

# The Dispatcher

## Special interest features covered in each issue:

- Autonomous and self-driving cars
- Map data and navigation
- Data privacy
- Third party automotive services
- Regulations and Standardisation

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Telematics Industry Insights by Michael L. Sena

## Report from Dispatch Central

THE UNITED STATES will elect a new president in November, and I presume it will be Hillary Rodham Clinton. My absentee ballot vote for her has already been mailed. At this point, we know more about her as a person and as a politician than we knew about Barack Obama when he was elected in 2008. She has significantly more experience and is more qualified in both national and international affairs than he was at his election, and certainly more than her principal opponent in this election. If you doubt that, just read her bio. She is no orator. I can say that from personal experience having been in a hall to hear her speak. She is not going to win an arm wrestling match against most of the leaders of the world's countries, but she will have their respect. She has earned it.

What kept President Obama from sinking during his first two tough years as president was his vice president, Joe Biden—who, like Hillary Clinton has roots in Scranton, PA—and his cabinet, including HRC. Except for one mistake, his choice for Secretary of Transportation, Ray LaHood (Republican from Illinois), he had an excellent

group of advisors. If he agrees to stay on, Anthony Foxx, who replaced LaHood, would continue to do a solid job as Secretary of Transportation, and keeping Dr. Mark Rosekind as the Administrator of the *National Highway Traffic Safety Administration* (NHTSA) would continue the momentum that has been building around improving the effectiveness of the country's road transportation system. THE FEDERAL AUTOMATED VEHICLE POLICY released in September gives her a head start going into her first year.

## Autonomous Driving News

A FEW MONTHS LATER than originally scheduled, the U.S. DOT and NHTSA issued its **Federal Automated Vehicles Policy** at an open-air news conference on September 20, 2016. With a backdrop of half a dozen self-driving test vehicles (no Tesla in sight), Secretary Foxx introduced the guidelines. He was followed by speakers who endorsed automated driving as one of the best ways to improve safety on the roads. Then, Secretary Foxx and NHTSA Administrator, Dr. Mark Rosekind, took questions from the press.

What is different about this policy compared to the situation today is that it proposes to be proactive rather than reactive. Currently, the fifty-year-old Vehicle Safety Act gives NHTSA jurisdiction over all elements of design in motor vehicles and manufacturers self-certify that their vehicles meet the Federal Motor Vehicle Safety Standards. It suggests having pre-market testing, data and analyses by a vehicle manufacturer reported to DOT. This would prevent unsafe vehicles

*"Our job is to do the best job we can of ensuring that transportation is safe. The absence of something like this policy creates a bit of a vacuum and makes it difficult for safety to be addressed properly".*

*"We are laying out today a standard we believe is flexible and nimble, but also provides clarity for anyone who touches this industry."*

*"That is what is so revolutionary about this. Before we could only throw the flag after a violation occurs, but now we are building up a safety culture from the ground floor that will stand up over time."*

Anthony Foxx  
Secretary of Transportation  
U.S. Dept. of Transportation

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**Gear 2030 High Level Group**

The European Commission DG for Internal Market, Industry, Entrepreneurship and SMEs re-launched in October 2015 the High Level Group on Automotive Industry, now called GEAR 2030. Gear 2030 will work on three main areas:

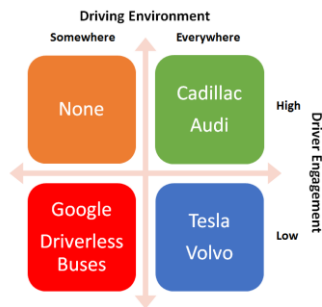
**ADAPTATION OF THE EU VALUE CHAIN:** Globalisation, changing mobility patterns, digitalisation and consumer expectations are reshaping the environments where automakers operate. However, those who manage to adapt and respond to the imminent changes will emerge stronger than they were.

**TRADE, INTERNATIONAL HARMONISATION AND GLOBAL COMPETITIVENESS:** Europe is no longer an absolute leader in terms of regulatory standards and the market access benefits stemming from the free trade agreements and multilateral frameworks are becoming increasingly challenged.

**ROADMAP FOR HIGHLY AUTOMATED VEHICLES:** Automated and connected vehicles could form part of the shift to a true Digital Single Market within the EU. They could enable new transport services, lower accident rates and increased shares on third markets. However, driverless cars will not hit the road until the issues they raise are solved. In this regard, GEAR 2030 aims to develop a strategy on connected and automated vehicles by summer 2016.

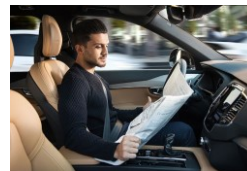
**What the Car Companies Are Doing**

CAR COMPANIES ARE DOING what they have always done: trying to look like they are not following the leader while that is exactly what they are doing. In the case of autonomous driving, their problem is that there is not one leader to follow. First, everyone thought it was Google until they put their mini-bug on the street and started losing key staff. Then it looked like Tesla had something going until the clothes came off the emperor. Apple? Total stealth. Now Uber is getting the headlines, but doing it with Fords and Volvos. It's a bit of a free-for-all. Let's try to put some structure into the current state of affairs.



This diagram of mine is based on what the companies have said and shown. Volvo may not like being placed in the same box with Tesla, but that is where their information about their test vehicles (and the name of their self-driving product) places them. Here is what they say:

*The DRIVE ME project is taking the final step to driving safely in real traffic with ordinary people behind the wheel. This has never been done before. The technology is so reliable that the driver can focus on something else without having to pay attention to the traffic.*



Volvo IntelliSafe Autopilot

Images from Volvo's promotional material on the DRIVE ME cars shows drivers on the phone with notepads on their laps taking notes, reading the newspaper and gazing at an iPad. Doing something else, something more productive than driving, is exactly what some say is one of the main reasons for developing self-driving cars in the first place, while others say it is safety, safety and more safety. Yes, it's a bit of both, but it's the dosage that differs.

Cadillac and Audi are taking a more cautious approach. Cadillac's SuperCruise will steer the car during highway driving, pass other vehicles, brake for traffic, speed up and change lanes. This is what both Tesla and Volvo do as well. The difference is that Cadillac and Audi will be placing a camera near the rear view mirror that will monitor the drivers' actions. If drivers remove their eyes from the road for more than a few seconds, warning tones sound and lights flash. If the driver does not respond, the car is slowed to a stop.

**OPEN AUTODRIVE FORUM**

The OPEN AUTODRIVE FORUM and The Dispatcher have one thing in common: They are both completely free. According to Dr. Volker Sasse, Chairman of the Navigation Data Standard Association (NDS), which has taken the initiative to establish the OADF, it has the ambition to function as the umbrella above the standards coming from NDS, ADASIS, SENSORIS and TISA. The latter three are all organized and chaired by ERTICO and many companies are members in all four organizations.

At this point, OADF is serving the function of bringing industry participants together by organizing quarterly gatherings in different regions of the world. The last one was in June in San Jose, CA and the next is in October in Beijing. Amnon Shashua of Mobileye (see page 4) spoke at the June event. Speaking with colleagues who have taken part in the gatherings, OADF is serving a good purpose by providing an opportunity for the different organizations, as well as companies and individuals who are not members of the four to meet, share opinions and 'get on the same page'.

It remains to be seen if OADF will evolve into a standards coordinator. The NDS and ADASIS were developed as industry standards and belong to the respective members. For now, the idea of an informal and open forum sounds just fine.

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## Who are your customers and what do they need?

ARE WE FORGETTING who we are doing all of this for? By 'this' I mean developing self-driving vehicles, high-speed trains, car-sharing and ride-sharing schemes. I couldn't help asking myself this question many times during the past several months after reading countless newspaper and magazine articles about how self-driving cars were just around the corner and receiving invitations to numerous conferences where overnight experts would be telling everyone how their 'Look Ma, no hands!' vehicles would be better than the next guy's.

At some point in our world's history, delivering products at 'everyday lowest prices' became the goal for business, and buying only the

lowest-cost products became the goal of every consumer. This has had consequences in what people do to earn a living and how much money they have to purchase the products that are on offer. I did a little research<sup>1</sup> on the U.S. and found the following:

In 1978, the number one job in the most number of the fifty states was secretary, with 21 states out of 50. It was followed by machine operator/electrical equipment assembler (10 states out of 50) and truck driver (9). In 1996, the number of states with secretaries holding the top spot went down to 8, machinists dropped to 2, but truck drivers were tops in 29. In 2014, there were no states where machinists

were number one, secretaries had dropped to 5 and truck drivers stayed at 29, although not in the same states. Farming dropped from 8 states in '78 to 2 (North and South Dakota) in 2014. Computer programmers showed up first in four states in 2014. (CA is not one of them.)

Self-driving trucks could save \$67 billion annually if every one of the 1.3 million truck drivers in the U.S. were replaced by a robot. Lots more would be saved if the additional 2.8 million taxi, van and other commercial vehicle drivers were made redundant by autonomous technology. What would those 4.1 million drivers do when they lose their jobs, and whose money are we saving?

*Continued on P.6*

## What the Car Companies Are Doing (continued from p.2)

Concerning Driving Environment, 'Somewhere' means in specific areas, like Google's office complex or along designated roads in a city center. 'Everywhere' means just that, the car should be able to manoeuvre on any street anywhere in the world. Volvos are to be tested in Göteborg, Pittsburgh, Beijing and on the roads in the UK.

As I say in the article on page 4, the decision to operate somewhere or everywhere has implications on the types of map data that are required and how that data is processed. It is clear that the vehicle OEMs had no interest in

developing solutions that operate in only selected environments, unless the vehicles are job-specific, like the Komatsu's *Autonomous Haulage Vehicle* that has no place for a driver. I cannot think of any examples of high driver engagement in 'Somewhere' environments. If you are going to pay for a driver in a passenger-carrying-pod, then let him or her drive the bus.

Now to the issue of where the majority of tests are being performed. Is there anyone else, besides my good friend Dr. Michael W. Dobson (see sidebar) who thinks it is odd that we

have mayors of major cities like Paris and London who are doing everything possible to get rid of all private vehicular traffic, and then there are other mayors who are actively promoting autonomous driving projects in their cities? If the principal objective of autonomous cars is to save lives, then, like Willy Sutton who robbed banks because that was where the money was, we should be building autonomous cars to operate where the majority of the accidents are occurring. It is not on city streets. And it's rural areas that need more transport options.

### Artificial Intelligence (AI)

*Merriam-Webster defines 'artificial intelligence' as a branch of computer science dealing with the simulation of intelligent behavior in computers; and, the capability of a machine to imitate intelligent human behavior.*

*The Internet Encyclopedia of Philosophy states: Artificial intelligence (AI) would be (Why not 'is' or 'will be', rather than using the past tense verb form used to talk about an hypotheses?) the possession of intelligence, or the exercise of thought, by machines such as computers." Can a machine think?" asked Alan Turing.*

*"Here, let me get that for you."*



*"These (self-driving) cars will have the ability to process data and make decisions much faster than we will as humans. No individual company is going to program these vehicles with a set of ethics that isn't bought into by society at large."*

*Bill Ford, executive chairman of Ford Motor Company, September 13, 2016*

*"Almost every time I read an article detailing the benefits of autonomous vehicles I find a statement something like, "It's time we dramatically improved driver safety." This, indeed, is a noble thought, but I often wonder if the roll-out of autonomous vehicles will follow the unacceptable diffusion path of Internet adoption from urban to rural landscapes?"*

*Dr. Michael W. Dobson*

[https://www.linkedin.com/pulse/autonomous-vehicles-rural-america-dr-mike-dobson?trk=pulse\\_spock-articles](https://www.linkedin.com/pulse/autonomous-vehicles-rural-america-dr-mike-dobson?trk=pulse_spock-articles)

### Personal Periscope



*Tiny unmanned aircraft systems might soon be used by the military, after a successful test of the PD-100 at the Pacific Manned-Unmanned Initiative (PACMAN-I) in Hawaii. The PD-100 is small enough to fit into someone's hand, and has an operational range of nearly 8,000 feet.*

**LiDAR**, for Light Detection and Ranging, was originally developed as a remote sensing method that uses light in the form of a pulsed laser to measure ranges to the earth. These light pulses, combined with other data recorded by the airborne system generate precise, three dimensional information about the shape of the earth and its surface characteristics.

LiDAR has been adapted for ground-based obstacle detection and avoidance to navigate safely through environments using rotating laser beams, like the ones on top of Google's test cars.



## The Future of Automotive Navigation

WHILE I WAS INVESTIGATING the Tesla/Mobileye affair, I found a video of a presentation given by Mobileye's co-founder, Chairman and CTO, Professor Amnon Shashua, Sensing and Beyond: Towards Full Autonomous Driving. It was an hour and fifteen minutes long and worth every second. It was a tutorial on the ways to achieve autonomous driving which, he said, were built on three pillars: sensing, planning and mapping.

With 360° sensing using cameras, radar and LiDAR, the vehicle is able to both interpret and produce an environmental model in which the vehicle will operate. By planning he means understanding the rules of the road, that is, how humans drive in the particular place where the car is located (e.g., Boston versus Birmingham—it matters). Ethics apply everywhere, but how they are applied in different places varies.

He devoted the majority of his talk to mapping, distinguishing among the navigation maps we have today from multiple suppliers, high definition maps from HERE and TOMTOM and the 3D image maps from Google.

Today, he said, we have two types of systems being developed. The first is characterized by Google, which offers full autonomous capability somewhere (i.e., Mountainview, CA), and that somewhere

is mapped at the highest level of detail with 3D images. The second is partial autonomy everywhere, characterized by the OEM-developed systems, like those from Volvo, Daimler and Tesla. Note that this talk was before the breakup with Tesla (see page 5), and Tesla was its poster child. Where the industry needs to go, he says, is full autonomy everywhere, and we are not going to get there by trying to extend Google's massive data volume approach beyond Silicon Valley or trying to build even more detailed high definition maps.

He has three suggestions to change the map paradigm for fully autonomous driving:

First, rather than trying to map everything densely in 3D, map sparsely in 3D to get the big scene and map densely in 1D. The idea is to make everything visible into a point landmark and attach attributes to the point that can be used for on-board processing. Second, use every vehicle as a probe to upload the 1D data for comparison to the base map that is stored off-board, process data from multiple sources to confirm its veracity, and then send updates back to the vehicles. The size of the data packets being transferred must be small, around 10 Kbytes/km, because neither the car companies, the map companies nor

the customers are going to pay for massive data transfers. Third, instead of higher resolution maps, implement stronger artificial intelligence agents to process the lower resolution data more intelligently.

Prof. Shashua used the term *Road Book* as a descriptor the data that would result from his approach, as opposed to map. Every OEM or self-driving car developer would have its own content using the Road Book approach.

What I missed in his talk and in all discussions of autonomous driving is the most important: How does the car know where to go? He kept talking about local coordinates and signs as landmarks to keep the car on the road, but which road? He never mentioned that people driving cars don't simply follow the car in front of them. Either we know where we are going and have a cognitive map in our head that guides our hands and feet based on what we see with our eyes, or we have entered a destination in a navigation system and follow the instructions that it barks out at us.

Autonomous driving demos liken the driving task to keeping a car on a track in a video game. Shashua says that driving is a 'multi-agent game'.<sup>2</sup> Let's always remember that the most important agents in the 'game' are the Sapiens inside the car, not the robots driving them.

## Autonomous Driving News (continued from p.1)

from being put on the roads. It recommends establishing a Pre-Market Approval Authority (like Europe's type-approval) to replace self-certification for highly automated vehicles. My guess is that self-certification will gradually disappear. It suggests a Cease-and-Desist Authority, which would enable NHTSA to require manufacturers to take immediate action to mitigate safety risks, like forcing Tesla to recall all Autopilot software. Both of these would require statutory approval. My favorite is Post-sale Authority to Regulate Software Changes. Self-certification is too fuzzy and software changes can significantly affect the basis of original certification. This is also problematic in Europe's type-approval process as was shown with Tesla being able to introduce its so-called Autopilot without a new type-approval test.

Another key point is the differentiation made between what the states will do and what the federal government will take responsibility for. In a nutshell, when the vehicle is being driven by software, the federal laws and authorities will apply. When it is being driven by a human, the conventional state laws will remain in effect. The goal is to have a single policy that applies for the entire country.

Complementing the Policy statement is a Fact Sheet that lists a 15-point Safety Assessment that outlines objectives 'how to achieve a robust design'. [The Federal AV Policy Guidance document is 116 text rich pages, but it is definitely worth the effort to read it.](#)

GOOGLE AND UBER HAVE FALLEN OUT OF LOVE. Of course they have. Google is in the ad brokering business and UBER is in the ride brokering business. What Google thought it was buying into when it invested \$258 million in UBER in 2013 was all those UBER riders clicking on ads and all those UBER-contracted cars using Google's self-driving software with Google's map data. This gave it a seat on UBER's board. But then, UBER became fixated on building its own map database (deCarta and Bing maps acquisitions) and developing its own self-driving car software (poaching professors and staff from Carnegie Mellon University in Pittsburgh). When UBER started inviting car companies (Ford and Volvo) to partner with them, Google had enough. David Drummand, who seems to have more titles than a Hungarian prince, was Google's board member. He said: "I recently stepped down from UBER's board given the overlap between the two companies." And then there was the MICROSOFT \$137 million investment in UBER in the hopes that UBER will use its Azure cloud. UBER lost \$1.2 billion in the first half of 2016, mainly due to incentives to drivers to increase market share and the bleeding in China which has now stopped as a result

of the deal with Didi Chuxing (backed by both Alibaba and Tencent). Its investors have shown a great deal of patience because they know that the whole game is about market share. But whether driverless technology and its own maps are really essential to a successful UBER is not as clear as crystal to many observers, including your editor.

TESLA AND MOBILEYE have also fallen out of love. Going steady with *The Musketeer* takes its toll. This breakup is not pretty. With his auto company losing tons of money, his spaceships blowing up on the launching pad and the government continuing to investigate the root cause of the accident in Florida when his Autopilot was engaged, I'll wager that he wishes he was already on Mars.<sup>3</sup> The ostensible reason for the breakup is what is in question. Tesla says that Mobileye objected to Tesla developing its own sensing software to supplement or replace what Mobileye has provided. The implication is that Tesla cannot rely on Mobileye's product because it failed in the Florida crash. Tesla said that Mobileye gave it an ultimatum: stop the development or we stop supporting Tesla. When Tesla refused, Mobileye announced the end of their relationship.

Mobileye's Chairman, Amnon Shashua, has quite a different story. He says Tesla is flat out lying, that it had warned Tesla the Autopilot software should not be promoted as a hands-free option. "Autopilot is not designed to cover all possible crash situations in a safe manner. It is a driver assistance system, not a driverless system," says Shashua. Clearly, I agree with Shashua. Mobileye is moving on. In July, it signed a deal with BMW and Intel to create an open, industry-based platform for the next generation of safe autonomous driving.

OXBOTICA is a company developing an "infrastructure-free navigation system". Dr. Graeme Smith is its CEO. Graeme has an impressive set of credentials. He was part of Ford Telematics Europe in the late nineties and was in charge of Ford's Wing-cast operations. He then joined Russ Shields' *Connexis* and had a term at *Riccardo* before taking on the task of running OXBOTICA, a commercial spinoff from Oxford University's Mobile Robotics Group. The key selling point of the OXBOTICA solution is that it is not reliant on a GNSS in order to operate. This means it can transition between outdoor and indoor settings where GPS or other GNSS solutions are not available. The OXBOTICA system is also vehicle-agnostic, so it can be applied equally well to cars, buses, trucks or anything that moves on wheels on the ground.

The OXBOTICA *Selenium* software is going to be showcased in eight shuttle vehicles in Greenwich, London as part of the GATEway project. There will be a six-month operational trial starting in early 2017. It has been a number of years since I visited Greenwich. Maybe this would be a reason to do so.

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### Footnotes

1. U.S. Census Bureau, 2015 Statistics.
2. Multi-agent system is a computerized system composed of multiple interacting intelligent agents (software, robots, humans) operating within an environment.
3. Elon Musk has been quoted as saying: "It'd be pretty cool to die on Mars, just not on impact."
4. In Switzerland, an idea to guarantee every citizen a yearly income of 30,000 Swiss francs (€28,000), regardless of other wealth or employment, gained enough supporters to trigger a referendum in June 2016. It was rejected by 77% of voters. In the wake of the Nokia implosion, Finland will test the concept.
5. See the last chapter of *Sapiens: A Brief History of Humankind* by Yuval Noah Harari (First published in Hebrew in 2011; English edition 2014).

## Who are your customers; what do they need? (from P.3)

There are serious proposals on the table in some countries<sup>4</sup> to establish a guaranteed minimum income to protect all the people being put out of work by robots and artificial intelligence. The U.S. and Europe have a lot of truck drivers because the goods produced in out-sourced countries like China need to get from the

ports to the distribution points and finally to the stores where they are sold—or increasingly, to the homes of people who ordered them on-line.

Most of Walmart's 2.3 million employees are highly underpaid. That makes them perfect customers for Walmart stores. Amazon is gaining ground fast on

Walmart. If Walmart folds, and Amazon's trucks are driverless, there may be no alternative to a permanent unemployment payment. But who will be left to pay the taxes that will pay the minimum income? I suggest it is time to stop thinking about lowering costs and start thinking about saving the human species, and not just from traffic accidents.<sup>5</sup>

## Musings of a Dispatcher

CHINA WAS A BI-MONTHLY DESTINATION for me between the middle of 2011 and the middle of 2015. My first visit there was to Beijing in 2007 for the ITS World Congress. Returning for the first time in 2010, I found that everything had changed. My hosts attributed the changes to the 2008 Olympics. In 2007, my wife and I found Beijing decidedly unfriendly and uninviting, especially the taxi drivers and their vehicles. After my return visit, I found it exactly the opposite. What fascinated me most about China was the dynamism and the fast pace of

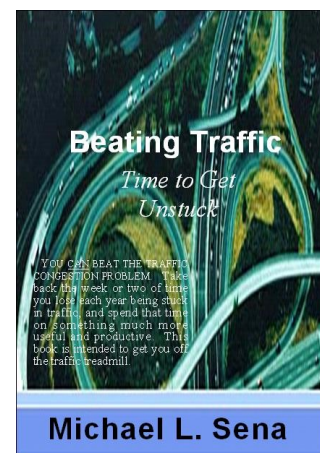
change. One example is the taxi business. I grew up hailing taxis, so I was well prepared to get out on the streets of Shanghai and Beijing and compete with the locals. In early 2014, the group I was managing organized a meeting in Beijing. It was the first time I was there in six months or so. We came out of the meeting around five p.m. and had agreed to meet at a restaurant for dinner. I went out into the street as usual, but none of my colleagues left the curb. They were all looking at their smart phones. Overnight, cab hailing was no longer *de rigeur*. Between 2014

and 2015, I was working with a group that had integrated WeChat into their business operations in every possible way. I used it constantly when I was there, and it was the main way I communicated with my colleagues when I returned to Sweden. Late in 2015 upgraded my iPhone operating system. When it finished over an hour later, my WECHAT app was in Chinese. There seemed no way to change it back. I deleted it, and reloaded it. All my contacts were gone. I miss them, but WECHAT is not made for life outside of China.

### About Michael L. Sena Consulting AB

Michael Sena works hard for his clients 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 is happening. Explaining and understanding the how and why, and developing your own strategies, are what we do together.



Michael L. Sena

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