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Spring is the time for rhododendron and azaleas on the East Coast of the United States, and Princeton is in full bloom just at the time of the SmartDrivingCar Summit in May.



Third Annual Princeton SmartDrivingCar Summit



Fine Hall at Princeton University

*THIS IS THE third year in succession that Professor Alain L. Kornhauser, Director of Princeton University's Transportation Program and Faculty Chair of Princeton Autonomous Vehicle Engineering (PAVE), has organized the **Princeton SmartDrivingCar Summit**. The Summit takes place in mid-May, after classes are completed but before commencement and class reunions take place at the end of the month. It is a gathering of men and women from the business, academic and government sectors who are engaged in some way in the world of transport. What's the Summit all about? Professor Kornhauser does not spare words in his description of the event: It's intended as a forum for all those interested in "achieving safe, inclusive, affordable, energy efficient and environmentally responsible on-demand 24/7 mobility—especially the mobility disadvantaged." You had to recite this at the dinner on Wednesday evening in order to get served.*

On the evening before the start of the Summit, Professor Kornhauser and his wife Elizabeth hosted a dinner reception at their spacious home. For the second year in a row, rain kept us indoors, all the better to meet at least half of the Summit's one hundred attendees over food and libations. Once again, it was a great start to a great event.

Day One: The Global View on SDCs

Clear skies and warm sun set the tone for the first day of the **SmartDrivingCar (SDC) Summit**. This year's venue was divided between Fine Hall, which has been the home of Princeton University's Mathematics Department since 1969 (see photo in sidebar), and large classrooms in the adjacent Lewis Library. At last year's Summit, for the plenary sessions we sat at large round tables in a big room at the Engineering School, sort of dinner theatre style. This year, we were in a more traditional conference setting in the large auditorium at Fine Hall. We moved to the classrooms for three parallel two-hour workshops held on Wednesday afternoon, Thursday morning and Thursday afternoon.

On the first day, for seven hours, from 8.30 to 15.30, with the exception of a fifteen-minute coffee break, a half-hour pause for lunch and a forty-five minute mini-panel discussion, we had twenty presentations that ranged from between ten and twenty minutes in length. It was rapid-fire from start to finish without breaks for questions. This followed the same pattern as previous Summits. Here are some of the highlights.

My three favorite presentations—that were most on topic for the Summit—were by Katherine Freund, President and Founder of ITNAMERICA, Anil Lewis, Executive Director of Blindness Initiatives, NATIONAL FEDERATION OF THE BLIND, and Edward Friedman in the New York City Mayor’s Office for People with Disabilities. Katherine’s topic was *Dignified Transportation for Seniors*. ITNAMERICA’s service is directed at older people in non-urban areas, where transportation is less available. It is a non-profit organization which relies on volunteers who drive their own cars to pick up seniors who need rides. The organization has no restrictions on where the riders wish to go, such as only to a doctor’s office or to a senior center. Katherine said something that I have seen both in my own family and in places where my wife and I have lived. Older people need more than a car arriving at the street in front of where they live. They often need help getting to and from their home, assistance with carrying bags or putting their walkers into the car. Cars without drivers would not do much for delivering dignified transportation for seniors with such needs.

Anil gave a view from people with visual challenges. He said that you cannot retrofit functionality in driverless vehicles you are intending to offer to blind people. You need to begin the design process by analyzing and incorporating the requirements of the blind right from the start. He said his organization tried to collaborate with Google when it was first developing its driverless vehicle, but Google declined the offer. It said it would have to develop driverless cars first and would then look at specific issues for various types of users. Edward’s message was similar to Anil’s, which is that you need to design with accessibility in mind from the very ‘git-go’, as he put it throughout his talk. We also need to remember that it is not only for people who have permanent disabilities that we must design for accessibility; at some point in our lives, accidents or illness will cause temporary disabilities.

There were kernels of wisdom in each of the presentations. Sam Schwartz, also known as ‘Gridlock Sam’, warned that taking peo-

ple off transit and putting them into smaller vehicles would increase the number of people dying in accidents, simply because transit has significantly fewer accidents per passenger mile than cars. David Kidd of the HIGHWAY LOSS DATA INSTITUTE, whose organization has tested the automated driving systems from, among others, MERCEDES-BENZ, BMW, TESLA, VOLVO and INFINITY, said that HLDI has concluded that the building blocks for self-driving and ADAS must be improved before we can start to try to get driverless cars to work properly.

Time to catch our breath

The mini-panel held right after lunch gave us all a chance to slow down, catch our breath and begin to ask questions. The panel was titled *Facilitating Technological Innovation in AVs*, and featured Bernard Soriano from the CALIFORNIA DEPARTMENT OF MOTOR VEHICLES and Robert Porreca, from the NJ MOTOR VEHICLES COMMISSION. It was moderated by Bryant Walker Smith from the U. OF SOUTH CAROLINA LAW SCHOOL. ‘Facilitating’ in this context meant providing legislative relief to putting driverless cars on public roads.

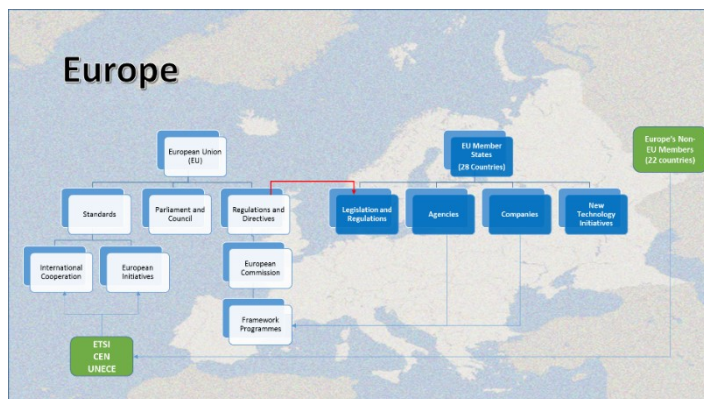
Bernard said that California now allows completely driverless vehicle operation, but so far only *Waymo* has been approved for operation of a driverless vehicle. That was in October 2018, but the company has still not put a driverless vehicle on the roads. Since 2014, there have been 155 crashes in California involving cars in which a safety driver has been present. 50% of these have involved *GM Cruise* or *Waymo* vehicles. Both Bernard and Robert lamented the fact that there are no standards for ensuring safe operation. Every manufacturer of cars, and companies that retrofit system to cars (such as *Waymo*), are developing according to their own guidelines.

I wanted to ask a question about the panelists’ view about the possible difference in responsibility between an automotive OEM that designs the entire vehicle and incorporates driverless functionality into the vehicle’s components and companies like UBER and subsidiaries like *Waymo* that design driverless software and hardware and retrofit it to existing vehicles. *Waymo* and *GM Cruise* are retrofitting and they have higher accident rates than automotive OEMs. Is there any correlation? But I was not aggressive enough to attract the attention of the moderator.

At 3 p.m. we divided into three groups for separate workshops. The idea of the workshops is to address a specific issue that is either a current roadblock to putting driverless vehicles on the road

or is a potential enabler of driverless vehicles. One of the workshops dealt with ridehailing as a precursor to affordable shared ride mobility for the mobility disadvantaged. Another looked at artificial intelligence and data. The third was about what is happening in Europe. All of them would have been interesting to attend, but one had to choose. Your editor moderated the workshop titled *Driverless Mobility Initiatives in Europe*.

Driverless Mobility Initiatives in Europe



The **SmartDriving-Cars Summit** is essentially U.S.-centric. The only reference to Europe or other parts of the world by presenters during the twenty presentations was by Laura

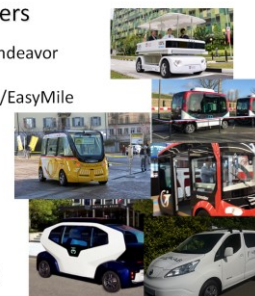
Kornhauser (daughter of Professor Kornhauser and CEO of STRATIFY). She referenced AI guidelines released by the EU in December 2018. Although there is talk of international cooperation and coordination of standards and regulations, there is also a natural predilection to seek competitive advantages for the regions' respective companies. Nevertheless, the Summit has encouraged and attempted to foster an understanding of what is happening in both Europe and Asia.

Michel Parent, President of AUTOKAB, explained why there are so many tests of self-driving shuttles in France. France is the largest producer of self-driving shuttles which are used in tests in France and all over the world. One of those companies is AUTOKAB. Why aren't France's two automotive OEMs, PSA and RENAULT, producing driverless shuttles? Adriano Alessandrini, Professor at the University of Florence and Director of *CityMobil2*, the EU-funded road transport system project, gave us his take on the reason. If a car company creates a hit with driverless shuttles, it will eventually take sales away from its cars, which are much more profitable. Both Michel and Adriano called for more investigations into the designs of roadways that would be necessary to increase the speed of driverless shuttles, which is currently too slow to be a serious alternative to other mobility modes.

Jacques Amselem, Head of IoT for ALLIANZ TECHNOLOGY and based in Paris, offered us the European view on liability, access to accident

French Players

- ☐ Induct/Endeavor
- ☐ Robosoft/EasyMile
- ☐ Navya
- ☐ Lohr
- ☐ Milla
- ☐ AutoKAB



This is a driverless shuttle being tested in Sweden by Stockholm's public transit company, Stockholms Lokaltrafik (SL). It is one of three field trials currently going on in Sweden.

and usage data, the need for technology transparency and awareness and training of connected and automated vehicles (C-AVs). He presented the five guiding principles for accessing on-board data that have been recommended by the EU C-ITS group, including consent by the data owner, open and undistorted competition, data privacy and data protection, tamper-proof access and standardized data access. These principles would be an excellent basis for establishing international standards.

Those of us in this workshop have recommended to Professor Kornhauser that the view from Europe should be part of the plenary sessions, not a parallel workshop, because of its importance to all of the attendees.

Before the first day ended we all were invited to the second social event of the Summit, the Wednesday evening reception and dinner at the Princeton Faculty Club in what was the university's President's residence.

Day Two: The Business and Institutional View

On the second day of the Summit, Professor Kornhauser opened it with a one of his signature monologs. This one was on why he does like the *SAE Six Levels of Automation*. If you have heard him at other conferences or read his weekly blog, you will know that his aversion to the SAE structure is complete and intense. He believes that the first level, zero, is irrelevant because it simply states the obvious, that there is no automation. The five additional levels suggested by SAE provide distinctions that, in his view, are neither easily distinguishable nor understandable by anyone other than technicians. He believes that three levels cover all of the different markets and business cases. These are:

- Safe Driving – the vehicle brakes automatically in order not to hit another car, an object or a pedestrian.
- Self-driving – the vehicle has automated driving features, but there is 'adult supervision' of the vehicle at all times and the human driver is ready to take over the driving task whenever it is deemed necessary.
- Driverless – "It's an elevator or it's a train in unattended operation."

There was a good discussion among the participants. Some defended the SAE approach while others suggested that there might be only two levels, one with an attentive driver and one without.



Professor Alain Kornhauser is clearly pleased with the results of the first day of the Summit just prior to dinner being served at the Wednesday evening reception.



Jacques Amselem is smiling for the camera at the Summit dinner.

I, too, am skeptical about the SAE's six levels. Advanced driver assistance systems need to get much better to assist drivers in all situations before we turn over the complete driving task to robots.

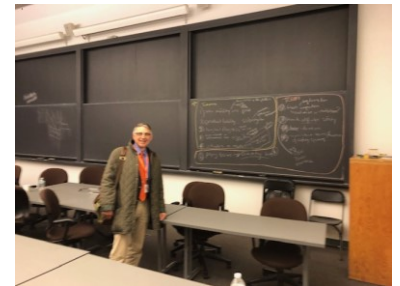
Once again, we broke into three groups for workshops. The morning workshops were on design of affordable, driverless, shared-ride 'mobility machines', perspectives from insurance industry, and creating a welcoming environment in New Jersey for shared ride mobility. I was a designated discussant at the insurance workshop, so that is where my time was spent.

Perspectives from the Insurance Industry

This workshop was instructive because of the discussion it generated about how cars that drive themselves could potentially affect the business of insuring individuals against loss of life and damage to property, and insuring the developers of vehicles with self-driving features against liability for those losses. This type of discussion, in which different interest groups sit in the same room, is all too rare. There are so many liability questions that I have not seen addressed, such as who is responsible for an accident to a person when he or she is entering a vehicle that is unattended. If I miss a medical examination because a driverless car cannot navigate to the hospital, and I have to pay for the missed appointment, who covers that cost? These questions need to be discussed in a multidisciplinary setting, with representatives of the automotive and insurance industries sitting in the same room.

OEMs and Dealerships

This was an afternoon workshop that definitely should have been attended by all of the Summit attendees. Its full title was *OEMs & Dealerships as the Force Behind Self-driving Cars*. Ably moderated by Sheldon Sandler, the panel comprised seven dealer representatives and myself. I can detect a moan from my OEM readers. Why not have representatives from the OEM headquarters staff who could address their driverless research development directly? The answer is simple: They won't agree to come. Last year, Professor Kornhauser and I tried for months to convince VOLVO CARS to attend to discuss its Drive Me initiative, either with a representative from the national sales company in Rockleigh, NJ or someone from Gothenburg. There was not even a response from most of those who were contacted. The OEMs are simply not talking about their driverless activities outside of a limited number of public events and in sanctioned press releases.



Here is your editor following the insurance workshop. Action items and take-aways are written on the blackboard. The photo was taken by Jacques Amselem, who was a major contributor to the discussion in the workshop.

But, do you know what: having the dealers, who meet the people who will decide to buy—or not to buy—a car with all the bells and whistles being put on them by the developers back in Munich and Dearborn was even better than having staff or management that are coming up with the bells and whistles but who refuse to talk about it. What they said was that customers are not clamoring for connected, automated and safety-featured vehicles. Customers expect cars to be safe when they buy an expensive car, like a MERCEDES-BENZ or a BMW, and when they come into a VOLVO showroom, they come there because they expect a car they would buy to be safe. Matt Long, whose family owns three Volvo dealerships in the Princeton area, said that only 15% of the people coming to his showrooms ask for advanced driver assistance features. It was a lively discussion, again, one that should have been heard by all of Summit attendees.

Take Aways from the Summit

The Summit was over at 16.00 on Thursday. Many of us who were not rushing off to catch a train or plane lingered over coffee in the Fine Hall courtyard and reflected over the two days we had just experienced. I had the feeling we were just getting started. There was so much more to discuss. Here are my main thoughts:

- It's not a place to make sales pitches.
- The people who attend are there to learn and share what they know.
- It would be useful to have people who are actually involved in the design and development of vehicles with self-driving and driverless capability, but only if they are willing and able to talk.
- The workshops were excellent—at least the ones I attended—because they were organized around active participation by the attendees. In my opinion, the content of the workshops would have been of interest to every attendee. Parallel workshops means that everyone is missing two-thirds of what they would have gotten if they could have attended all the workshops.
- We have a better understanding than we did one year ago of the up-and-downsides of driverless alternatives versus alternatives with drivers for increasing the mobility of the mobility disadvantages. That still does not mean that we are closer to implementing them.

I for one am already looking forward to next year's Summit, and I hope to see even more readers of **THE DISPATCHER** in Princeton in May 2020.

European Commission is getting it wrong on V2X

1. *Delegated Regulation on Cooperative Intelligent Transport Systems (C-ITS).*

1. This Regulation establishes specifications necessary to ensure compatibility, interoperability and continuity in the deployment and operational use of Union-wide C-ITS services based on trusted and secure communication. It lays down how vehicle-vehicle, vehicle-infrastructure and infrastructure-infrastructure communication is to be conducted by means of C-ITS stations and how C-ITS stations are to be placed on the market and put in service, to enable the provision of C-ITS services to ITS users.

2. This Regulation applies to all C-ITS stations in the field of road transport and to their interfaces with other modes of transport.

3. The deployment of C-ITS stations is carried out in accordance with Article 5 of Directive 2010/40/EU. Member States shall designate the part of their transport network infrastructure that is equipped with C-ITS stations.



Violeta Bulc, European Commissioner for Transport (2014-2019)

HOW THE EU WORKS: The Commission proposes; the Council of Ministers ponders; and, the Parliament passes. This may appear to give the Commission a great deal of leverage. In fact, it does. But the heads of the Member States (i.e., the leaders of the 28 countries that currently comprise the EU) and the Members of Parliament do not want to appear to be pushovers. They want to be convinced that what the Commissioners are proposing is good for their countries and good for the EU as a whole.

As part of the lobbying process for a Commission proposal, it is standard procedure for the head of a Directorate or a Commissioner with portfolio who is in charge of a particular proposal for either a *Regulation* or a *Directive* to write to the Member of Parliament in charge of the parliamentary committee that receives the proposal. On the 4th of April 2019, Violeta Bulc, European Commissioner for Transport, accompanied the Commission's recommendation on the *Delegated Regulation on Cooperative Intelligent Transport Systems (C-ITS)* that was adopted by the Commission on the 13th of March 2019¹ with an introductory memo to Karima Delli, Chair of the European Parliament Committee on Transport and Tourism. She was writing to "obtain Ms. Delli's support for this Regulation that will lead to accelerate the rollout of C-ITS on European Roads."

A politician could have been forgiven

What I found most remarkable about this introduction memo is that it is written by a person who has all the qualifications for understanding, evaluating and discussing communications technology, but the introduction memo is full of misleading and incorrect statements. She has a BA in computer science and informatics and a Master's of Science in information technology. She has worked in both the IT and telecommunications industries before entering politics in 2013 and skyrocketing into the position of the European Commissioner for Transport which she has held since November 2014. I will take the major claims in the introduction memo in turn, but first please read the sidebar that summarizes the purpose of the *Delegated Regulation*.

Claim One: “Despite many claims, there is only one technology available for deployment today: Wifi (802.11 pp or ITS-G5).”²

If you begin with *incorrect premises*, it is improbable that you will end up with correct conclusions. There are two problems with Claim One. First, IEEE 802.11 is a standard which is the basis of all products marketed as Wi-Fi.³ IEEE 802.11p is an approved amendment to the IEEE 802.11 standard which was introduced to add wireless access in vehicle environments (WAVE).⁴ IEEE 802.11p defines enhancements to IEEE 802.11 which are required to supply ITS applications, including data exchange between high-speed vehicles (V2V) and between vehicles and the road infrastructure (V2I). It uses the licensed band of 5.9 GHz. It is the basis of WAVE (the mode of operation used by IEEE 802.11 devices to operate in the Digital Short-Range Communication 5.9 GHz Band allocated for ITS communications) and ETSI ITS-G5 in Europe.⁵

IEEE WAVE (U.S.) and ITS-G5 (EU) are both based on IEEE 802.11p, and they are similar but not identical. They can be grouped together as a technology solution for V2V and/or V2I (along with vehicle to pedestrian, all can be referred to as V2X), but an ITS-G5 system is not interoperable with an ITS WAVE system.

The second problem with Claim One is that the 802.11p-based solutions are not alone in being available now for deployment. 3GPP finalized the ***Cellular Vehicle-to-Everything*** (C-V2X) specification Release-14 in March 2017, and 5GAA has been helping to define and test the protocols and specifications since then.⁶ C-V2X will be ready for deployment in 2019, and AUDI, FORD, PSA and SAIC (China) are leading the effort. Engineering and field operational tests for C-V2X are taking place in the U.S., Europe, China and Japan.

Claim Two: “Users will have to wait years and taxpayers will have to pay hundreds of billions of euros for a new network (5G) to get access to these services.”

5G is not the basis of C-V2X, and C-V2X requires no additional infrastructure to implement, as does ITS-G5 and IEEE WAVE. C-V2X can be implemented with no infrastructure investment because it uses the existing cellular network for long-range communication and the dedicated ITS spectrum for V2V or V2I short-range communications. Safety messages are sent using low latency transmission direct communication in the 5.9 GHz ITS band on the PC5 interface, as shown in the diagram below.

2. It is Wi-Fi and 802.11p. The name Wi-Fi is sometimes written as WiFi, Wifi, or wifi, but these are not approved by the Wi-Fi Alliance.

3. The Institute of Electrical and Electronics Engineers (IEEE) is a professional association formed in 1963. The IEEE Standards Association is an organization within IEEE that develops global standards in a broad range of industries. The Wi-Fi standard IEEE 802.11 is one of them.

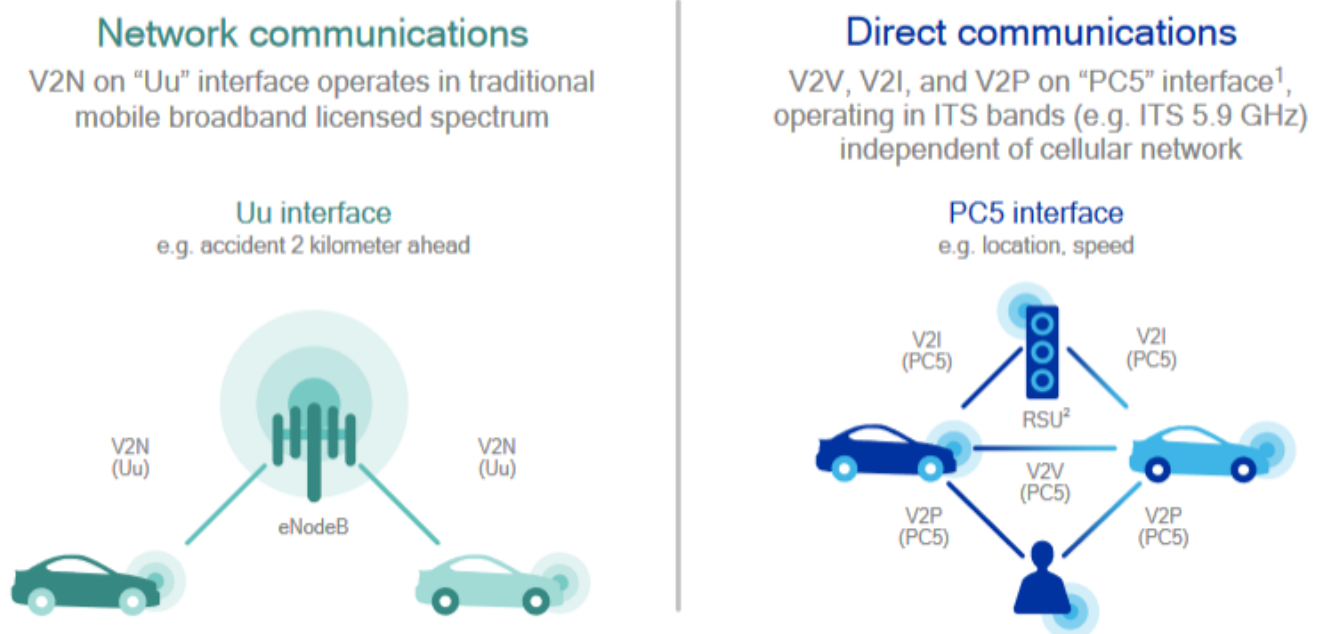
4. IEEE 1609 is a family of standards for Wireless Access in Vehicular Environments (WAVE), and IEEE 802.11p is the basis for WAVE. See https://csi.dgist.ac.kr/uploads/Seminar/1407_G5_WAVE_KKB.pdf

5. The European Telecommunications Standards Institute is an independent, non-profit standardization organization in the telecommunications industry in Europe.

6. **3GPP** - The 3rd Generation Partnership Project (3GPP) is a standards organization which develops protocols for mobile telephony. **5GAA** – The 5G Automotive Association is a global, cross-industry organisation of companies from the automotive, technology, and telecommunications industries (ICT), working together to develop end-to-end solutions for future mobility and transportation services.

That there are no investments required for the 802.11p-based system is the great myth. The roadside units required for V2I and to make V2V secure are going to cost hundreds of millions of dollars/euros. There is no business case for this infrastructure because it can only be used for short-range communication, so the money for it will have to come from the country governments. The U.S. Department of Transportation made it clear that it would not provide funding for roadside units and that the introduction of V2V would have to rely on only car-to-car communication. This has been one of the main sticking points to its introduction in the U.S. because cybersecurity is a major issue.

C-V2X defines two complementary transmission modes



1. PC5 operates on 5.9GHz; whereas, Uu operates on commercial cellular licensed spectrum 2. RSU stands for roadside unit.

Claim Three: Over time, we will add multiple technologies to the mix (hybrid approach).

IEEE WAVE/ITS-G5 can co-exist with C-V2X in the 5.9 GHz spectrum, but once a portion of the spectrum is allocated to the 802.11p-based systems, there is no compatibility or evolution path from there to C-V2X or 5G. For this reason, GSMA has urged the Commission to adopt a technology-neutral approach in developing the EU's C-ITS, calling on the European legislators to allow the market to decide with technology is best. The *Delegated Regulation* is anything but technology-neutral, and this is the problem.

Claim Four: The Delegated Regulation would also not have been possible without the support of the automotive industry, which started development of ITS-G5 more than a decade ago and has developed all the vehicle-to-vehicle services.

VW has decided to move ahead with ITS-G5 in Europe, but AUDI is firmly behind C-V2X. On 16 April 2019, BMW and DEUTSCHE TELEKOM asked the German government to block the Commission's proposal to make ITS-G5 the primary connectivity standard for V2X. In a recent letter sent to German Transport Minister Andreas Scheuer, BMW CEO Harald Krueger and DEUTSCHE TELEKOM CEO Tim Hoettges said that adopting a standard that does not include 5G will see Europe fall behind other regions in vehicle connectivity. DAIMLER has stated its position as follows: For cars, C-V2X is preferred because it is the natural path to expand connected cars based on mobile networks, will be rolled out to cars much faster, will add additional potential safety improvements and will have lower investment impact to cars.

Claim Five: Furthermore, the situation in the U.S. is almost identical. The base line of the Department of Transport (Ed. It is Department of Transportation), just as ours, is ITS-G5 (or DSRC as it is called in the U.S.), already deployed by many states and the automotive industry.

The DSRC deployed in the U.S. is for tolling systems, which has nothing to do with V2X. Cadillac has been installing IEEE WAVE systems operating on the 5.9 GHz spectrum in its Cadillac models since 2017. TOYOTA had committed to start implementing IEEE WAVE in 2021, but on 26 April 2019, the company issued a statement in a letter to the U.S. Federal Communications Commission saying that “unfortunately we have not seen significant production commitments from other automakers,” and would therefore not move forward with their former commitment.

In December 2016, the Department of Transportation proposed to mandate IEEE WAVE in all new vehicles. When the new administration took office in January 2017, it decided not to act on the proposal. Last year, the acting head of the U.S. National Highway Traffic Safety Administration, Heidi King, said the agency's “past research has centered around DSRC — because that was the only technology available, but that NHTSA is now exploring other technologies, including cellular-based services being pursued by FORD MOTOR CO.” FORD said in January it planned to deploy cellular

In 1999, the FCC reserved 75 megahertz of spectrum in the 5.9 GHz band for automakers to develop technology to allow vehicles to communicate with each other. Called Dedicated Short Range Communications (DSRC), the technology could eliminate hundreds of thousands of annual car crashes, automakers and regulators say.

FCC Chairman Ajit Pai said in remarks to the Wi-Fi World Congress on Tuesday that “the time has come for the FCC to take a fresh look at this band” that has gone largely unused.

“This valuable mid-band spectrum is largely lying fallow, and it has been so for two decades now — just as the internet has gone from dial-up modems to gigabit Wi-Fi,” Pai said.

“It is time to launch a comprehensive review of the future of the 5.9 GHz band, make a sober assessment of the facts, and then make a timely decision.”

vehicle-to-everything technology, or C-V2X, in all new U.S. vehicle models beginning in 2022.

There is justice after all

The European Parliament replied to Commissioner Bulc with a public letter to the President of the European Commission, Jean-Claude Juncker. It was probably not the response either Commissioner Bulc or President Juncker expected and definitely not the one they wanted. This is what the Parliament wrote (I have added underlines for emphasis):

The European Parliament,

- having regard to the Commission delegated regulation (C(2019)1789),*
 - having regard to Article 290 of the Treaty on the Functioning of the European Union,*
 - having regard to Directive 2010/40/EU of the European Parliament and of the Council of 7 July 2010 on the framework for the deployment of Intelligent Transport Systems in the field of road transport and for interfaces with other modes of transport, and in particular Article 6(3) thereof,*
 - having regard to the motion for a resolution by the Committee on Transport and Tourism,*
 - having regard to Rule 105(3) of its Rules of Procedure,*
- A. whereas the European Cooperative Intelligent Transport Systems (C-ITS) strategy identified a risk of fragmentation of the internal market in the field of C-ITS and a need to lay down minimum requirements for C-ITS services to ensure their coordinated and coherent deployment;*
- B. whereas the Commission made use of the empowerment under Directive 2010/40/EU to adopt a delegated act to ensure compatibility, interoperability and continuity of C-ITS services in the deployment and operational use of Union-wide C-ITS services based on trusted and secure communication;*
- C. whereas according to the Commission, it is seeking to promote the use of a ‘hybrid communication approach’, which combines two types of technologies:*
- short-range communication technologies and longer-range communication technologies; whereas ITS-G5 has*



Jean-Claude Juncker, President of the European Commission (2014-2019)

been chosen as main reference for C-ITS deployment in short-range communication;

D. whereas a truly technology-neutral approach would consider all existing deployments using cellular networks and grant mutual interoperability at the service level, allowing all new technologies to be introduced in addition to ITS-G5;

E. whereas the Commission, through the requirement on backwards compatibility with ITS-G5, is setting limits to the development of innovative transport C-ITS solutions across Europe;

F. whereas the delegated regulation was formally transmitted only a few days before the beginning of the recess period and the Parliament has less than two months of scrutiny to assess the act;

(The European Parliament)

1. Objects to the Commission delegated regulation;

2. Instructs its President (Jean-Claude Juncker) to forward this resolution to the Commission and to notify it that the delegated regulation cannot enter into force;

3. Instructs its President to forward this resolution to the Council and to the governments and parliaments of the Member States.

Who will get the last word?

The last word has not been uttered. The Commission is not used to taking 'No' for an answer. Ask the French and Dutch who in 2005 voted against the proposed EU Constitution. They were told to keep voting until they came back with the correct answer, which was 'Yes'. Ask the British, who have been trying to extract themselves from the EU for the past two years. But, for the moment, the Commission has been given a verbal lashing and told to do their homework. Ms. Bulc will be vacating her position following elections in May and the seating of the new Parliament in July. A new President of the Commission and a new Commissioner for Transport may have different views. Then we shall see.

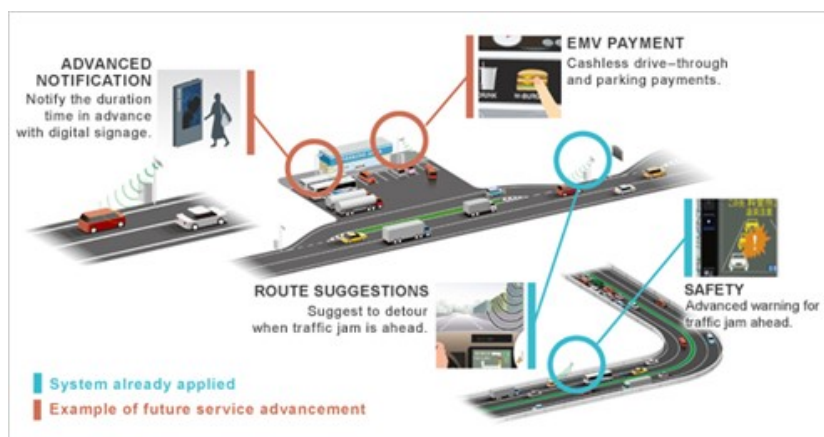
Toyota backs off IEEE WAVE in U.S.

TOYOTA MOTOR CORP announced on the 26th of April that it was halting plans to introduce IEEE WAVE technology into its U.S. vehicles as it had announced one year ago. It was in April 2018 that TOYOTA said it was committed to installing DSRC devices in its cars sold in the U.S. beginning in 2021. What happened—or didn't happen? Toyota said in a letter to the Federal Communications Commission (FCC) that “unfortunately we have not seen significant production commitments from other automakers.”

It was in 1999 that automakers were allocated a section of spectrum for intelligent transport system applications in the 5.9 GHz band. Since then, there has been a lot of testing and standardization work performed, but the spectrum has essentially gone unused. There have been suggestions by some FCC officials and cable companies about reallocating some or all of the spectrum for Wi-Fi and other uses. The U.S. Department of Transportation has invested over \$700 million in the system's development, and those who have been involved in the standardization and testing activities are determined to push forward with the IEEE WAVE concept based on 802.11p.

TOYOTA seemed to be firmly in this camp, mainly due to the fact that it has deployed DSRC services in Japan. Japan has allocated 5.8 GHz for electronic toll collection and the 760 MHz band for DSRC. Beginning in 2009, TOYOTA, NISSAN, ALPINE, PIONEER, PANASONIC, and MITSUBISHI ELECTRIC have deployed systems and services called ITS Spot Services.

ITS Spot Services in Japan shown in the illustration below consist of three basic services that are made available as an all-in-one system by high speed, infrastructure-to-vehicle communications.



TOYOTA said Friday's decision was based on “a range of factors, including the need for greater automotive industry commitment as well as federal government support to preserve the 5.9 GHz spectrum band for DSRC. The chance that the band could be subjected to “harmful interference from

unlicensed operations... creates a substantial and arguably insurmountable risk,” the company said. It said that it would “continue to re-evaluate the deployment environment” and said it is still a strong backer of DSRC “because we believe it is the only proven and available technology for collision avoidance communication.”

This view had been the ‘official’ position of the U.S. National Highway Safety Administration (NHTSA) under Mark Rosekind during the time that Barack Obama was President. Last year, the acting head of NHTSA, Heidi King, said the agency’s “past research has centered around DSRC — because that was the only technology available.” Now, NHTSA was “exploring other technologies, including cellular-based services being pursued by FORD MOTOR Co,” she said.

Uber: A Fool’s Gold

SCHUMPETER, in the April 27th issue of *THE ECONOMIST*, asked: “Can UBER ever make money?” His short answer was: “No.” His slightly longer answer was: “Yes, if it has no competition.” In his regular column at the end of the *Business* section, he reminds us of three facts that have been reaffirmed throughout the history of offering rides for payment:

- The taxi business is local, not global;
- As long as the taxis business is not regulated, it is relatively easy to enter a market and offer rides; and,
- Regulating the taxi business has been done in order to reduce congestion on a city’s streets by limiting the number of vehicles authorized to offer rides.

Schumpeter quotes from a paper written by Len Sherman of Columbia Business School comparing UBER’s business with that of unregulated taxis in New York City during the Great Depression. Many jobless workers turned to taxi driving to earn a living, and the relatively inexpensive *Ford Model T* provided the means to do it. The result was clogged city streets and cutthroat competition with no winners. In 1937, the Haas Act⁷ required taxi companies to purchase a license, called a ‘medallion’, for each taxi, and the number of medallions was limited to 16,900. Their original value was \$10, but by 2014, they were selling for \$1 million each. Unlicensed taxis numbered up to 100,000 in 2018, and the value of a medallion has plummeted.

It’s not the money Schumpey, it’s the data

As I have said on a number of occasions in these pages, UBER, LYFT and DIDI are not in the taxi business. For the foreseeable future,

7. The Haas Act was named for Lew I. Haas, Manhattan Democrat, that limited the number of medallions to 16,900. The medallion is attached to the taxi’s hood (bonnet).



they are also not in the money-making business either. Uber has lost \$7.9 billion since it was founded in 2009, and that trend does not look like it will be broken anytime soon. Its loss for 2018 was \$939. DIDI CHUXING lost \$1.6 billion in 2018.

There is nothing that can justify a \$100 billion valuation for UBER as it prepares for an initial public offering (IPO) except the promise of the data it will collect from its 90 million plus registered users and sell to anyone prepared to pay for it.⁸ Schumpeter does not even mention this. He simply says that UBER's IPO price is unjustifiably high. As long as we are willing to let companies profit from the data we hand over to them for free, we're the fools and they collect the gold.

As it turned out, UBER went to the market on Friday, the 10th of May, at a price of \$45 per share. On Monday it was down 18% to \$37.10, and it is trading 28% below its Series G stock price of \$48.77 when the company raised \$8 billion between December 2015 through October 2018. Its market cap in 22 May was \$69.82 billion. The fall in UBER's post-IPO share price is affecting its biggest investor, SOFTBANK, who saw its own shares fall 12% on the 14th of May. Things will get worse before they get better for Uber and for everyone who bought into its promise of lower costs with driverless cars. The only hope for UBER and for its investors is that it can deliver usable data. That may be easier said than done.

FCA and Tesla: Strange bedfellows

FCA AND TESLA have entered into an agreement that will allow FCA to count TESLA's cars as part of its fleet within the European Union. By doing so, FCA will be able to meet the new stricter EU regulations on average emissions that come into effect in 2021. In return for the favor, FCA will pay TESLA an unspecified (large) amount of money. This is legal. The EU is actually following an emissions credit mechanism that is already in place in the U.S. and which has resulted in Tesla earning hundreds of millions of dollars. The system allows companies whose cars emit more than the legal maximum amount of carbon dioxide to form so-called 'pools' with companies like TESLA have no (pump-side) emissions to pull their average emissions under the limit.

As of 2020, the average CO2 emissions of vehicles registered in the EU has to be under 95 grams per kilometer.⁹ For every gram above that limit, the manufacturer has to pay a fine of €95 for every car sold. FCA's current average is 126 gpk. A FCA spokesper-

8. Anyone who has an account with Uber, whether it's a customer or a driver, provides the company with his or her name, credit card number, mobile phone number, e-mail address, postal code. When a customer uses the Uber service, the company knows where you started your journey and when, where you ended your journey and how much you paid for the ride. It knows who you are and, with your name and postal code, can easily find your address. Every trip you make, Uber is watching you.

9. A phase-in period will also apply to the target of 95 g/km. In **2020**, the emission targets will apply for each manufacturer's **95%** least emitting new cars. From **2021** on, the average emissions of **all** newly registered cars of a manufacturer will have to be below the target. Manufacturers can group together and act jointly to meet their emissions target. In forming such a pool, manufacturers must respect the rules of competition law.

son said: "The purchase pool provides flexibility to deliver products our customers are willing to buy while managing compliance with the lowest cost approach." Does anyone else see the irony in an American company, TESLA, coming, to the rescue of what was a European icon, FIAT, pushed to the brink by Eurocrats? FCA's former CEO, Sergio Marchionne, held back on developing battery electric vehicles because the company lost money on every BEV it sold. For him, it was a choice between betting on the future or focusing on the present. The future eventually arrived. What would he think about getting into bed with Elon Musk?¹⁰

Tesla's fifteen minutes of European fame

15,755 TESLA MODEL 3s were sold in March in Europe, according to JATO DYNAMICS, a UK-based company providing competitive business intelligence for automotive manufacturers since 1984. This means that it was the best-selling model in the premium midsize car segment. *Mercedes-Benz C-Class* has owned the top spot followed by the *Audi A4* and *BMW 3-series*. It will be interesting to see if the sales in Europe follow the same downward trajectory as in the U.S. following the delivery of all the pre-ordered TESLAS.

A Road Trip Down Memory Lane

WHEN I WAS growing up in Scranton, PA, my cousin and I, who were the same age, were driven by our fathers to New York City to watch the *New York Yankees* play at Yankee Stadium in the Bronx. Route 46 was the road we took once we were in New Jersey. It led to the George Washington Bridge, across the Hudson River and to the stadium. We always made a stop at *Hot Dog Johnny's* along the way and ate one of the best 'dogs' between Scranton with its *Coney Island Texas Wieners* and *Nathan's* at the real Coney Island in Brooklyn. Construction on Interstate Route 80 as a replacement for Route 46 began in the 1960s and was completed in 1973. This took most of the non-local traffic off Route 46. You might think that that would have signaled the end of *Hot Dog Johnny's*. You'd be mistaken.

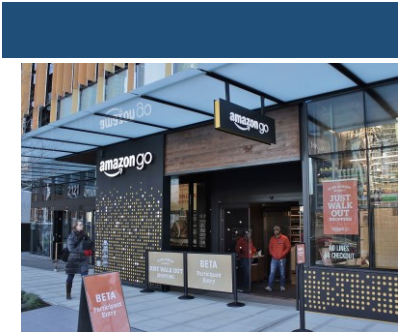
When I made the trek from Princeton after the Summit to Scranton for a family visit, I took the nostalgic route home with the intention of making a stop at *Johnny's*. It was still there, and the place was packed. I arrived at around noon, so the local lunch crowd was there, but there were a lot of out-of-state license plates in the parking lot. The hot dog was as good as ever, and the iced root beer in a classic glass mug made it taste even better. Some things don't change. Sometimes, they even improve.

10. "We still don't have a viable economic model for delivering an electric car," FCA CEO Sergio Marchionne told a group of reporters at an event on Monday. "As much as I like Elon Musk, and he's a good friend and actually he's done a phenomenal job of marketing Tesla, I remain unconvinced of the economic viability of the model that he's pitching."

Sergio Marchionne
October 2017



A Dispatcher's Musings: Here's looking at you, kid



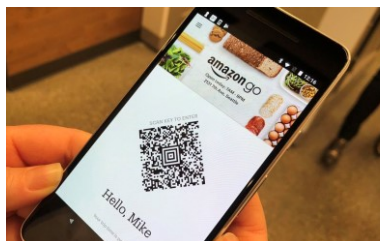
Amazon Go -The sign reads: Just Walk Out Shopping. No Lines. No Checkout. (No, seriously.)

<https://edition.cnn.com/2018/10/03/tech/amazon-go/index.html>

FASTER. CHEAPER. ZERO DEFECTS. That has been the mantra of manufacturers since long before Henry Ford invented the first truly integrated production line and Kiichiro Toyoda perfected it into lean production. They showed that handcrafting a car was not necessarily the only way to achieve the best end result and it was certainly not the way to achieve lower costs. Their companies built cars for the masses.

These principles of doing everything faster, less expensively and with fewer errors have found their way into everything we do today, from running companies to running our lives, and we apply the methods to everything from finding a mate to shopping for groceries. I'll leave the mate-finding for another time. I want to take a look at AMAZON's latest extension of its ever-expanding lines of business into the grocery shopping arena where its penchant for productivity has become legendary. The concept has been given the name *Amazon Go*.

AMAZON has developed a model for a grocery store that has no staffed checkout counters, no bar code reader checkout stations and no mobile bar code readers for scanning products when placed in the shopping cart. In a company presentation of the concept, Gianna Puerini, VP of *Amazon Go* said: "The company's plan from the beginning was ...what can we do so you could walk into the place, take anything you want and leave." It is assumed that she meant to add 'pay' to the plan, otherwise it's sanctioned shoplifting.



An *Amazon Go* store is equipped with sensor equipment connected to image processing software that tracks the individual shopper's movements from the time they enter through a turnstile using their pre-registered mobile app (see sidebar) until the time they leave through the turnstile with the same app. *Amazon Go* 'knows' everything the shopper has taken from the shelves and placed in their bag. Because it also stores every purchase you have ever made whenever you've been in the store—as well as your entire history with AMAZON—it can also help you along with making decisions. "Try this, Mike."

In search of a motive

Before we get to the technology, let's look at why AMAZON or anyone would spend time and money on such a setup. Recalling the article on 'jobs and tools' I wrote in the April 2019 issue of **THE DISPATCHER**, what are the jobs that the *Amazon Go* tool is intended to perform? From Ms. Puerini's statement we might conclude that it is to solve the shopper's problem of waiting in line at checkout. *CONSUMER REPORTS* published a report in April 2015 titled **Twelve Reasons Americans Hate Grocery Shopping**. Too few open checkouts was one of them, but it was by no means at the top of everyone's list. Congested aisles, too few choices (stores pushing their own brands), uninformed or indifferent staff, confusing layout, inept bagging (who still offers bagging?) were among the irritants. Too few open checkouts was the major problem listed for WALMART because everyone shops there for groceries and there will never be enough checkout cashiers. Inadequate parking was the biggest gripe with TRADER JOE's, the upscale store for the well-heeled, because their stores are located in places where the cost of land is at a premium and their prices are already high.

Stores don't provide cashierless checkout primarily for their customers' convenience; they do so to save money on the cashiers. They could move to all mobile or stationary bar code reading systems tomorrow, eliminating cashiers, but they don't because these systems introduce many other problems. Personnel are still needed when the automated checkout systems get hung up or when shoppers confuse them. My own experience is that both problems occur often. So let's get beyond the smoke screen to the real reasons AMAZON believes there is a market for something that is better than what exists today.

One strong candidate is to reduce shoplifting and employee pilfering. The margin for a grocery store is between 1-3%, among the lowest for any type of business. Globally, shoplifting alone costs retailers around \$50 billion annually.¹¹ Approximately 10% of that amount comes out of WALMART's pocket. Strategically placed cameras and plain clothes guards cannot watch everyone, but a ceiling full of cameras can. Adding a turnstile at the entrance where everyone must identify themselves before entering in itself would be a major deterrent.

Another motive is to be able to build stores where it is currently not economically feasible to do so today. Grocery store owners make money with volume. This is why they want to open as many stores as they can. But the stores have to be profitable. There are

11.
<http://money.com/money/4829684/shoplifting-fraud-retail-survey/>

large areas of the United States that are classified as ‘food deserts’¹², where grocery store chains simply cannot afford to build stores because of high crime rates and shortages of customers who can afford to pay for their goods. Both insurance and operation costs are high because of the added levels of security required. In 2010, the United States Department of Agriculture (USDA) reported that 23.5 million Americans lived in a ‘food desert’, meaning that they lived more than one mile from a supermarket in urban or suburban areas, and more than ten miles from a supermarket in rural areas.

Every step you take; every move you make

I’LL BE WATCHING YOU. Here’s what AMAZON says about how its *Amazon Go* system works: *“Rather than the user having to stop and “check out” with a cashier, teller or automated check station, because the picked items are already known and identified on an item identifier list associated with the user, the user may simply exit the retail location with the items. The exit of the user will be detected and, as the user passes through the exit (transition area), the user, without having to stop or otherwise be delayed, will automatically be charged a fee for the items (the items are transitioned to the user).”*

AMAZON says in its online FAQ and video that it is using a variety of technologies to collect the necessary data, including video cameras, pressure sensors, weighing scales, among others. It uses sensor fusion, image analysis, deep learning algorithms to combine data from different sensors to “increase the reliability and accuracy of the results.” The patent filing describes the confluence of sensor data:

“In some implementations, data from other input devices may be used to assist in determining the identity of items picked and/or placed in inventory locations. For example, if it is determined that an item is placed into an inventory location, in addition to image analysis, a weight of the item may be determined based on data received from a scale, pressure sensor, load cell, etc., located at the inventory location. The image analysis may be able to reduce the list of potentially matching items down to a small list. The weight of the placed item may be compared to a stored weight for each of the potentially matching items to identify the item that was actually placed in the inventory location. By combining multiple inputs, a higher confidence score can be generated increasing the probability that the identified item matches the

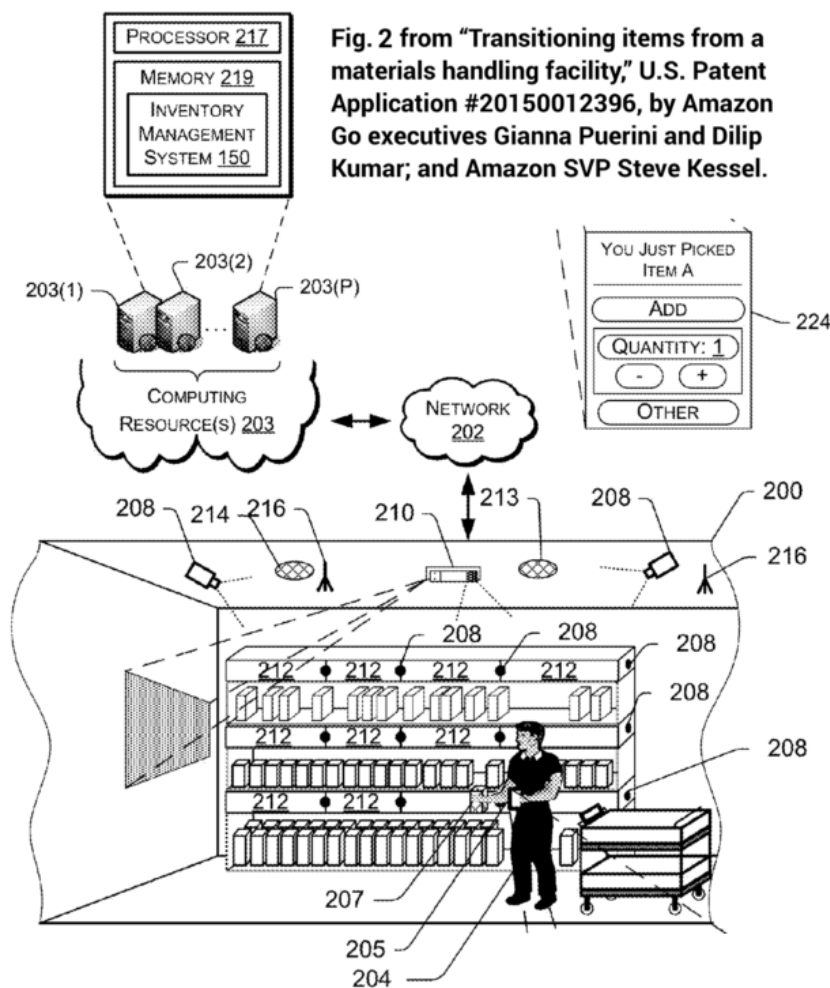
12. A ‘food desert’ is an area, especially one with low-income residents, that has limited access to affordable and nutritious food. According to the same source, an area with supermarkets or vegetable shops is a ‘food oasis’. Food deserts are characterized by a lack of supermarkets which decreases residents’ access to fruits, vegetables and other whole foods.

"The Community for Science-Based Nutrition | American Nutrition Association". americannutritionassociation.org.

item actually picked from the inventory location and/or placed at the inventory location.”

What if the shopper has a change of heart, or a parent decides that the liter of Coke their six-year-old picked up wasn't going to make the trip home: *“Take whatever you like. Anything you pick up is automatically added to your virtual cart. If you change your mind about that cupcake, just put it back. Our technology will update your virtual cart automatically,”*says AMAZON.

Below is a diagram from Amazon's patent.



Who wouldn't like to win the contract for supplying the millions of cameras that will be installed by AMAZON once they begin to roll out their stores?

For those who need assistance, AMAZON employees in bright orange shirts are around to restock items, prepare pre-packaged meals and to check IDs for those who want to purchase alcoholic beverages.

Because the all of the goods picked up by a shopper need to be tallied up at the end of the store visit and charged to a credit card connected to the app used to enter the store, the person picking up the goods must be connected to that app throughout the visit.



AMAZON says it uses facial recognition to identify the user. The patent filing also states that their system could “capture an image of someone’s hand as it crosses the plane of a shelf, analyzing skin color to help identify the person connected to the hand.”

Someone to watch over you

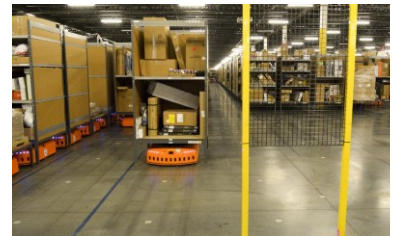
The same technology and algorithms that track a shopper’s movements to take products from shelves and place them in a shopping bag can be applied to workers in a fulfillment center filling cartons with products to be shipped to customers. AMAZON has built more than 100 centers in North America and a further 60 in the rest of the world. They are the basis for AMAZON’s \$207 billion online shopping business. They are vast, noisy places filled mostly with conveyor belts, movable shelves and robots whizzing the shelves around. Relative to their size, there are few people. They are highly automated ever since AMAZON bought KIVA SYSTEMS in 2012, maker of a robotics system (see sidebar) for moving shelves holding products to human packers, called ‘associates’. (WALMART also refers to its employees as ‘associates’.) Some associates put stuff into boxes that are then taken by the bots to a place where they are stored, while others take stuff out of the boxes delivered by the bots to be placed in boxes that will eventually be delivered into a customer’s hands.

Here we meet the lowly bar code reader again. It is the associate’s main tool, like a hammer for a carpenter and a keyboard for a journalist. Its main problem is that it turns an associate into a one-handed plucker because the other hand is holding the bar code reader. Putting the bar code reader in the ceiling gives the associates back one of their hands and increases throughput. AMAZON has a pilot project dubbed ‘Nike Intent Detection’ to test this concept. The person in charge of the project reports that “it feels very natural to the associates (to have all of their movements observed and recorded.)”¹³

The obvious next step is to give the associates earphones with a microphone so that they can communicate with *Alexa*. “Mike, could you show me the bar code on that book again.” *Sure, Alex.*

Who’s watching whom?

In George Orwell’s 1984, Winston and Julia believe they have found a safe haven in a room above an antique store in a ‘prole’ neighborhood of Airstrip One (formerly called London).¹⁴ Only the inner and outer party members are watched by the Thought Police, while the proles are left to their own devices. The pair



The orange Kiva Systems bots look like over-sized robot lawn mowers.

13. *The Learning Machine*. p.p. 54-55 *THE ECONOMIST*. (April 13th 2019).

14. Orwell, George. 1984. Secker & Warburg (June 1949). ‘Prole’ is a shortening of ‘proletarian’, who is a member of the class of industrial workers who lack their own means of production and hence sell their labor to the live (Merriam-Webster).

believe they have eluded the authorities for years, but when a voice screams at them from a telescreen hidden behind a painting painting on the wall, “You are dead!”, their conviction was confirmed that their hiding place, along with their conspirational thoughts they had expressed to each other, were known from the outset.

The world had to wait for thirty-five years from the time **1984** was published in June 1949 to see if Orwell’s vision of a future dystopia would be realized. It wasn’t. The technology was available, but it wasn’t yet deployed. Another ten years would pass before the Internet would become widely available and start us on the road to where we are today, paradise or perdition, depending on your particular point of view.

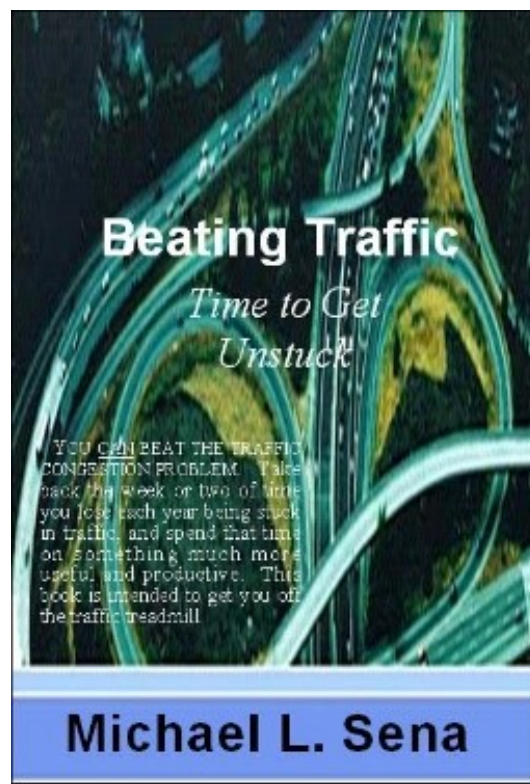
Thirty-five years have passed since 1984 (the year). We have reached the point where we know we are constantly being watched, not necessarily by malignant governments (although there are plenty of those) but by governments that say they want to protect us, and by companies that say they and their customers want to delight us. Like Faust’s Mephistopheles, we have exchanged something we cherish, our privacy, for favors: increased safety and security and presumably lower prices, more variety, greater convenience, higher levels of satisfaction and delight. Why have we tacitly or even explicitly agreed to this exchange? Because the very foundations for our own livelihoods are now based on all others allowing us to watch them? The last line of the slogan under the monument to Big Brother is “Ignorance is Strength”.



About Michael L. Sena

Michael Sena, through his writing, speaking and client work, attempts to bring clarity to an often opaque world of vehicle telematics. He has not just studied the technologies and analyzed the services, he has developed and implemented them. He has shaped visions and followed through to delivering them. What drives him—why he does what he does—is his desire to move the industry forward: to see accident statistics fall because of safety improvements related to advanced driver assistance systems; to see congestion on all roads reduced because of better traffic information and improved route selection; to see global emissions from transport eliminated because of designing the most fuel efficient vehicles.

This newsletter touches on the principal themes of the industry, highlighting what, how and why developments are occurring so that you can develop your own strategies for the future.



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