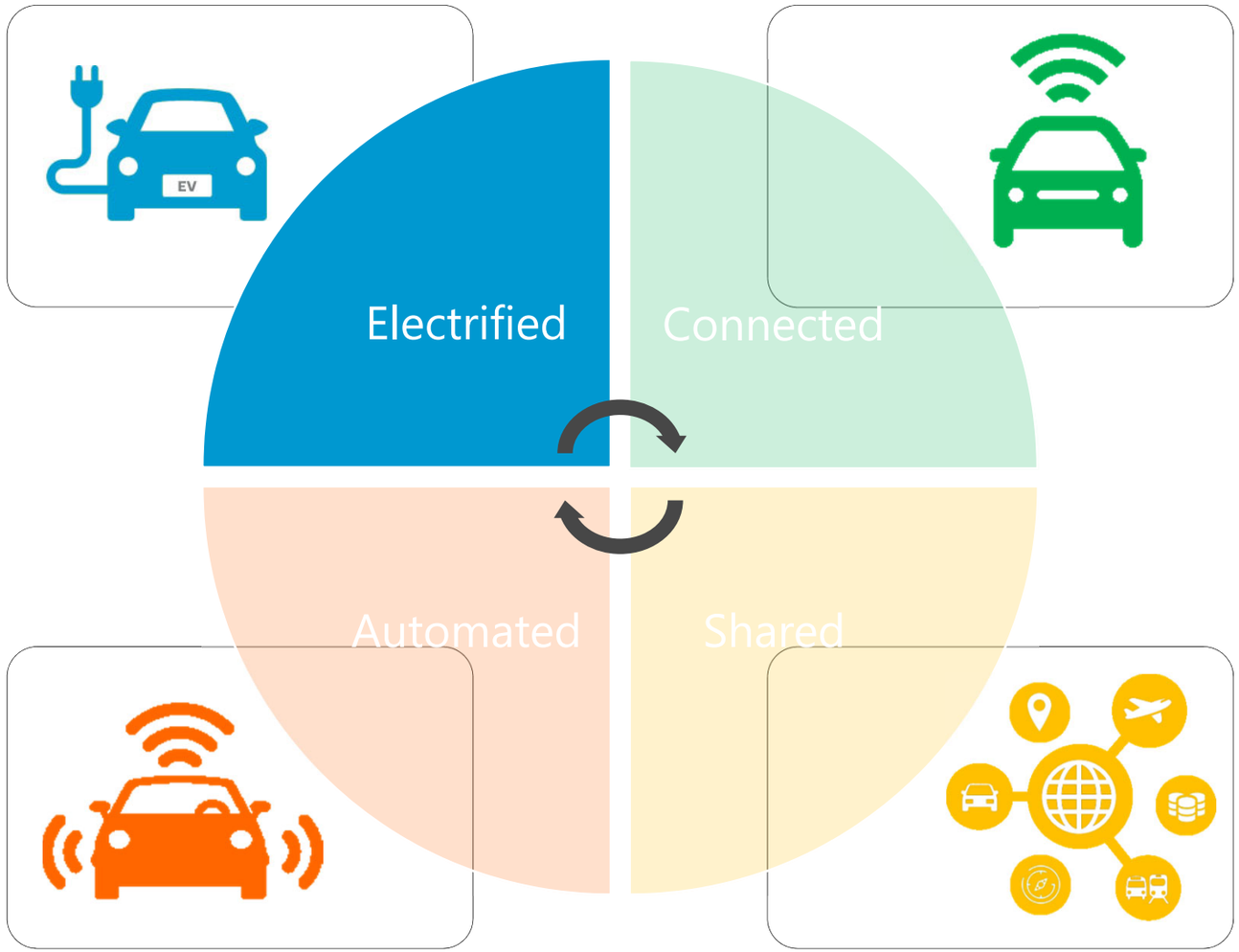
Intelligent Transport Systems

Mobility for Persons with Disabilities

4 trends in mobility



4 trends in mobility



Electrified - SAE Vehicle-To-Grid Standards

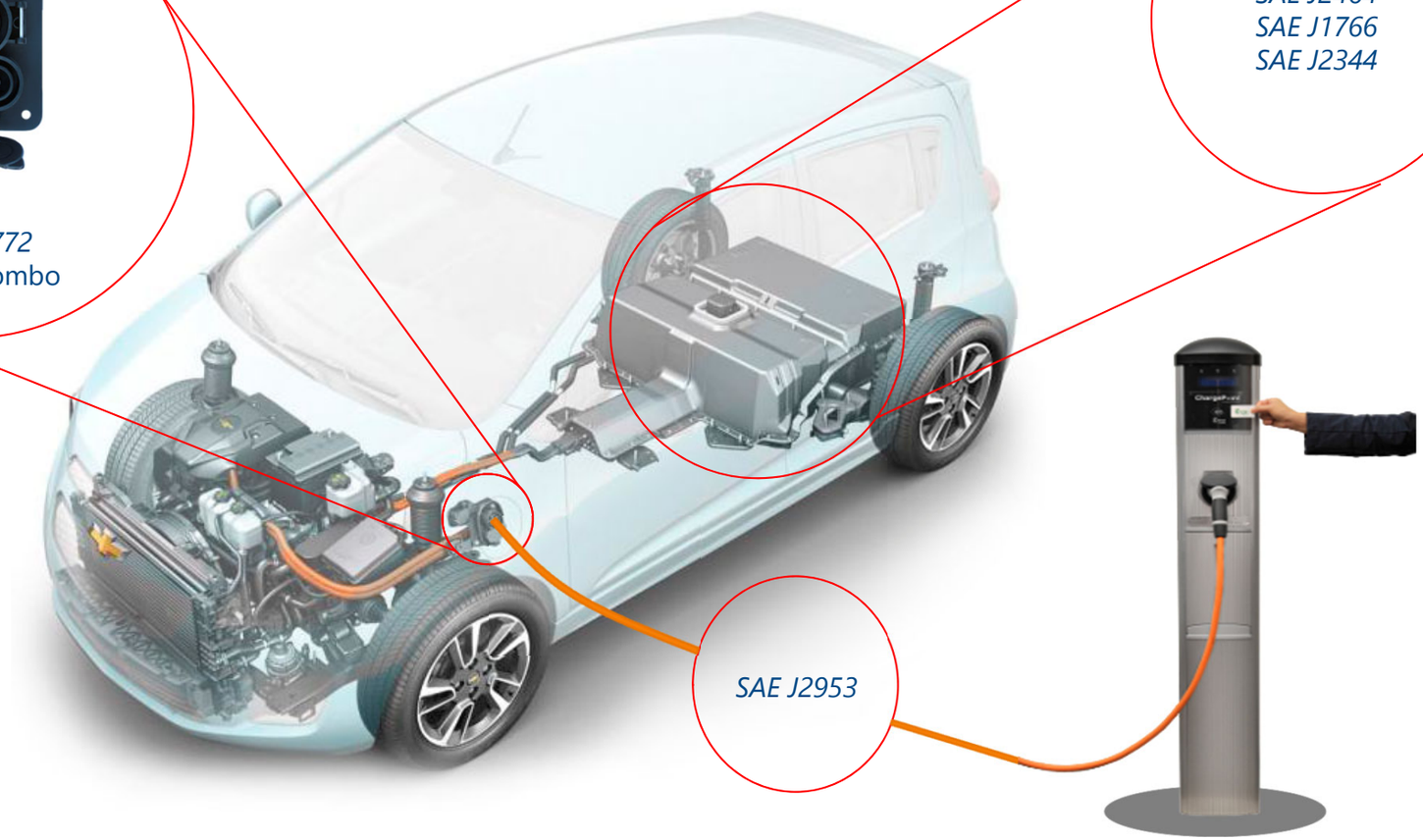
1. **AC/DC Charging**
2. **Vehicle to Grid Interoperability**
3. **SAE Battery Research and Standards**

New J1772™ version:

- 150 or 400 kW stations
- @ 400A
- charge times 15-20 min.

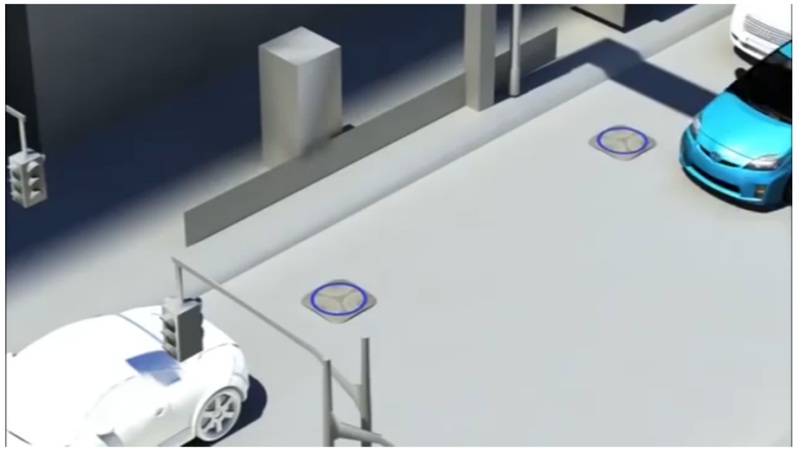
SAE J1772
AC/DC Combo

SAE J2929
SAE J2464
SAE J1766
SAE J2344



SAE J2953

Electrified - SAE Vehicle-To-Grid Standards



J2954 scope includes residential and parking garage, parking lot and side of road charging locations and Wireless Power Transfer (WPT) charging levels 1,2 & 3. Standardization to finish in 2018.

A collaborative research collaborative for the development of SAE J2954 will establish minimum performance, interoperability and safety criteria for wireless charging of EVs / PHEVs and vehicle alignment.

Companies participating:

TOYOTA, HONDA, NISSAN, BMW, Ford, GM, LEAR CORPORATION, Continental, QUALCOMM, WiTricity (Powering life, wirelessly), IHI, DELPHI, KAIST

Electrified - SAE Battery Standards

Battery Life Assessment Testing: J240, J2185, J2288, J2801

Determining Material Properties of Li-Battery Separator: J2983

Battery Testing Methodologies: J537, J1495, J2380

Battery Recycling: J2984

Battery Transport: J2950

Battery Functional Guidelines: J2289

Battery / EV Safety: J1766, J2344, J2910, J2929, J2464, J2990

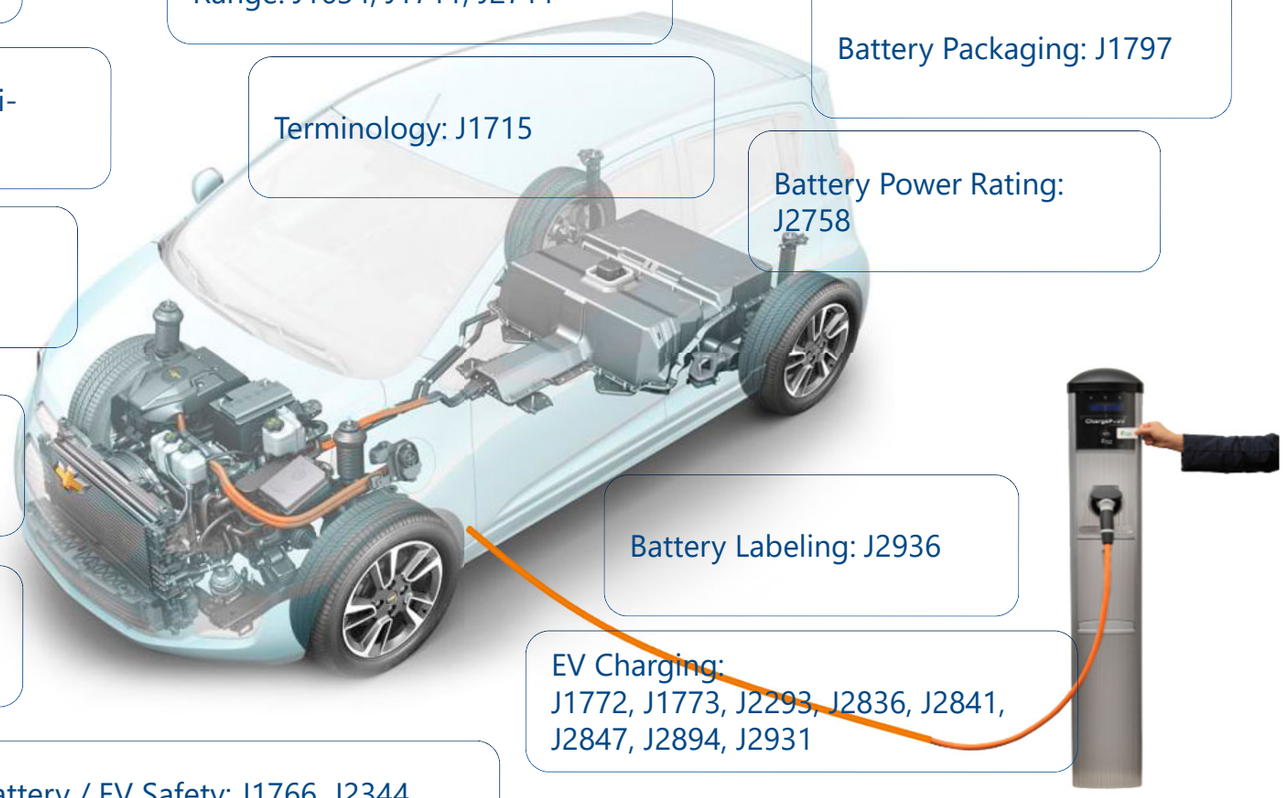
EV / Battery Fuel Economy & Range: J1634, J1711, J2711

Terminology: J1715

Battery Performance Rating: J1798

Battery Packaging: J1797

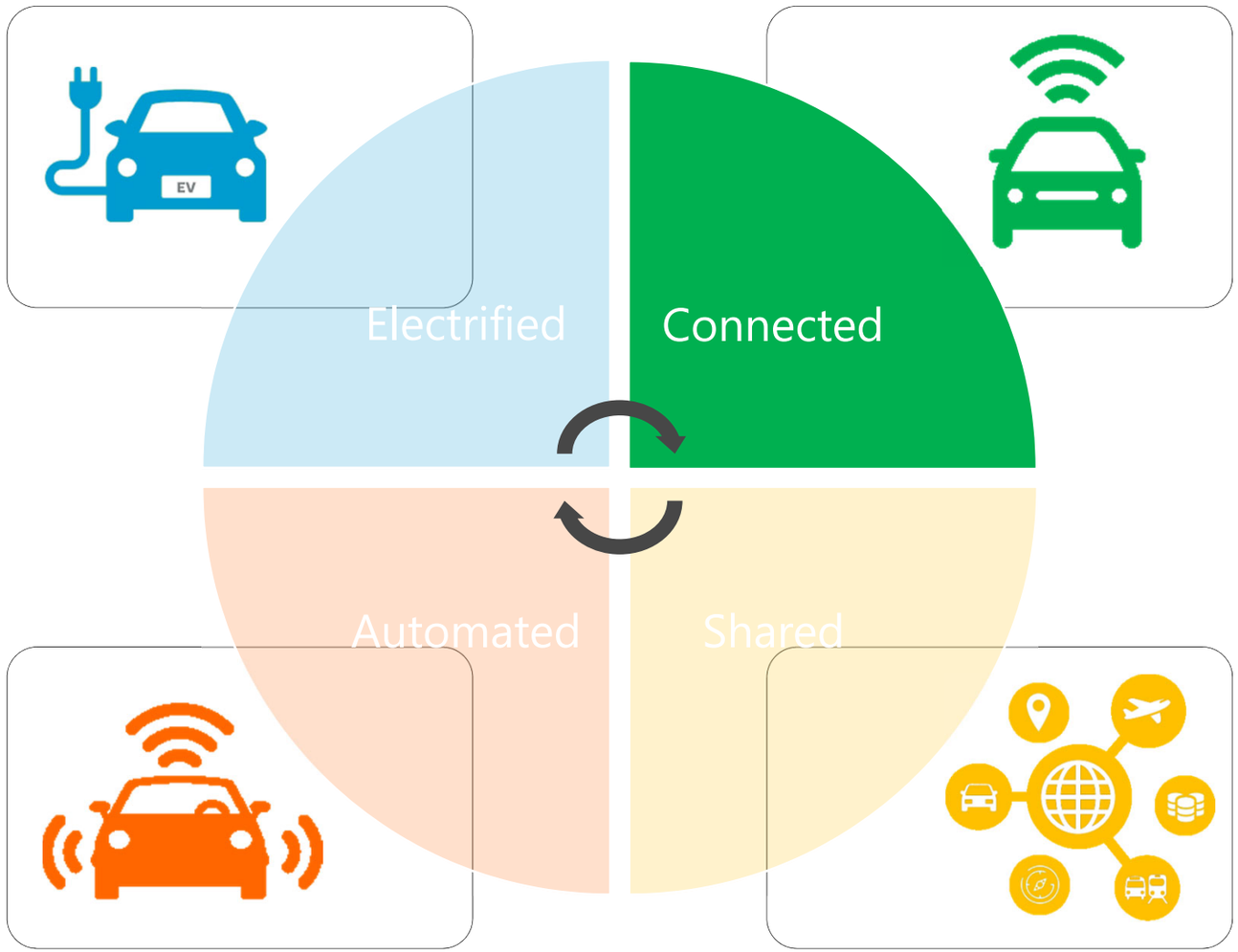
Battery Power Rating: J2758



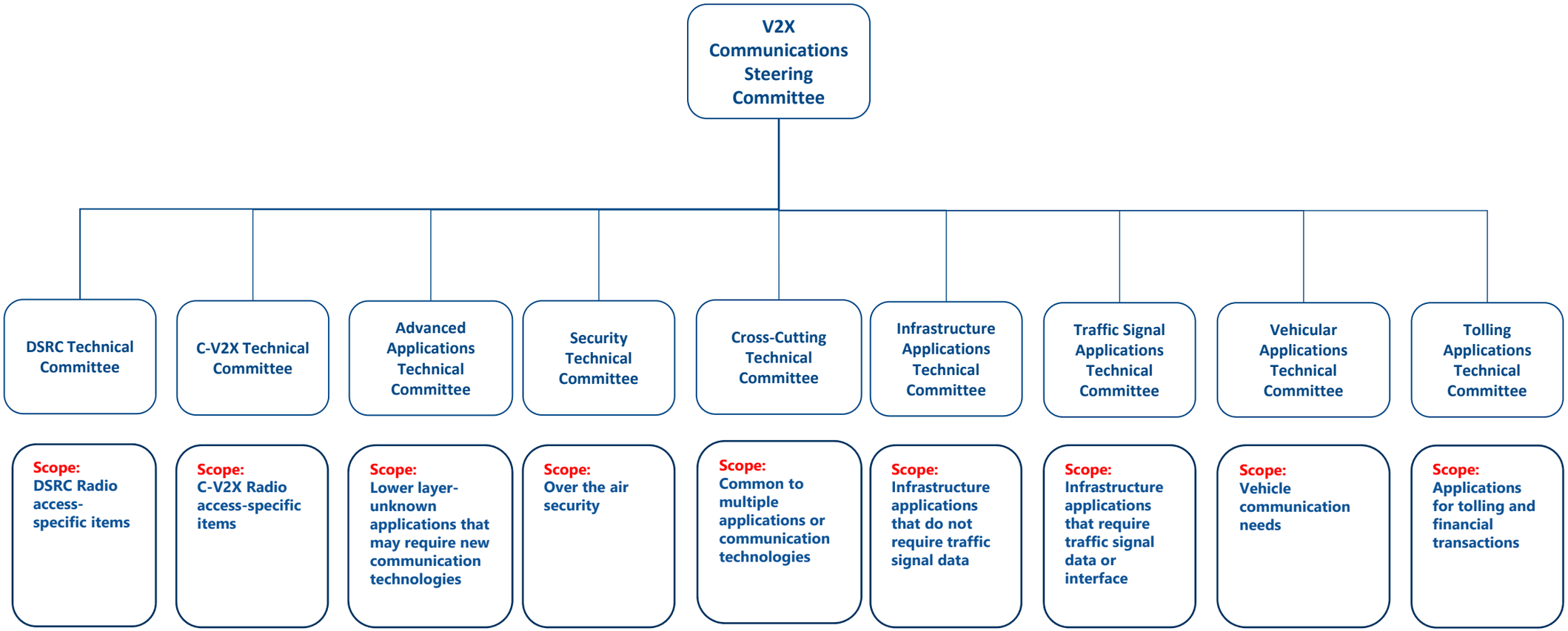
Battery Labeling: J2936

EV Charging: J1772, J1773, J2293, J2836, J2841, J2847, J2894, J2931

4 trends in mobility



Connected – where SAE standards are developed



SAE Standards to Support Connected Vehicle Technologies

Focus Areas for Standards

- ✓ Mobile Devices
- ✓ Road Side Equipment
- ✓ Traffic Information Management
- ✓ Systems and Data Back Haul
- ✓ Service Providers
- ✓ IoT
- ✓ DSRC and LTE Communications
- ✓ Road Weather
- ✓ Curve Warning
- ✓ Traveler Information
- ✓ Work Zone Warning
- ✓ Maps
- ✓ Adaptive Signal Control
- ✓ Platooning
- ✓ Disabled/Vulnerable Road Users

Examples of Driver Alerts

- Forward Collision Warning
- Emergency Electronic Brake Light
- Intersection Movement Assist
- Blind Spot Warning
- Weather Warnings
- Lane Change Warning
- Do Not Pass Warning
- Right Turn in Front
- Signal Phase and Timing
- Curve Speed Warning
- Vulnerable Road Users

Use Cases: V2V V2IV V2 Other Vehicle Automation Center to Center Center to Field

Connected - SAE DSRC Standards

- Supports interoperability
- Defines standardized message sets
- Defines formats for basic safety message set dictionary
- Being revised to meet new needs/applications

- Specifies minimum communication performance requirements
- Defines message transmission rate, channel usage, optional data usage in various situations

Published

J2735 Message Set Dictionary

- Basic Safety Message (BSM)
- MapData (Map) message
- Signal Phase and Timing (SPaT)
- Personal Safety Message (for pedestrian and other vulnerable road users)
- Traveler Information Message (TIM)

J2945/0 Systems Engineering Process Guidance for J2945/x Documents and Common Design Concepts

Publishing soon

- System engineering example
- Communication protocol
- Channel use
- V2X message/application priority

J2945/1 On-Board System Requirements for V2V Safety Communications — Published

J2945/9 VRU (V2P) Safety Message Minimum Performance Requirements

J2945/2 Performance Requirements for V2V Safety Awareness — Published

J2945/3 Requirements for V2I Weather Applications

J2945/4 V2I Road Safety (title TBD) Applications

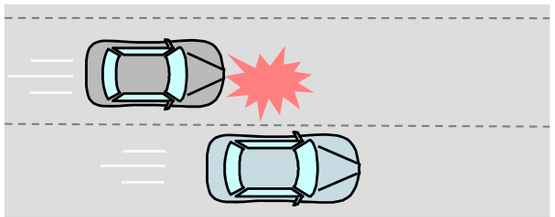
J2945/6 CACC/ Platooning Performance Requirements

J2945/10 Map/SPaT Related

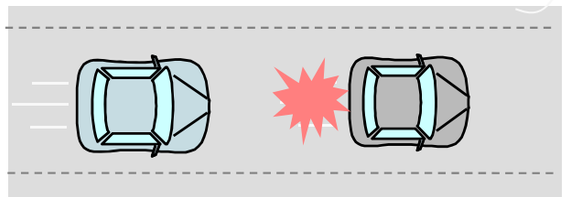
J2945/11 Signal Preemption Related

J2945/12 Traffic Probe Use and Operation

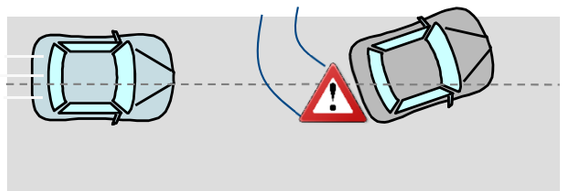
J2945/1"On-Board System Requirements for V2V Safety Communications"



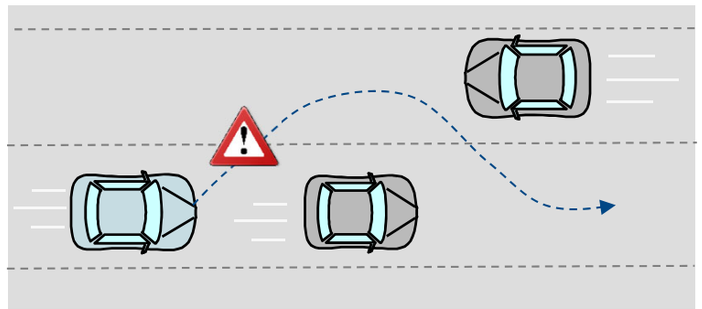
Blind Sport Warning



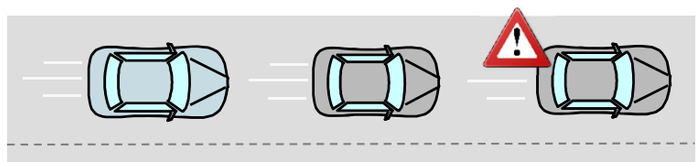
Forward Collision Warning



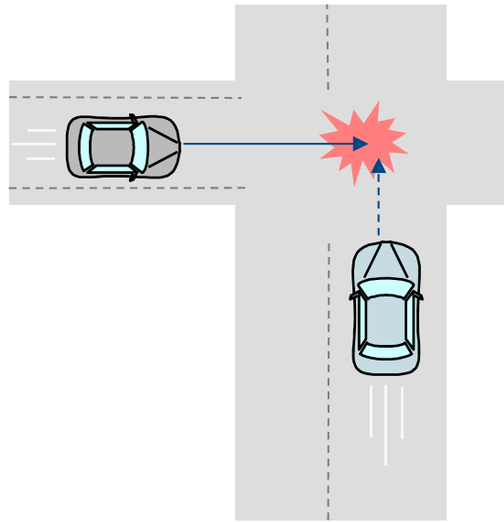
Control Loss Warning



Do Not Pass Warning



Electronic Emergency Brake Lights



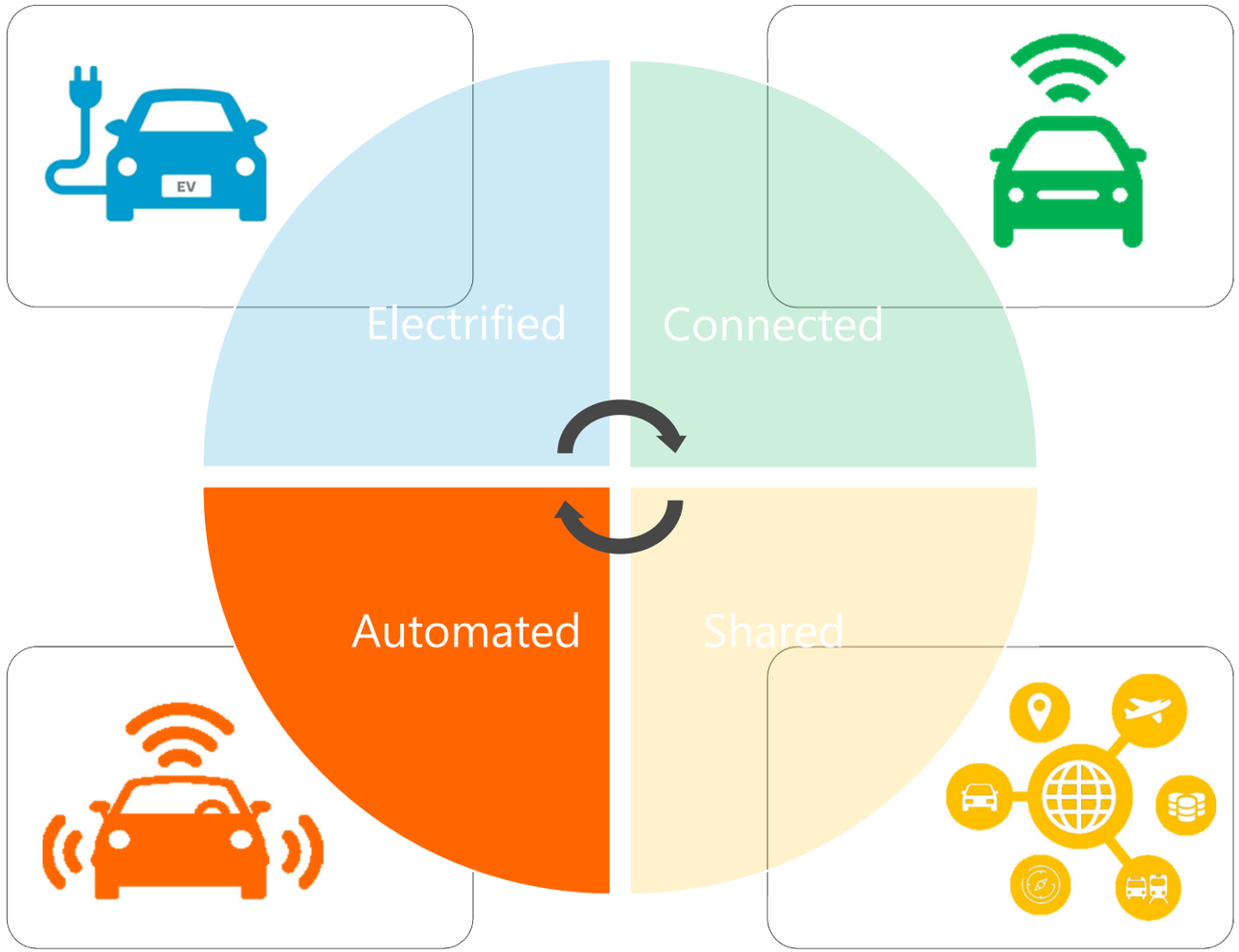
Intersection Movement Assist

- 1st edition of on-board system requirements standard for V2V safety communications
- Support interoperability and data integrity
- Largely referenced by USDOT's V2V safety system NPRM

SAE J2945/9 “VRU (V2P) Safety Message Minimum Performance Requirements”

- Defines the safety message minimum performance requirements from pedestrian device (e.g. smartphone) to vehicles
- Protect pedestrians (including people with disabilities/special needs), cyclists, public safety workers
- Personal Safety message is defined in J2735

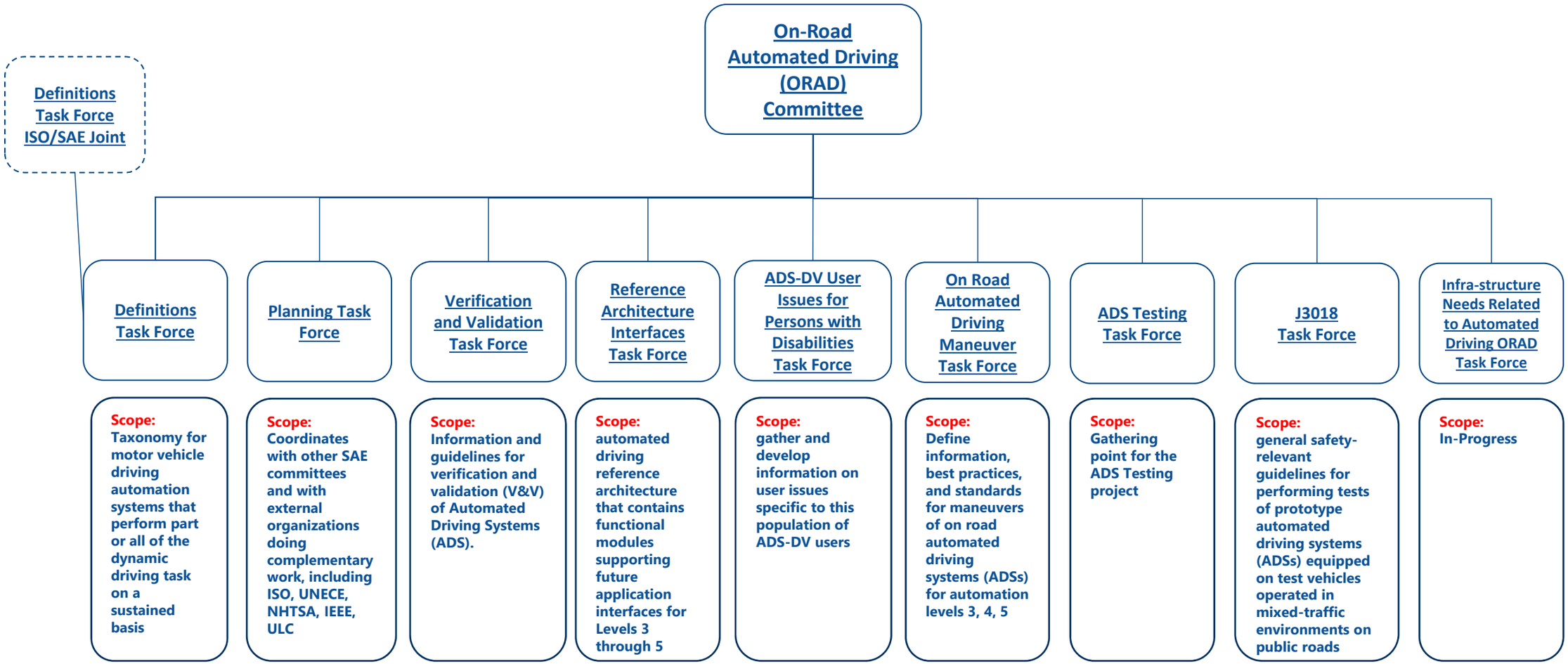
4 trends in mobility



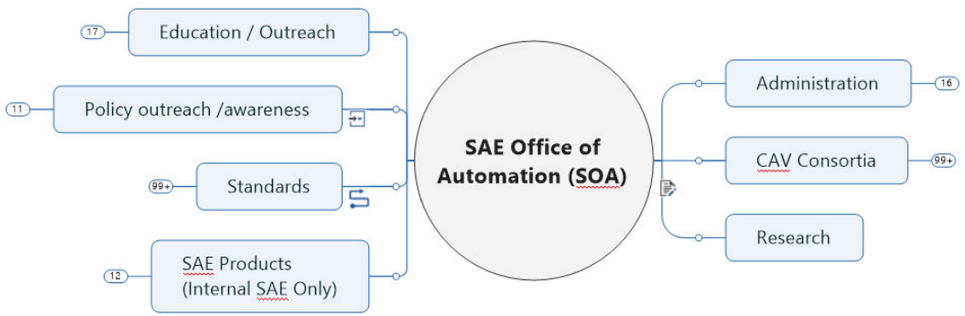
Automated - SAE Automation Standards – J3016™

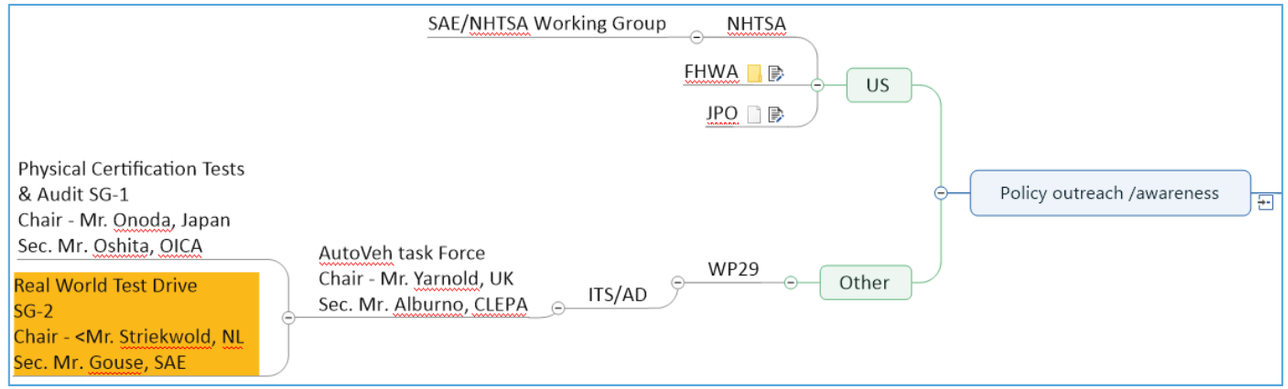
Level	Name	Narrative Definition	DDT		DDT Fallback	ODD
			Sustained lateral & longitudinal vehicle motion control	OEDR		
***Driver* performs part or all of the DDT**						
0	No Driving Automation	The performance by the ***driver*** of the entire *DDT*, even when enhanced by *active safety systems*	Driver	Driver	Driver	N/A
1	Driver Assistance	The *sustained* and *ODD*-specific execution by a *driving automation system* of either the *lateral* or the *longitudinal vehicle motion control* subtask of the DDT (but not both simultaneously) with the expectation that the *driver* performs the remainder of the *DDT*.	Driver and System	Driver	Driver	Limited
2	Partial Driving Automation	The *sustained* and *ODD*-specific execution by a *driving automation system* of both the *lateral* and *longitudinal vehicle motion control* subtasks of the *DDT* with the expectation that the *driver* completes the *OEDR* subtask and *supervises* the *driving automation system*.	**System**	Driver	Driver	Limited
***ADS* ("*System*") performs the entire *DDT* (while engaged)**						
3	Conditional Driving Automation	The *sustained* and *ODD*-specific performance by an *ADS* of the entire DDT with the expectation that the *DDT fallback-ready user* is *receptive* to *ADS*-issued *requests to intervene*, as well as to *DDT performance-relevant system failures* in other *vehicle* systems, and will respond appropriately.	System	**System**	*Fallback-ready user (becomes the driver during fallback)*	Limited
4	High Driving Automation	The *sustained* and *ODD*-specific performance by an *ADS* of the entire *DDT* and *DDT fallback* without any expectation that a *user* will respond to a *request to intervene*.	System	System	**System**	Limited
5	Full Driving Automation	The *sustained* and unconditional (i.e., not *ODD*-specific) performance by an *ADS* of the entire *DDT* and *DDT fallback* without any expectation that a *user* will respond to a *request to intervene*.	System	System	System	**Unlimited**

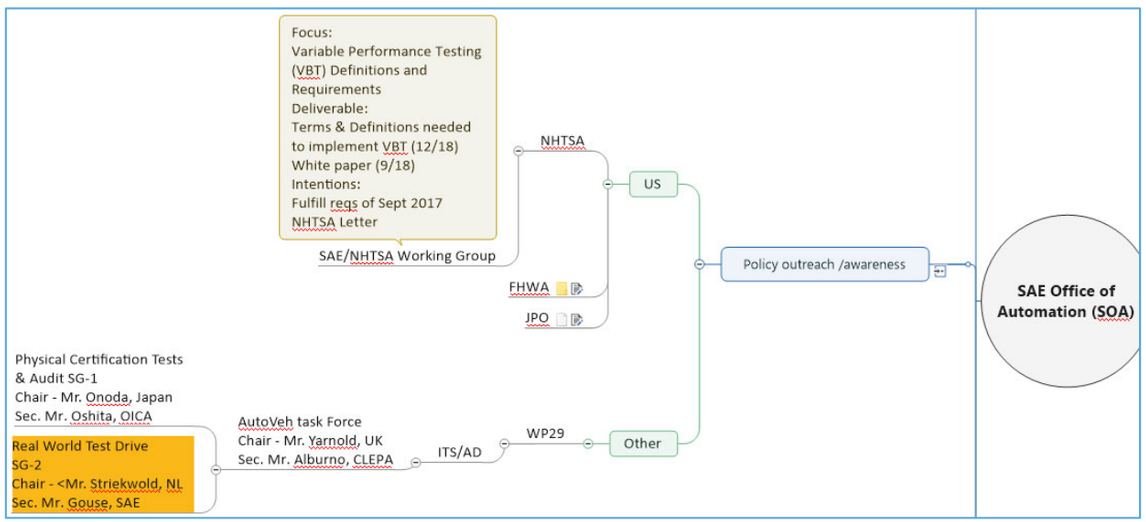
Automated – where SAE standards are developed



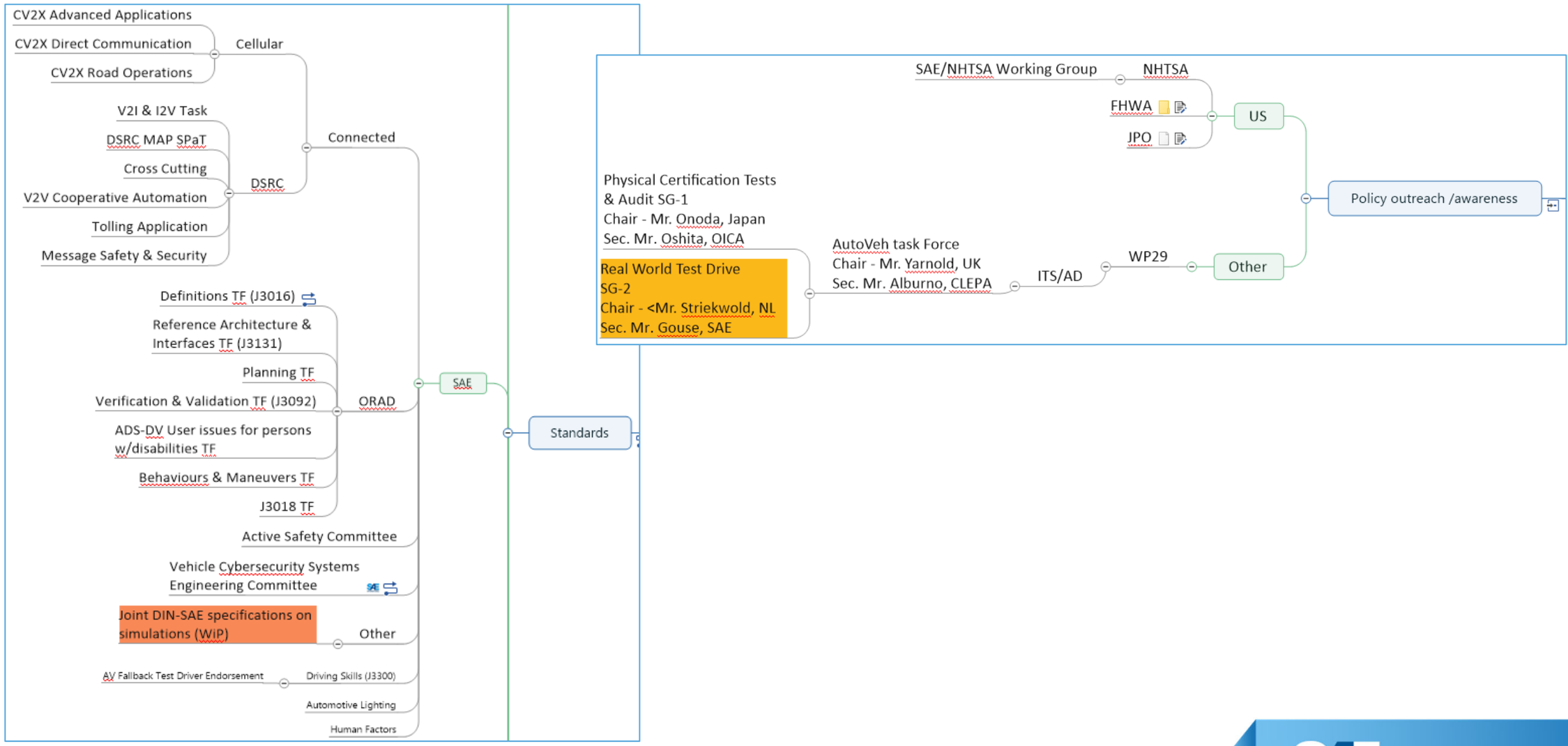
SAE Office Of Automation



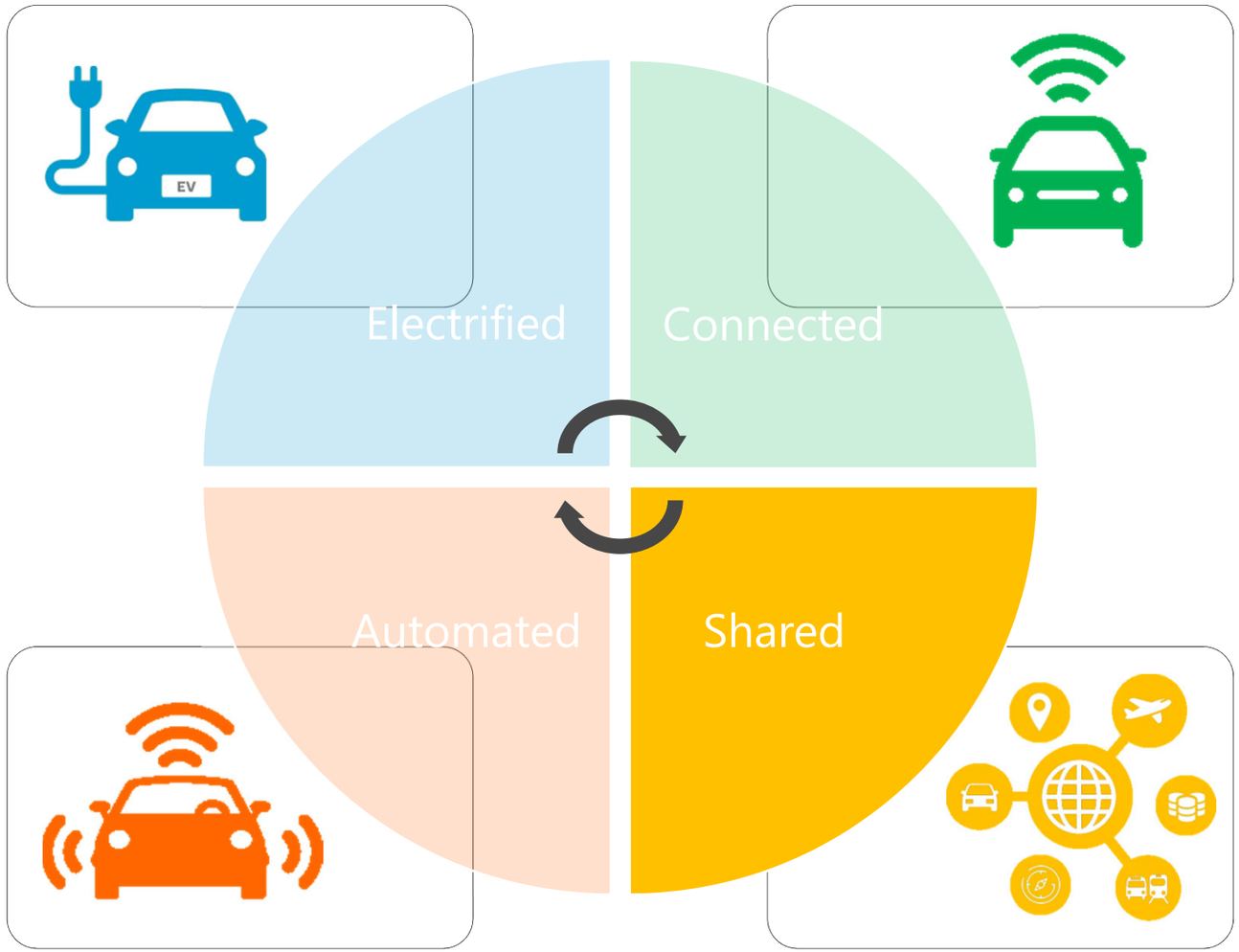




SAE Office Of Automation

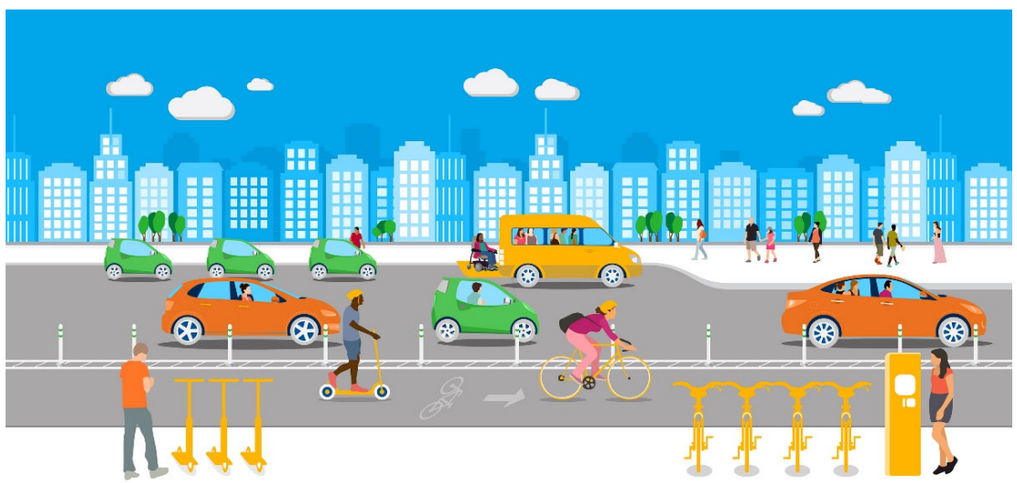


4 trends in mobility



What is Shared Mobility? (without video)

Shared mobility is the **shared** use of a vehicle, motorcycle, scooter, bicycle, or other travel mode. **Shared mobility** provides users with short-term access to one of these modes of travel as they are needed.

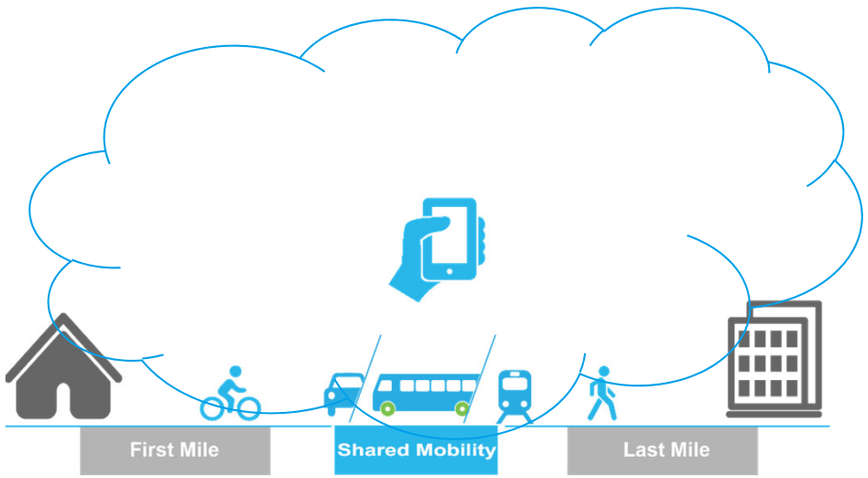


Background

- Rapidly advancing technology
- Congestion & Travel time
- Increasing traveler expectations
- Environmental concerns
- Demographic changes
- Limited Resources

https://www.sae.org/shared-mobility

SAE Shared And Digital Mobility Standards Committee



SAE Shared and Digital Mobility Committee embarked on the task of standardizing terms and definitions related to shared mobility.

MILESTONES

- Established in September 2017
- First technical report:

Published

J3163 – Taxonomy and Definitions for Terms Related to Shared Mobility and Enabling Technologies.

It covers six categories of terms related to shared mobility:

- Next steps include
  - Symbols and signage for shared mobility
  - Data format for data sharing
  - Household travel surveys
  - Exploring intersect with core GV technologies

SAE Low-Speed Mobility Devices Committee

New !

Electric Kick Scooter

Electric Skateboard

(Half) Segways

Electric Self-Balancing Unicycles

Emerging and innovative mobility vehicles and devices, sometimes referred to as micro-mobility, are proliferating in cities around the world.

These technologies have the potential to expand mobility options for a variety of people. Some of these technologies fall outside traditional definitions, standards, and regulations.

This committee will initially focus on low-speed personal mobility devices and the technology and systems that support them that are not normally subject to the United States Federal Motor Vehicle Safety Standards or similar regulations. These may be device-propelled or have propulsion assistance.

SAE Standards on a Global Platform

Joint development of SAE/ISO standards

Road Vehicle & Intelligent Transportation Systems (ITS)

SAE Standards on a Global Platform

SAE is providing Secretariat function

To ISO TC204 Intelligent Transport System

SAE Standards on a Global Platform

United Nations Nations Unies

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OFFICE FOR ECOSOC SUPPORT AND COORDINATION
25th Floor Secretariat Building, United Nations, New York, N.Y. 10017
Telephone: (212) 963-8652; Fax: (212) 963-9248
Website: www.un.org/ecosoc/ngo Contact: www.un.org/ecosoc/ngo/contact

26 July 2017

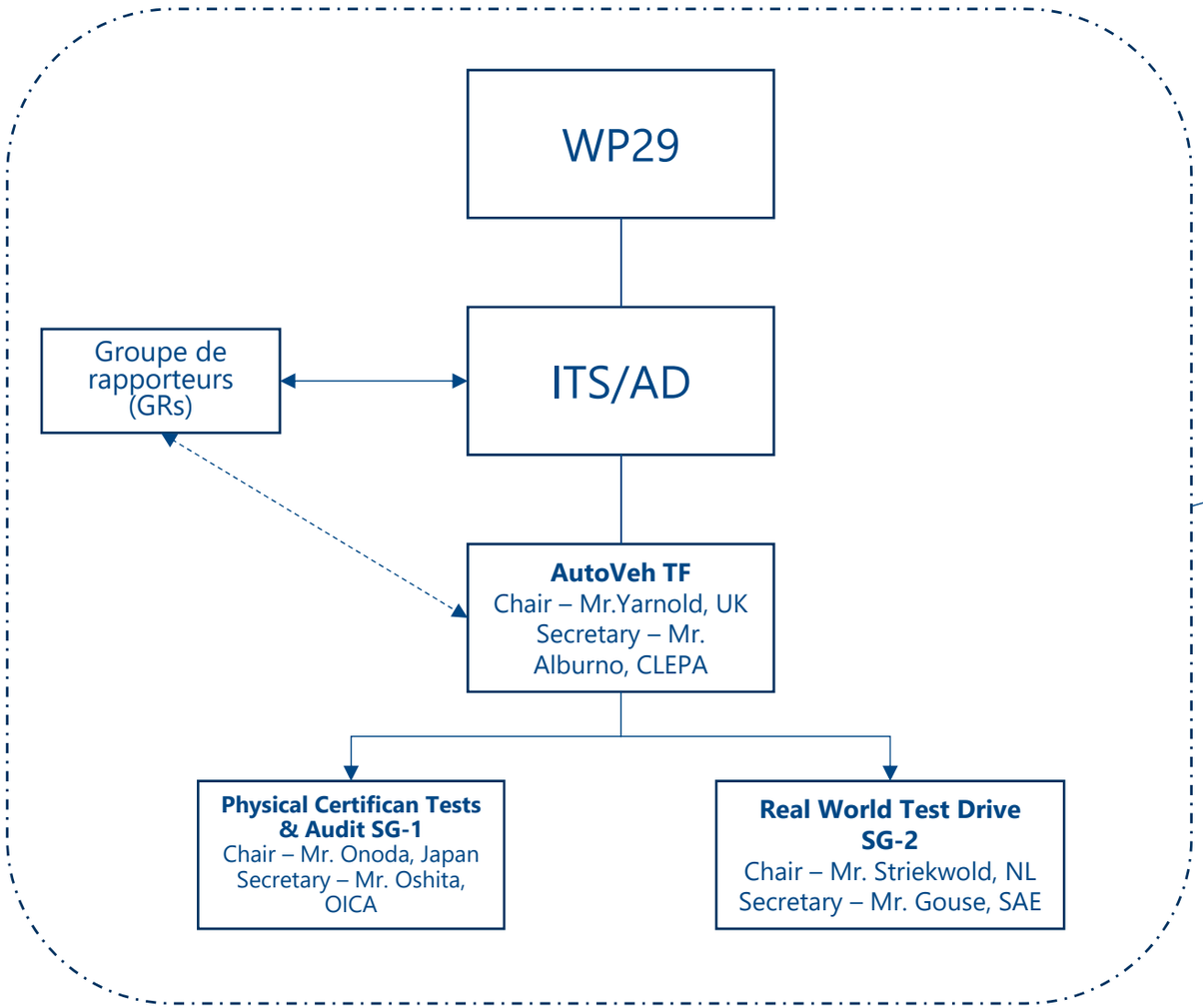
Dear NGO Representative,

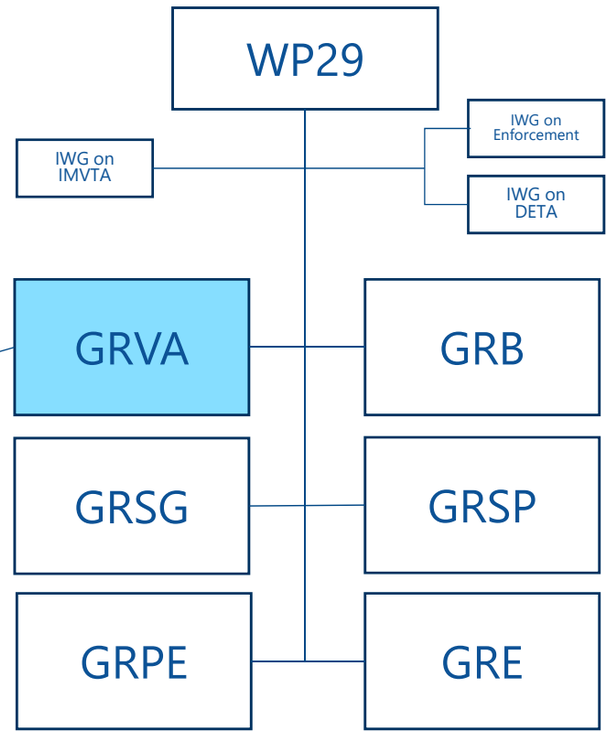
Subject: Follow-up to the decision of the Economic and Social Council

I am pleased to inform you that the Economic and Social Council (ECOSOC) at its Coordination and management meeting of 25 July 2017 adopted the recommendation of the Committee on Non-Governmental Organizations (NGOs) to grant **special** consultative status to your organization, **SAE International.** On behalf of all staff of the Non-Governmental Organizations Branch/OESC/DESA, please accept our heartfelt congratulations.

WP29

WP 29 Automated Vehicle Activities





Questions?