

Transportation from 2014 to 2040

*enabled and improved by
**Connectivity, Automation, Intelligence,
Electrification, and Electronification***

Dr. Yu Yuan

Chair, IEEE SCC42 (IEEE Standards Coordinating Committee on Transportation)
Board Member, IEEE Standards Association Standards Board
Secretary & Standards Chair, IEEE Transportation Electrification Community

Email: y.yuan@ieee.org

LinkedIn: <http://www.linkedin.com/in/dryuyuan>

Disclaimer...

“At lectures, symposia, seminars, or educational courses, an individual presenting information on IEEE standards shall make it clear that his or her views should be considered the personal views of that individual rather than the formal position, explanation, or interpretation of the IEEE.”

IEEE-SA Standards Board Operation Manual (subclause 5.9.3)

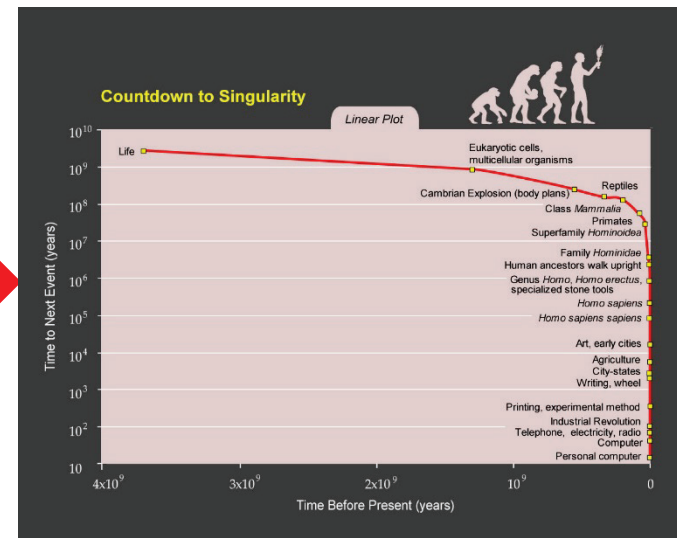
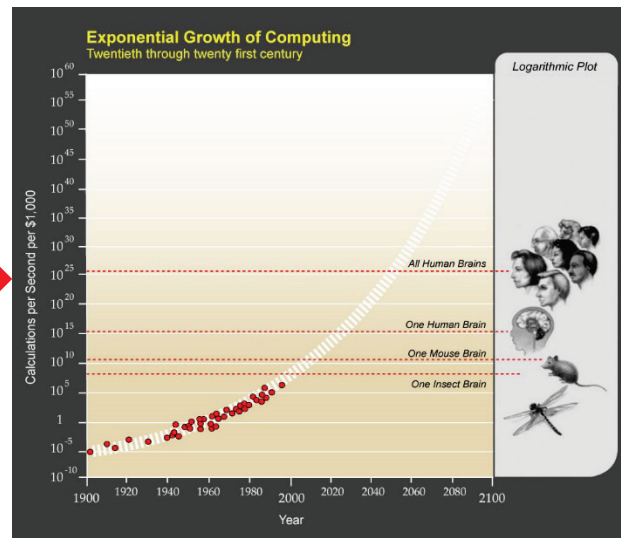
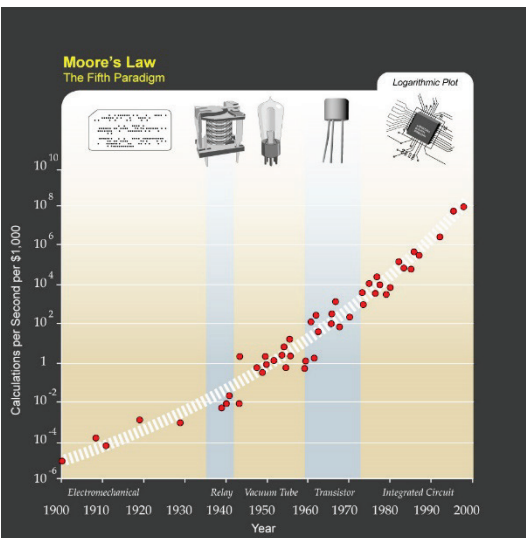
You have heard very different predictions

■ Are they too conservative?

- Every new car to be connected by 2025 ^[1]
- Self-driving cars to be 9 percent of global auto sales in 2035 ^[2]
- Nearly all cars to be autonomous by 2050 ^[3]

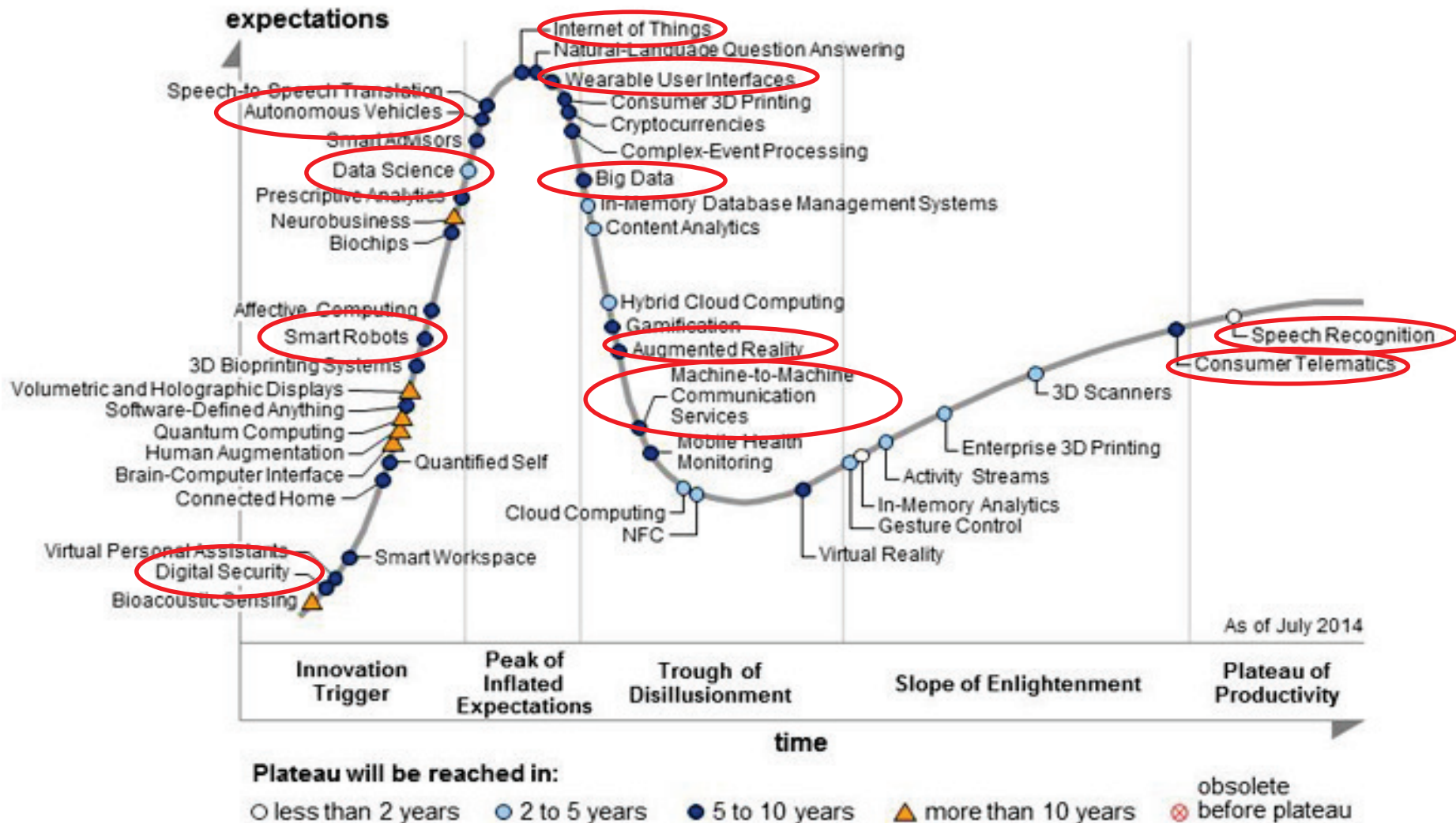
■ Are they too aggressive?

- The singularity is near ^[4]
- Artificial intelligence is our biggest existential threat ^{[5][6]}
- With artificial intelligence we are summoning the demon ^{[5][6]}
- Computers are going to take over from humans ^[7]
- The future of AI is scary and very bad for people ^[8]

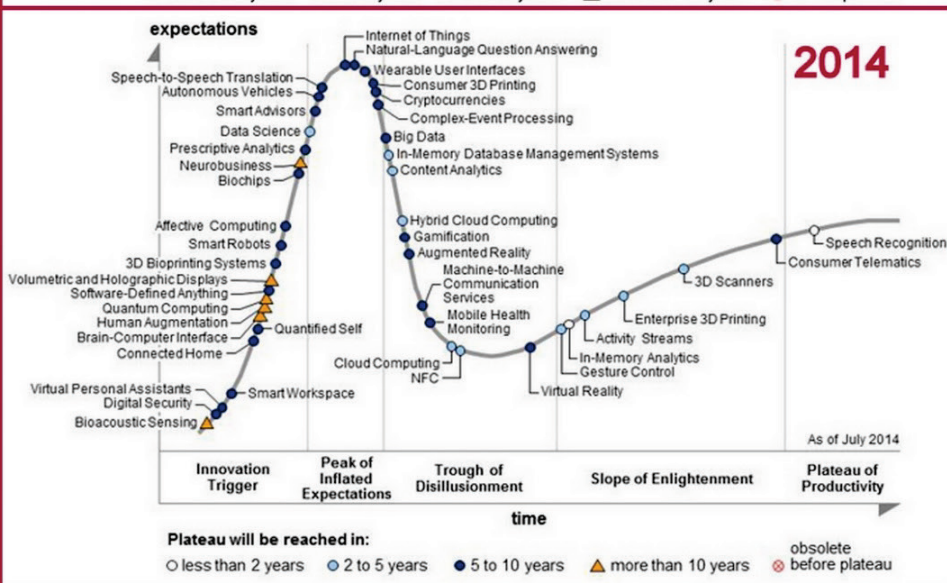
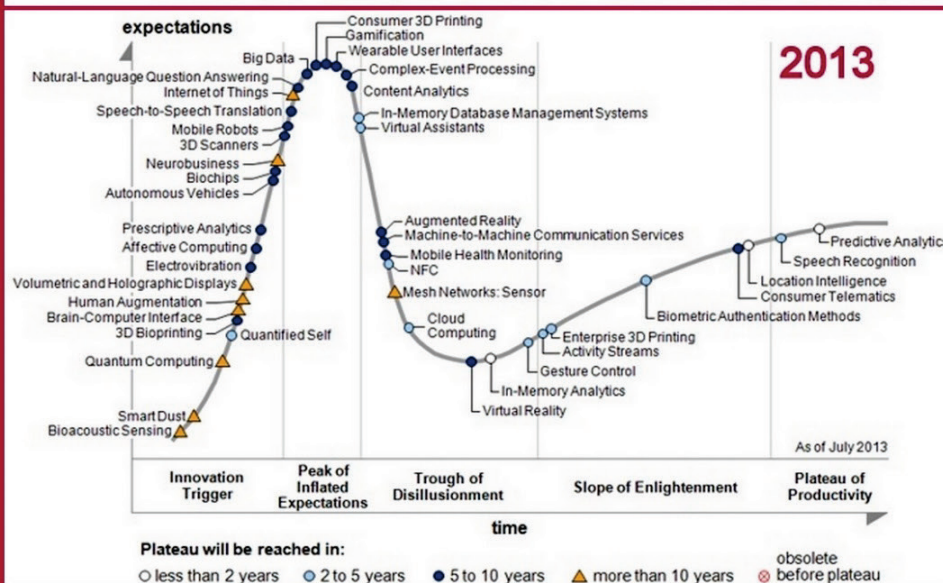
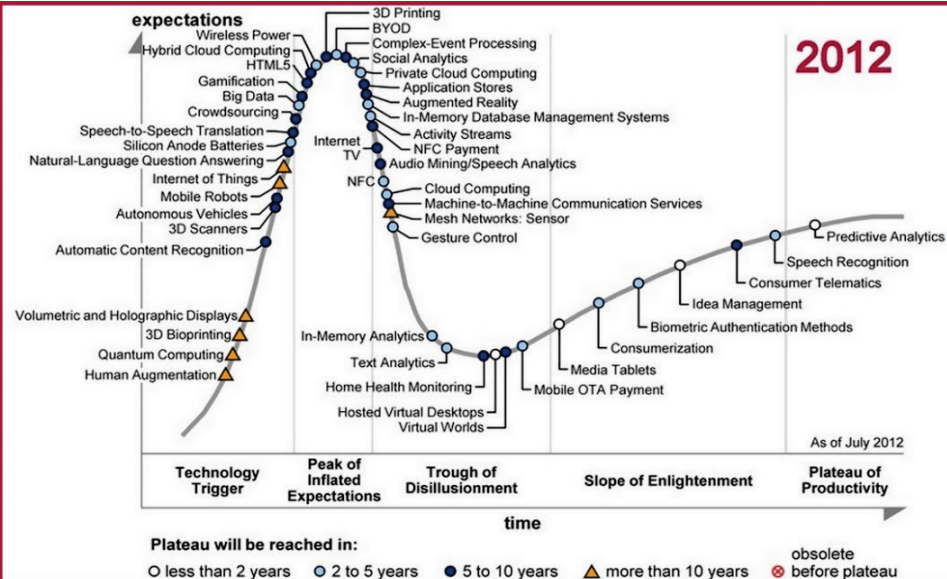
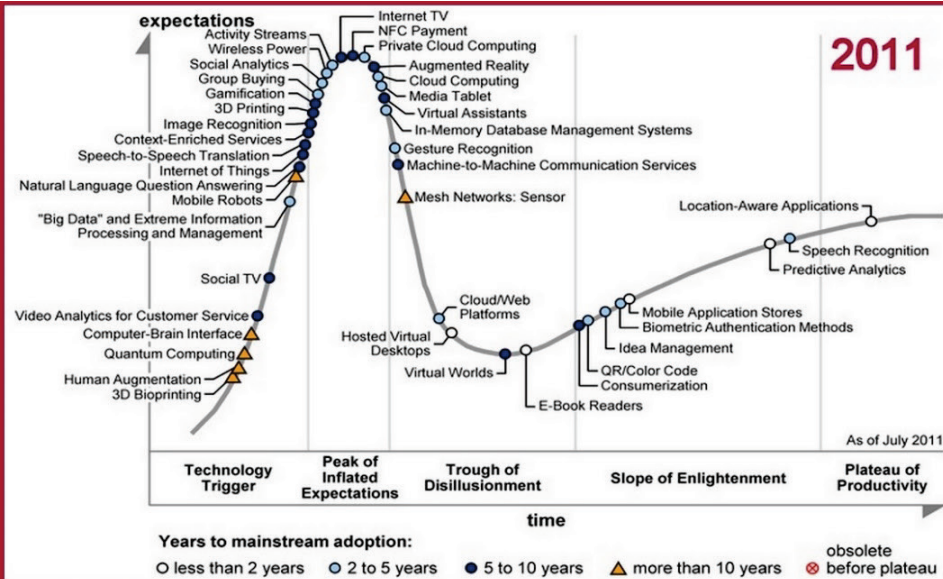


[1] <http://www.gsma.com/connectedliving/wp-content/uploads/2012/03/gsma2025everycarconnected.pdf>
[2] <http://www.reuters.com/article/2013/12/31/us-autos-selfdriving-cars-idUSBRE9BU0HJ20131231>
[3] <http://www.autoblog.com/2014/01/02/all-cars-autonomous-self-driving-by-2050-study/>
[4] <http://www.singularity.com/>
[5] <http://www.theguardian.com/technology/2014/oct/27/elon-musk-artificial-intelligence-ai-biggest-existential-threat>
[6] <http://qz.com/335768/bill-gates-joins-elon-musk-and-stephen-hawking-in-saying-artificial-intelligence-is-scary/>
[7] <http://uk.businessinsider.com/steve-wozniak-artificial-intelligence-interview-humans-family-pets-2015-3?r=US>
[8] <http://www.entrepreneur.com/article/244236>

Transportation Related Technologies in Gartner's Hype Cycle



Gartner's Hype Cycle 2011-2014



What predictions about the future of transportation will become true?

The best way to predict the future is to create it.

-- Dennis Gabor, Alan Kay, Steven Lisberger, Peter Drucker, and many others ^[1]

[1] <http://quoteinvestigator.com/2012/09/27/invent-the-future/>

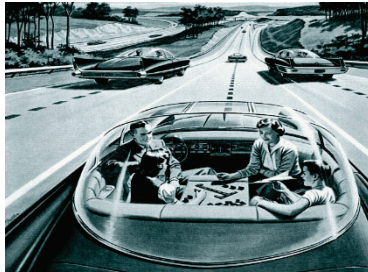
The Future of Transportation

to be more connected, automated, intelligent, electric and electronic



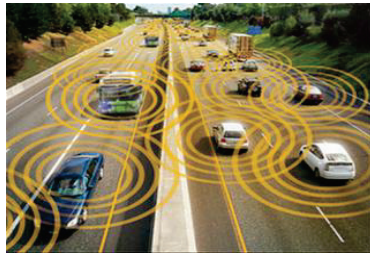
As smart as or even smarter
than a human driver

Intelligence



Automation

From driver assistance
to driverless



Connectivity

V2V, V2I, V2P, V2X, ...



Electronification

Faster evolution,
easier production,
easier maintenance,
more applications, ...



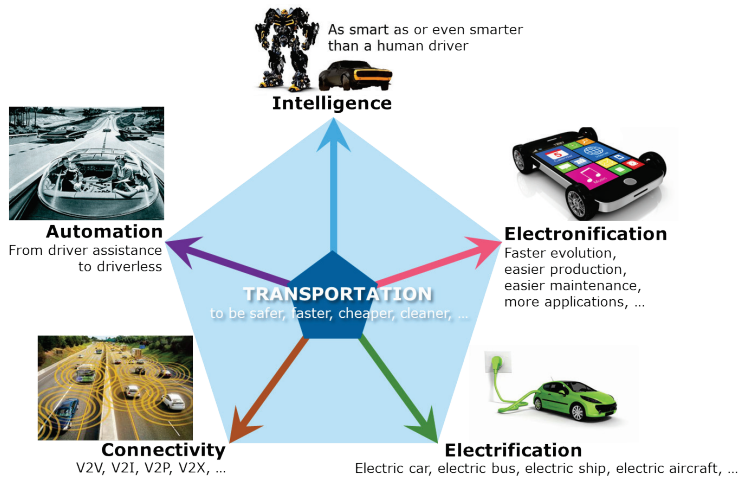
Electrification

Electric car, electric bus, electric ship, electric aircraft, ...

TRANSPORTATION
to be safer, faster, cheaper, cleaner, ...

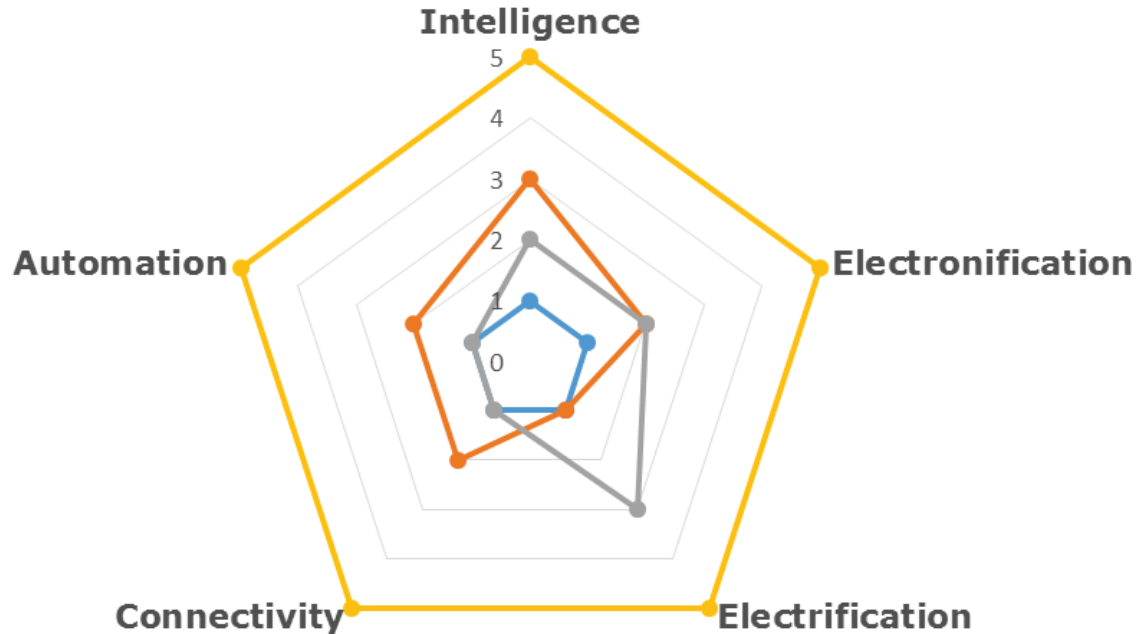
The Future of Transportation

Vehicles in a radar chart view



VEHICLE BENCHMARKS IN A RADAR CHART

- The majority of today's new vehicles
- Today's most advanced self-driving vehicles
- Today's most advanced electric vehicles
- Vehicles in 2040



IEEE Transportation Standards

Advancing the Technologies for Connected Vehicles through Consensus Building

(December 2014 Edition)

Connectivity

IEEE 802.3

Defining the physical layer and data link layer's media access control of wired Ethernet, in local area networks and wide area network applications.

IEEE 802.15

Wireless personal area networks allows the use of wearable and other short-range wireless devices (such as health monitors).

IEEE 802.20/802.21/802.22 Series

Communications standards for connecting vehicles to 802 systems.

Transportation Electrification

IEEE 2030 and its related standards are the first all-encompassing standards series providing alternative approaches and best practices for achieving smart grid interoperability.

IEEE 1547 Series

A series of standards for distributed power to maximize the benefits of interconnection.

IEEE P1562

Standard for array and battery sizing.

IEEE 1901 Series

Standards relating to broadband connectivity over electric power lines.

Intelligent Transportation Systems

IEEE 1609

A family of standards defining the architecture, services and standard interfaces for secure vehicle-to-vehicle (V2V) and vehicle-to-infrastructure (V2I) wireless communications.

IEEE 1616

Standards for motor vehicle event data recorders.

IEEE 802.11

WLAN to support communication between vehicles and the roadside and between vehicles while operating at speeds up to a minimum of 200 km/h for communication ranges up to 1000 meters.

Traffic Safety

IEEE 1512

Multiple standards for traffic safety and emergency communication.

Smart Rail

A wide range of standards relating to electric rail operation including IEEE 11-2000, IEEE 16-2004, P1653.1, P1791, P1833, P1883, P1884, P1887, P1896, P2406, 1536, 1558, 1568, 1570, 1628, 1629, 1630, 1653 series, and 1698. As well as a series of standards relating to communication for rail transit systems, including IEEE 1473, 1474, 1475, 1476, 1477, 1482.1, and 1483.

And more...

IEEE Standards Coordinating Committee on Transportation (SCC42) leads the coordination of IEEE standardization activities for technologies related to transportation.

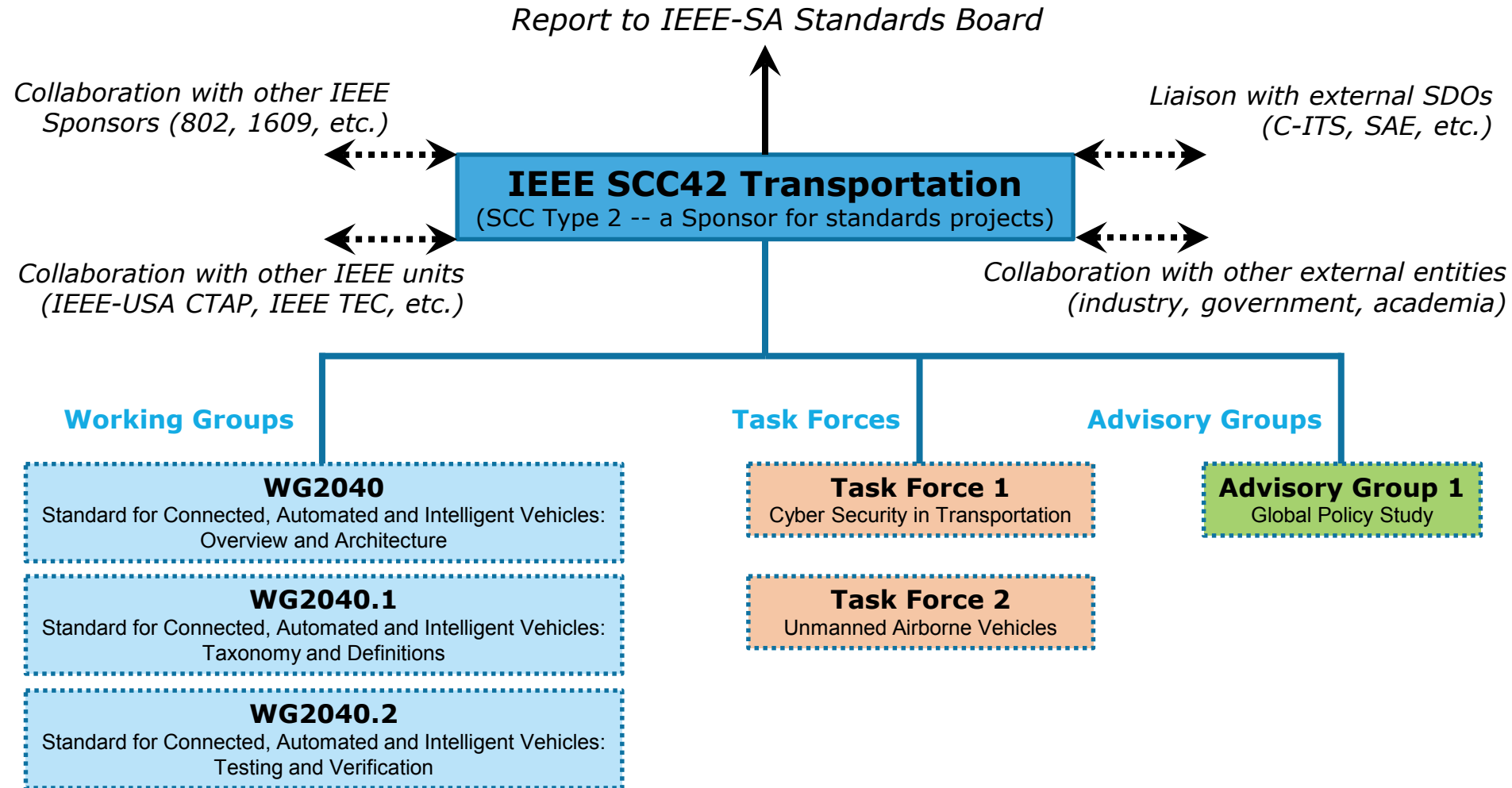
IEEE SCC42 Transportation

(IEEE Standards Coordinating Committee on Transportation)

- On Aug 21, 2014, the IEEE-SA Standards Board established a new committee -- **IEEE SCC42 Transportation** (IEEE Standards Coordinating Committee on Transportation). Being supported by over 30 IEEE Societies and Councils, IEEE SCC42 Transportation leads the coordination of IEEE standardization activities for technologies related to transportation, especially in the areas of connected vehicles, autonomous/automated vehicles, inter- and intra-vehicle communications, and other types of transportation electrification. These technologies include but are not limited to Mobile Apps, Sensor Networks, and Communications that allow human to vehicle, vehicle to vehicle, vehicle to infrastructure, vehicle to platform, and vehicle to everything exchange of information and data. Where standardization needs exist, the SCC will develop guides, recommended practices, standards, and common definitions of terms.
- IEEE-SA press release on Oct 14, 2014:
 - http://standards.ieee.org/news/2014/ieee_scc42_transportation.html
- *Contact: Dr. Yu Yuan* y.yuan@ieee.org

IEEE SCC42 Transportation

Current committee structure and ongoing work



The 4th International Conference on Connected Vehicles and Expo

19-23 Oct 2015, Shenzhen, China

www.iccve.org/2015

■ About the conference

- The world's most searched connected vehicles conference on Google
- Cosponsored by over 20 organizations including multiple IEEE Societies and Councils, TRB, SAE, ACM, IFAC, etc.
- Enjoy and benefit from the cross-disciplinary community that ICCVE conferences uniquely offer: civil engineers meet with computer scientists, mechanical engineers talk to electronic engineers, ...
- IEEE SCC42's face-to-face committee and working group meetings will be held in conjunction with the conference

■ About the Shenzhen city

- The capital of electronics industry in China
- One of the four Tier-1 modern cities in China
 - Modern infrastructure and facilities
 - Convenient transportation to/from all major cities in China
- Authentic dim sum and Cantonese cuisine
- Adjoins Hong Kong and Macau
 - Attendees can visit three famous cities and experience diverse cultures in one trip



Thanks



Contact me

Email: y.yuan@ieee.org

LinkedIn: <http://www.linkedin.com/in/dryuyuan>