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Mobility Industry
Insights by
Michael L. Sena

THE DISPATCHER

IN THIS ISSUE

THE SEPTEMBER-OCTOBER 2023 ISSUE IN BRIEF

I had finished the book I had been reading before I was able to purchase a new one. With quality book stores as rare as butter in the bread basket at restaurants, I've found that re-reading my old books is a good (and economical) way to fill the void. John Steinbeck's Travels With Charley grabbed my eye when I scanned my shelves looking for a volunteer. I was about to leave on a two-week trip to the U.S., and the book's subtitle, *In Search of America*, fit with my feelings about what I would be doing while I was "back home". Charley is Steinbeck's dog, a standard poodle, and, second to his wife, his best companion. He decided to make the cross-country trip in a specially constructed camper, which was a small cabin bolted onto the bed of a GMC pickup truck. He named it 'Rocinante', after Don Quixote's horse.

He left his home in Sag Harbor, Long Island in the middle of September, 1960. The year is important because it was a presidential election year in which John F. Kennedy was pitted against Richard M. Nixon. Steinbeck was an author, one who won the Nobel Prize in Literature in 1962. He was not a travel writer, so the book does not describe places. It is a narrative of his encounters with the people he met all along the way. During my reading of his book, two encounters stood out the most. The first was a conversation with a New England farmer, who did not want to talk politics for fear of offending. The second was his family reunion in California. Steinbeck had grown up in California and lived there for most of his life. California was a Republican state; Steinbeck had flirted with Communism. He definitely did not see eye-to-eye with his siblings. It reminded me of my conversations over dinners with my former in-laws, diehard supporters of Nixon. It was actually quite similar to what is going on now in America. I had forgotten just how similar.

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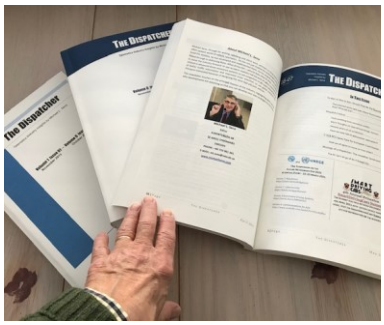
Feature: Standardization and Regulation



Feature Articles

We really do need driverless vehicle standards

My hypothesis is that without standards, whoever decides how the driverless vehicle algorithms work, whether it is the boss or the individual programmer, that person will use his or her own biases to determine what those algorithms do, and, further, when the deciding person is behind the wheel of a car that he or she is driving, they will take the same actions as the algorithms for which they were responsible. My proposition is that the task for any and all standards bodies developing the specifications for driverless vehicle algorithms is to make sure that all algorithms installed in driverless vehicles are programmed to do approximately the same thing, thereby eliminating to the greatest extent possible individual biases.

I WAS DRIVING to Newark Liberty Airport after a two-week stay in my country of birth. It was Saturday morning. As is my habit when in the U.S., I was listening to *NATIONAL PUBLIC RADIO*. I had missed the rerun of *Car Talk* with the "Tappet Brothers", Tom and Ray Magliozzi, but caught another favorite: *Wait, Wait! Don't Tell Me*. The news came on when it was over. A Wisconsin woman was suing *YOUTUBE* for the wrongful death of her fourteen-year-old son. It seems that her son, who was interested in science experiments and had grown to depend on *YOUTUBE* for supplying him with ideas, followed one of the experiments to the T—and died as a result. "Hold your breath until you pass out." That was the experiment. He obeyed, but never woke up. I guess that was in another *YOUTUBE* video.

My mind wound back to the early days of in-vehicle navigation systems. Someone had followed the directions barked out from his system and wound up in a lake or a river in the middle of the night. He blamed the car manufacturer for selling a defective system, and the car company blamed the nav system

supplier, who, of course, blamed the map producer. Most thinking people blamed the driver (Duh!?). I had two negative nav experiences on this trip, one with my *iPhone* and the other with my nephew's TESLA.[1]

The *iPhone* map missed the fact that there were two unconnected parts of a road. It directed me to one of the sections of the roads, which ended at a gate that led to a large estate and said we had arrived. I knew the person I wanted to visit was not on the other side of that gate. I eventually found his house by using the old NBWA method, navigating by wandering around. The *Tesla* took us on a route that no one in their right mind—especially a person who grew up in the city and had made the trip without the help of a navigation system hundreds of times, like my nephew—would ever have taken. My nephew was just curious to see what his *Tesla* was going to do. The rest of us were hungry and just wanted to get to the restaurant.

What makes us turn off our brains and follow ridiculous directions, whether it's seeing what will happen if we hold our breath and pass out, driving headlong into a lake, or depending on instructions that we sense are wrong? If we can do it, will the robots that are "just following orders" from the algorithms do it as well?

Driverless vehicles will act like humans

This is not an analysis of the so-called "Trolley Problem", where a runaway trolley can be controlled by an observer who must decide whether to intervene and save many lives at the cost of one life, or not intervene and let the errant trolley driver or owner assume the blame for taking many lives. The Trolley Problem, which is an application of the 'doctrine of double effect',[2] is often raised when discussions center

[1] The family did not buy it. His company has decided to provide Teslas as company cars.

[2] The doctrine (or principle) of double effect is often invoked to explain the permissibility of an action that causes a serious harm, such as the death of a human being, as a side effect of promoting some good end. According to the principle of double effect, sometimes it is permissible to cause a harm as a side effect (or "double effect") of bringing about a good result even though it would not be permissible to cause such a harm as a means to bringing about the same good end. https://plato.stanford.edu/entries/double-effect/

around who bears responsibility for a driverless vehicle killing or injuring people. Thomas Aquinas appears to be the first person who brought up the topic of double effect with the example of self-defense. Is it wrong to kill someone in self-defense, he asked rhetorically? Only if you didn't intend to kill him, he concludes. A doctor operates on a pregnant woman and saves her life, but the pregnancy is terminated. The doctor is not a murderer, according to Aquinas's thinking. The Catholic Church has established conditions for the application of double effect, however the world in general does not operate under the rules set down by the Catholic Church or any religion, as the discussion of the question of abortion clearly indicates.

How should the algorithms that control the driverless vehicle be configured to react when a life-threatening event is imminent? Should they be programmed to do one of the following:

- Kill the occupants of the vehicle rather than killing one or more individuals outside of the vehicle;
- Do everything possible to save the lives of the vehicle's occupants without regard for those outside the vehicle; or
- Refuse to decide to do either and simply stop the vehicle as quickly as possible and let whatever is going to happen happen?

What happens if two driverless vehicles are going to meet and they have different programming biases? At this point we should ask: "What would humans do?" If I meet a car on a two-lane undivided highway, and that car is in my lane driving very fast right toward me, I don't know if the driver in the other vehicle is: a) intent on killing both of us by using my car as his suicide weapon; b) if he believes he is in the correct lane and that I will realize that I woke up in Britain and not Sweden and move out of his way before we collide head-on; or c) if he has lost consciousness and the car is out of control. I have to make a decision with incomplete knowledge of the other driver's intentions and basis of knowledge. Within less than a few seconds, I will have to take some action using my stored up knowledge of all of my possible options and a very quick analysis of the immediate surrounding conditions. Do I swerve into the open lane and hope that he continues straight? Do I brake very hard and

hope he will do the same? Is there a possibility to swerve onto the shoulder at the last moment in case he is suicidal? If we crash, who will go to hell? Robots cannot worry, so the last question is not relevant for them, but it is for their programmers.

Don't blame me; I just did what they told me to do

There is plenty of research on how humans feel if they have caused death or suffering as a result of their actions. Researchers at COLUMBIA UNIVERSITY looked specifically at the programming of a driverless car algorithm.[3] In one experiment, participants imagined they were programming a self-driving car and needed to decide how it would behave if it were involved in an accident with pedestrians. Would the self-driving car protect the rider at the expense of the pedestrians, or would the car protect as many pedestrians as possible, even if it meant sacrificing the rider?

The researchers found that the programmers felt more guilty if they had programmed the algorithm by following orders from their boss on how to configure the algorithm, irrespective of the alternative (protect the rider or protect the pedestrians) than if they had made the decision themselves. This was counter to what other research has found, in particular with respect to killings in WWII concentration camps, where those who ran the camps and those who actually carried out the killings excused themselves because they said they were just following orders. The COLUMBIA researchers dug deeper with additional experiments and found that people (presumably nonpsychotic) want to avoid personal responsibility for other peoples' suffering, and they attempt to do so by blaming others for actions they take that cause suffering. They will refuse to accept any culpability in order to avoid sharing in any of the guilt. In other words, they want the boss to tell them what to do.

Biases determine actions for humans and robots

Driverless cars are not guided by an invisible hand constantly hovering over the controls, but are guided by algorithms that have been trained to respond to various types of stimulation, such as traffic signs and lights, speed limit

[3] https://spsp.org/news-center/character-context-blog/what-happens-when-you-just-follow-orders

signs, warning signs, actions of other vehicles, actions of pedestrians, actions of animals, and much, much more. Someone programmed those algorithms to do certain things under certain conditions, or has established a framework algorithm so that an action can be based on a number of different inputs. One would think that if the person deciding how the algorithms should work (the boss or the programmer) is an experienced, conscientious driver, the result of the program should be better in terms of the vehicle driving safely than if the person doesn't even have a driver's license. Experienced drivers know they should not drive into fire scenes and drive over fire hoses. However, even if the person is experienced and conscientious, it does not mean that the person is not biased toward taking certain risks, like not stopping completely at stop signs or accelerating through a yellow light.

How do our brains process information and choose to accept or reject the signals (data) we receive from external sources, and then make decisions based on how our brains process that information. A sign says that the road has sharp curves ahead, and another sign says the speed limit is 70 kph, down from 100 kph. A driver ignores the speed limit sign and the sharp curve warning, maintains his speed of 110, loses control of his car in the curve, crashes and dies. The driver believed something in his head, rather than the advice provided by the road authority. Why? Will algorithms that control a driverless vehicle, if they begin to think like humans, start thinking for themselves and either drive us into a lake or overestimate the vehicle's ability to stay on the road?

Unwavering trust or unshakable bias

Let's first look at biases. While it is nothing new from an historical perspective, political shenanigans during the past decade have highlighted the fact that our psychological biases and predispositions make us vulnerable to falsehoods, claims Nathan Walter, a professor of communication studies at NORTHWESTERN UNIVERSITY who studies the correction of misinformation.[4] In the example above, the driver was

[4] Nathan Walter research concerns the power of strategic storytelling, correction of misinformation, and the role of emotion and affect in social

certain that the signs had an ulterior motive which had nothing to do with his safety, or they were meant for other drivers who were less experienced or who were driving cars that did not have (what he believed were) the road-holding qualities of his car. The falsehood in this case is what the driver believed, that at the speed he was travelling, he and his car would be able to manage to get through the curves safely. The driver was misinformed, and the signs were there to for a corrective purpose. Why did the driver ignore them?

In Walter's work, he examines "the continued influence of misinformation in the face of correction and the theoretical explanations of this phenomenon". He found that corrective messages were more successful when "they are i) coherent; ii) consistent with the audiences's world-view; and iii) delivered by the source of the misinformation itself" (i.e., the person who told the lie or gave incorrect advice admits that he lied or was mistaken). "Corrections are less effective if: a) the misinformation is attributed to a credible source (the person who lied or gave the bad advice is known for telling the truth and giving good advice, or people believe what he says without any proof that he is not lying or giving bad advice); b) the misinformation has been repeated multiple times prior to correction; or c) when there is a time lag between the delivery of the misinformation and the correction". The curve and speed limit signs might have seemed coherent from the road authority's point of view, but they were not consistent with the driver's world view. The driver considered the correction as not coming from a credible source because he had proven many times that he doesn't die if he ignores their signs. His bias finally caught up with him.

Incorrect information is not necessarily a lie

The route my nephew's *Tesla* gave us to the restaurant was not incorrect. We did arrive at the restaurant, even if it took longer and we traveled on roads that were not meant for through traffic. The fact that it was a ridiculous route was

influence. Studying the contexts of health, politics, and science, his research interests boil down to one simple question: how to augment the influence of "good information" and attenuate the influence of "bad information?" https://www.washingtonpost.com/wellness/2022/11/03/misinformation-brain-beliefs/

not because the route calculating algorithm was programmed to generate ridiculous routes. The algorithm simply had incorrect information about the quality of the roads, ignored certain attributes that were in the database, such as road class, had a misconception about the value a driver would put on the directness of the route, rather than its theoretical shortness, or simply had an instruction to take the shortest route as the crow flies and everything else be damned. My nephew knew the route was wrong. He followed it as an experiment. But anyone not familiar with the area would have trusted the instructions and been rewarded for following them by arriving at the restaurant. I imagine if a driverless *Tesla* taxi picked up my sister and took her to the restaurant where she has been driven (she does not have a driver's license) several dozens of times, she would not have been amused.

On two occasions in 2022 in San Francisco, *CRUISE* vehicles in driverless mode without safety drivers on board drove into ongoing fire zones, once driving over the firefighting hoses.[5] The firefighters had to smash the window of one of the vehicles to make it stop. Driving over firefighting hoses violates California's *Vehicle Code*. A young or inexperienced driver may not have read the *California Vehicle Code* but managed to obtain his or her driver's license.[6] They might also have driven over a firefighting hose, in which case they would have been cited and received the appropriate punishment. It is more likely that even an inexperienced driver would have the common sense to avoid the obvious. Apparently, the *CRUISE* vehicles were not programmed with the entire *California Vehicle Code*, or perhaps the car's sensors thought the hose was a big, fat snake and had the bias to 'Kill Snake'.

Is driving objective or subjective?

Daniel Kahneman, an Israeli-American psychologist and economist is noted for his work on the psychology of judgment, decision-making, and behavioral economics, for

[5] https://www.thedrive.com/news/sf-firefighters-smash-cruise-self-driving-taxi-window-to-stop-it-from-driving-over-hose

[6] It's unlikely that anyone inside or outside California has read the Vehicle Code, save for the persons who wrote it.

which he was awarded the *2002 Nobel Memorial Prize in Economic Sciences*, which he shared with Vernon L. Smith. His empirical findings challenged the assumption of human rationality that was prevailing in modern economic theory, that human beings are capable of always making rational decisions and that markets and institutions, in the aggregate, are healthily self-regulating.[7] His book, Thinking, Fast and Slow (Farrar, Straus and Giroux, LLC., 2011) brought his theories to the masses (including me) so that we could share in his insights. His research helps to answer the question: Is driving objective or subjective? It is both, he says, and this is why you need to be a certain age and pass a driving test in order to be able to get behind the wheel of a car and mix it up on the roads. This is also why programming driverless vehicles has proven to be so difficult. Objective tasks require rules and explicit reasoning. *It's snowing, so ABS will work differently than if the roads are dry*. Subjective tasks require intuition, instinct, and implicit processing. *The car ahead hit its breaks, maybe a deer ran across the road. I'd better slow down.*

Kahneman calls subjective thinking *System 1* and objective thinking *System 2*. He describes *System 1* as "effortlessly originating impressions and feelings that are the main sources of the explicit beliefs and deliberate choices of *System 2*". Driving a car on an empty road is handled by *System 1*, explains Kahneman, while parking a car in a tight space requires *System 2*. *System 1* is automatic and intuitive, while *System 2* is deliberate and requires that you pay attention. If you park a car in a tight space often enough, like a parking attendant, the task becomes a *System 1* task. However, Kahneman warns that *System 1* has biases, trivializes problems so that it does not have to call in *System 2*, and it cannot be turned off. "Errors of intuitive thought are difficult to prevent. Biases cannot always be avoided, because *System 2* may have no clue to the error (e.g., that driving over fire hoses is an offense). Even when cues are available, errors can be prevented only by the enhanced monitoring and effortful activity of *System 2*."[8] He says that humans have learned to live

[7] Ariely, Dan. The End of Rational Economics. Harvard Business Review (July-August 2009)

[8] Kahneman, Daniel. *Of 2 Minds: How Fast and Slow Thinking Shape Perception and Choice* (Excerpt). *SCIENTIFIC AMERICAN* (June 15, 2012).

with these two systems, and that it would be "enormously tedious" for *System 2* to constantly monitor *System 1* to check every routine decision. "The best we can do is compromise: learn to recognize situations in which mistakes are likely and try harder to avoid significant mistakes when the stakes are high."

Driving is not just intuitive

"Human memory happens in many parts of the brain at once, and some types of memories stick around longer than others."[9]

Kahneman is a psychologist, not a neurologist, and he made it clear in his book that he was not describing brain systems. His 'systems' are a metaphor for how humans do things, how we use memory. I am neither a psychologist nor a neurologist, but I am reasonably certain that in order to put driverless vehicles on our roads and keep them there, we will have to convince the people who decide what is safe to operate on those roads that the robot-controlled vehicles are able to do what human drivers have been doing for the past century, at least as well and hopefully better. I'm pretty sure they are eventually going to realize that they require more proof for allowing cars to be delivered with driverless functionality than a statement from the seller that its vehicles can be driven onto an expressway, along an expressway, and off an expressway with no hands on the steering wheel and no eyes on the road.

Developers of driverless algorithms should have to prove that those algorithms really can go beyond operating on *System 1* using heuristics. This is an approach to problem solving that employs a practical method that is not guaranteed to be optimal, perfect, or rational, but is sufficient for reaching an immediate short-term goal, like navigating to a restaurant or taking over the wheel at the start of an on-ramp to an expressway and handing it back to a human driver at the end of an off-ramp. A five-year-old boy in Utah stole the family car and drove it for three kilometers, mostly on a limited access highway, before he was pulled over by a Highway Patrol officer. He had never driven before. Intuition

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https://www.scientificamerican.com/article/kahneman-excerpt-thinking-fast-and-slow/

[9] Greshko, Michael. *Human memory: How we make, remember, and forget memories. NATIONAL GEOGRAPHIC*. (March 4, 2019)

took this kid a fairly long way. That intuition might have gotten him all the way to California—which is where he was headed, he claimed—if he didn't have to do anything other than steer, accelerate and brake, or it could have gotten him or other drivers or pedestrians killed or severely injured. There are several thousand vehicles on the roads in the U.S. that have been sold to customers who have been told that they have full self-driving capability. Those cars have shown that they can drive as well as the Utah five-year-old on a highway. That is simply not good enough.

Prove that your robot can think fast and slow

This means that anyone offering such vehicles should have to show that its car has a memory system built into its algorithms like that of a human, one that is explicit, called 'declarative memory', and one that is implicit, called 'nondeclarative memory'. Declarative memory has the sorts of memories one experiences consciously, like the rules of the road. Explicit memory is subdivided into semantic memory ("knowing that") and episodic memory ("remembering"). Nondeclarative, implicit memory ("knowing how"), builds up over time, and does it without our conscious involvement, sort of in background mode. It includes procedural memories which your body uses to remember skills that you have learned, like playing an instrument, riding a bicycle, or driving a car. It takes less time to learn that a sign with a 50 on it means 50 miles per hour (50 kilometers per hour, so it's good to know if you are in Canada or the U.S.), than it does to learn how to play a guitar or drive a car. If you are stranded on an island in the Pacific Ocean for thirty years, you may need to take a refresher course in sign reading, but you should be able to slide into the seat of your old car and take it out for a spin without endangering yourself or everyone else around you.

Whenever we do anything, we use the two memory levels in our brains. Michael Greshko in his well-formulated article (see footnote) explains that different kinds of memories are held in different areas of the brain, and there are different processes that the brain uses for recalling the memories so that they can be used. For instance, it's the hippocampus region that is used for forming, retaining, and recalling declarative memories. It is still believed that "memories are held

within groups of neurons, or nerve cells, called cell assemblies. Those interconnected cells fire as a group in response to a specific stimulus, …and the more the neurons fire together, the more the cells' interconnections strengthen". Scientists are still not totally sure how it all works, but what we know so far goes a long way toward helping us understand what needs to be classified as declarative and what needs to be stored and managed as nondeclarative memory.

What is also important for our brain and for driverless cars is that in order for short-term memory to become long-term memory, it has to be "strengthened" for long-term storage, a process called "memory consolidation". The nerves in our brain actually modify themselves to "grow and talk to their neighboring nerves differently," explains Greshko. Some memories must be "reconsolidated" each time they are recalled, and these types of memories must be categorized differently. Such memories might be more subject to biases or misinterpretation.

It's more like two Systems and two Types[10]

Gregg Henriques writes that two "metatheories", one for psychology and one for cognitive science, work together in a "highly synergistic fashion". He refers to a cognitive process theory developed by Professor John Vervaeke which he calls the 3Rs for *recursive, relevance*, *and realization*. He posits that the mind scans inputs for relevant information and then moves to realize both what is the case and what paths of action can be taken. This is what he calls *Type 1*. Then there is also a secondary recursive process that functions to place a check on the initial grasp that relevance/realization had formed of the situation. This recursive process "updates the initial inference based on how it conforms to anticipated expectations and based on how it aligns with other modeling processes held in the mind". This secondary recursive process is called *Type 2*. There is no dividing line between *Type 1* and *Type 2* cognitive processes. The brain manages them simultaneously, and it does this for all primates.

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[10] Henriques, Gregg and Vervaeke, John. *There Are Two Types and Two Systems of Cognitive Processes*. *PSYCHOLOGY TODAY* (April 29, 2022). https://www.psychologytoday.com/us/blog/theory-knowledge/202204/there-are-two-types-and-two-systems-cognitive-processes

Where do Kahneman's Systems come into this picture? Just as robots are not humans, humans are not just primates. Humans have the animal-mammal-primate cognitive structure of primates, but we also have the more verbal, rational, self-conscious, self-reflective, justifying "person" mind, says Henriques. According to Henriques, the human ego is a "mental organ of justification that evolves in response to the evolution of propositional language and the resulting question-answer dynamics of justification that emerge with it". The primate-experiential system can be thought of as Kahneman's *System 1* and the person-propositional system can be considered *System 2*. The catch is that primates, not just humans, can perform *Type 1* tasks, but only humans can operate in *System 2* mode.

Driverless cars must be better than chimps and 5-year olds

I like the image to the right because it expresses very well the challenge of driving a car. It is both a physical and a mental process. I did a search on "What is the most difficult physical and mental task for a human?" Most of the answers were emotional or brain without brawn types of task, like learning a new language. There were a number of references to learning to ride a bicycle, but driving a car took the prize for the most complicated physical and mental task for the brain. It is cognitive. A driver has to see and responsively act, but the driver must also rationally reflect.

It is precisely because driving is so complicated that we cannot allow solutions for it to be invented by individual geniuses who make up their own rules for how its algorithms should work. Although there is no disagreement on the fact that robots are not sentient, no matter how artificially intelligent they are, driverless cars must replicate the mental and physical processes that humans perform if they are going to work at least as well as human drivers. In order to be reasonably certain that they do, there needs to be a set of standards that have been developed by experts in the fields of psychology, cognitive science, neuroscience, vision, automotive mechanics, physics, and driving. *Types* and *Systems* need to be built into the standards for driverless cars and implemented by the developers. It will take them time to create the codifying structure because as far as I know, it has never been done, not from both a mental and physical perspective. There should be no shortcuts, just like there are no shortcuts

for obtaining a driver's license and there are both age and functional requirements for becoming a driver. The amount of elapsed time this takes will depend on how much time the standards developers can devote to the task. If there plenty of moral and financial support it can be done more quickly than the normal ISO processes that take years.

One more thing: all of those involved should have driver's licenses and at least twenty years of experience in driving, the more the better. Albert Einsteins need not apply.[11]

Recommendations for a robust standards process

Before humans give up direct control of our vehicles and convert them into robotic devices operated by algorithms, we have to make sure that we minimize the harm that these robotic vehicles can cause. We need to take a deep breath, take a step back, and stop rushing under eighteen-wheelers, into concrete barriers, and over fire hoses.

- Objectiveness – Collect and codify all of the driving tasks and related activities that can be defined as objective. How to operate a car with ABS on all of the different temperature, precipitation and road surface conditions is an example of such a task. Constantly fill up the objectiveness tank with new data.
- Get the Systems and Types straight – Highly automated driving systems that supplement a human driver hand over tasks that require Type 2 and System 2 processing. The standards need to identify where these points are and what needs to happen when the human is not there to perform the Type 2 and System 2 functions.
- Biases – There should be no room for individual biases when it comes to obeying the rules of the road in the operational design domain in which the vehicle is operating. Those rules must be part of every vehicle operating in that domain. And if a vehicle moves domains, the new domain data must be added. When in doubt, STOP!
- Urgency – There is no urgency. Take small steps. It will take time to create the right standards, to test them in restricted places, and to build the infrastructure for monitoring performance.

[11] Albert Einstein did not have a driver's license, according to informed sources.

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Rudderless at NHTSA

FOR A WHILE, I was thinking that there must be something about the basic foundation of the *NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION* that makes it an unattractive organization to manage.[12] It's had 15 Administrators over its 22 year history, beginning in 1970. There have been 10 U.S. Presidents during the same period. The previous administration in which Elaine Chao was Secretary of Transportation, the agency to which NHTSA reports, did not even bother to find a replacement for Mark Rosekind when he left along with all of President Obama's appointees. Finally, on the 26th of May 2022, over a year after the Biden administration assumed control over the workings of the Executive Branch of the federal government, Steven Cliff was confirmed by the U.S. Senate. He resigned less than four months later on the 12th of September.

I have now understood that the problem isn't *NHTSA* or the Administrator's job definition. The problem as I see it is that the Administrator's job is a political appointment, and like any political appointment, people will be nominated for the position who do not have the qualifications for the job. They helped the President get elected, they have a personal profile that ticks the boxes that are needed to show that the administration is sensitive to issues of equality, or they have a strong interest in one of the administration's political platform goals that has nothing to do with highway traffic safety. The people doing the appointing of an Administrator, from the President to his advisors, have been selecting prospects for the job who have an agenda that is not aligned with the objectives of *NHTSA*.

It is worth noting that *NHTSA* describes its mission as "Save lives, prevent injuries, reduce vehicle-related crashes" related to transportation safety in the United States." It further states: "Through enforcing vehicle

[12] https://en.wikipedia.org/wiki/National_Highway_Traffic_Safety_Administration

performance standards and partnerships with state and local governments, *NHTSA* reduces deaths, injuries and economic losses from motor vehicle crashes."

There are around 600 employees at *NHTSA*. They are government employees who don't leave when an administration changes, and they have been hired to fill the jobs of highway traffic safety specialists. If you own a fishing trawler with a ship full of seasoned sailors, and you install a real estate broker as its captain, you have the makings of a mutiny. If the person who is captaining the ship does not have the skills needed for the job, the job doesn't get done, or the wrong jobs gets done poorly, and the people who are supposed to get the work done are not going to be either effective or happy. This is what has been happening at *NHTSA* almost from the very beginning. (See the June 2022 issue of The Dispatcher.)

Who is steering the ship?

Although *NHTSA* is part of the DEPARTMENT OF TRANSPORTATION, which is run by the Secretary of Transportation, currently Pete Buttigieg,[13] it was President Biden who announced on the 19th of October 2021 that he was nominating Steven Cliff as his selection for the position of Administrator. The Senate Commerce Committee held hearings on his nomination, but came to no conclusion on whether to recommend it for a vote to the Senate before it expired at the end of the year. President Biden tried again right after the New Year. Cliff was confirmed in May. Why was there pushback from the Commerce Committee? Look at Cliff's qualifications. He has a Ph.D. in chemistry. He joined the California Air Resources Board (CARB) and worked as a technical manager for greenhouse gas cap-and-trade policy. Then he served as a manager for the Greenhouse Gas Market Development and Oversight Branch and assistant division chief of the Climate Program. He was assistant director of sustainability in the California Department of Transportation for two years, 2014-2016, and then moved to the California Air Resources Board. Then he came to *NHTSA* in 2021. He left

[13] Pete Buttigieg. Secretary Buttiegieg's qualifications for his job were eight years as mayor of South Bend, Indiana, a city of approximately 100,000 residents, and he made a run at the presidency before dropping out and supporting Joe Biden.

NHTSA to return to CARB and become its Executive Officer, a position that clearly is a better fit with both his qualifications and his interests.

What did the Biden administration do next? It named Ann Carlson, the agency's chief counsel, as Acting Administrator and formally nominated her for the Administrator position in March of this year. What are her qualifications? Before joining the Biden administration, Carlson was a professor of environmental law at the UCLA School of Law. She also served as faculty co-director of the Emmett Center on Climate Change and the Environment. This background was certainly not going to endear her to the Republicans nor to the traffic safety specialists at *NHTSA*, and is another example of pushing the environmental agenda at the agency responsible for managing traffic safety.

In May, President Biden announced that he was withdrawing Carlson's nomination. Obviously, he understood that she didn't have a snowball's chance in hell of being confirmed. Buttigieg said that Carlson would continue at *NHTSA*, but did not specify what she would be doing. Republicans were especially critical of Carlson's role in developing fuel economy "standards" in 2021, saying that her stance was "consistent with (her) long career as an environmentalist without traffic safety experience".[14]

Environmental scope creep started early

I said that *NHTSA*'s mission was highway traffic safety, but in 1975, the U.S. Congress, under the Energy Policy and Conservation Act (EPCA), gave it the responsibility of setting and enforcing the CAFE (Corporate Average Fuel Economy) Standards. The *ENVIRONMENTAL PROTECTION AGENCY* (*EPA*), which was also established in 1970, calculates the average fuel economy levels, and sets related greenhouse gas standards under the Clean Air Act. President Obama established a policy on the 21st of May 2010 by which *NHTSA* and *EPA* have issued joint Final Rules for CAFE and GHG emissions regulations for passenger cars and light trucks built in model years 2017 and beyond, and have also

[14] https://www.autonews.com/regulation-safety/biden-withdraws-nomination-official-head-nhtsa?utm_source=daily&utm_medium=email&utm_campaign=20230531&utm_content=article7-headline

developed fuel efficiency and GHG emissions regulations for medium- and heavy-duty vehicles built in model years 2014 through 2018. Clearly, emissions and fuel economy have nothing to do with traffic safety, but there must have been some fierce backroom bargaining that went on to keep one or the other agency from expanding its scope into the other's administrative territory.

Maybe it's just easier for government head hunters looking to fill the top spot at *NHTSA* to find climate crusaders than it is to find qualified transportation safety professionals. Perhaps it's the climate crusaders, rather than transportation safety professionals, who volunteer to help Democrats get elected and are ready to move into whatever position is available. What is clear is that traffic safety is not being served by the battles between the political parties to put in or keep out climate crusaders. It can hardly be said that *NHTSA* has had a full-fledged Administrator since Mark Rosekind, who was extremely qualified.

If DOT is worried about losing control of cars and trucks to the *EPA* if it has to give up having a foot in the CAFÉ and GHG door, then set up another "administration" and let *NHTSA* focus on **SAFETY**. Put individuals in charge of each of the "administrations" who are actually qualified to do their jobs and are not just political bandwagon followers. Americans deserve better than what they have been getting from their government.

Electrofuels (E-Fuels)

THE 'E' IN E-Fuels is short for 'Electro'. It is there because the fuels in questions are produced using electricity. E-Fuels made headlines recently, including in these pages, because the EUROPEAN UNION was forced to allow E-Fuels to be used if it wanted to have its coveted ban on fossil fuel cars in 2035 passed by the *European Council of Ministers*. Several countries, notably Germany, Italy, and France, were balking. They were concerned that their car companies (e.g., Porsche, Ferrari, and Renault among others) would get left in the BEV dust if they could not continue producing cars that their customers wanted to buy.

What are E-Fuels? Think of them by analogy: synthetic diamonds are to mined diamonds as E-Fuels are to petrol/gasoline, diesel, or jet fuel. Lab-grown, synthetic diamonds are

diamonds that are produced in a controlled technological process, usually produced by subjecting graphite to very high temperatures and pressures. Unlike diamond simulants (i.e., fake diamonds), synthetic diamonds are composed of the same material as naturally formed diamonds: pure carbon crystallized in an isotropic 3D form. They share identical chemical and physical properties with mined diamonds.[15] E-Fuels look and perform exactly like the fuels they are replacing, but they are not made by pumping oil out of the ground and refining it into the fossil fuel products. Let's take a step back to the basics: hydrocarbons.

Hydrocarbons are organic compounds composed of hydrogen and carbon atoms. They can be found in petroleum and natural gas and are introduced into the environment through their use as fuels and chemicals. The energy that's within the hydrocarbon in our fuels is released through combustion. Combustion of hydrocarbons is a chemical reaction where a hydrocarbon reacts with oxygen to create carbon dioxide, water, and heat. Incomplete combustion of hydrocarbons produces the most oxidized form of carbon, carbon dioxide, as a product. Carbon monoxide, a by-product of hydrocarbon combustion, is a primary pollutant in the troposphere. Carbon dioxide emissions from burning fossil fuels are the main contributor to climate change, leading to a changing climate and trapping heat in the atmosphere.[16]

Oil refineries are one way hydrocarbons are processed for use. Crude oil is processed in several stages to form desired hydrocarbons, used as fuel and in other products.

E-Fuels are "drop-in replacement fuels".[17] They can be used in today's ICE vehicles without any modifications to the engines or fuel systems. They have to be refined in refineries to produce the final product. They can be transported using the existing fuel logistics processes and pumped into vehicles using the existing fuel delivery infrastructure. And, importantly, they contain the hydrocarbons that are found in petroleum and natural gas. When they are combusted in vehicles, the same chemical reactions occur, energy is released and carbon dioxide, water, and heat are generated. So, why go through the trouble and expense of producing E-Fuels if we get the same bad stuff going up into the atmosphere as with petroleum-based fuels? This is, of course, the question asked by all those who are against everything but BEVs. Because the process is **CARBON NEUTRAL**. E-Fuels do not put any more CO_2 into the atmosphere than what has already

[15] https://www.britannica.com/science/synthetic-diamond
[16] https://efuel-today.com/en/production-process-of-e-fuels/
[17] https://efuel-today.com/en/production-process-of-e-fuels/

been taken out to make them. It's like making new aluminum cans out of recycled aluminum rather than from mined bauxite.

E-Fuels are made by using electricity to combine hydrogen with carbon under high pressure. Making the hydrogen, obtaining the carbon, and creating the E-Fuel all have to be powered by zero-carbon electricity, otherwise the result cannot be classified as an E-Fuel. Zero-carbon hydrogen is produced using an electrolysis process with electricity non-fossil-based sources, such as wind, solar, and nuclear power. The electrolysis process separates water into hydrogen and oxygen. Carbon comes from carbon dioxide that is either captured directly from the atmosphere using a so-called direct-air capture (DAC) system or it is taken from the source of the CO_2 generator, like a like a smokestack on a coal- or gas-fired electricity plant.

In the next step, the hydrogen is combined with CO_2 under high pressure using a catalyst. The hydrogen binds with the CO_2 and is converted into a liquid energy carrier, the E-Fuel. Because electricity is used for the production of E-Fuels, the procedure is known as a 'power-to-liquid process' because electricity is converted into a synthetic liquid that is easy to store and simple to transport. One of the principal processes used for the combining of H and CO_2 is the Fischer-Tropsch Synthesis.[18]

E-Fuels are also a good way of making renewable energy portable

Critics of E-Fuels say that it is too expensive, that it is wasting renewable electricity when it could be used for directly charging BEV batteries. Lithium-ion batteries, solar panels, wind turbines, and electric cars in general, were all more expensive than they are now. They are less expensive today because of economies of scale. E-Fuels will most probably be competitive with fossil fuels by the end of the decade.[19] Being able to use carbon-neutral fuels in the billions of vehicles already on the ground, on the sea, and in the air will go a

[18] The Fischer–Tropsch process is a collection of chemical reactions that converts a mixture of carbon monoxide and hydrogen, known as syngas, into liquid hydrocarbons. These reactions occur in the presence of metal catalysts, typically at temperatures of 150–300 °C (302–572 °F) and pressures of one to several tens of atmospheres.

[19] See The Economist

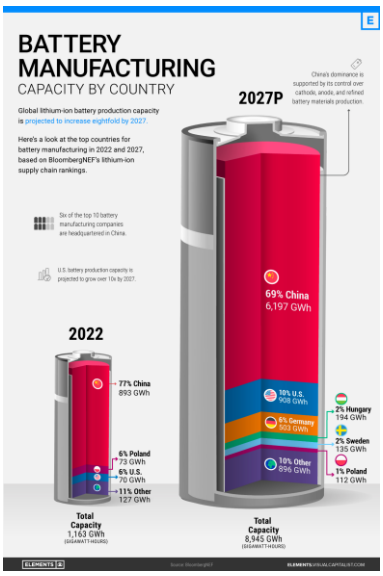
long way toward slowing down climate change. There is another major benefit that is derived from E-Fuels. They solve a very large problem with storing and transporting renewable energies.[20] Like fossil-based fuels, E-Fuels have a very high energy density, ten times higher than a lithium-ion battery, and they can be stored under room pressure and at room temperature. That means they can easily be transported. Renewable energies can be generated in the places around the world where it is easiest and most economical to generate them (e.g., in Wellington, New Zealand for wind and Yuma, Arizona for sun) and transported anywhere they are needed using existing technologies.

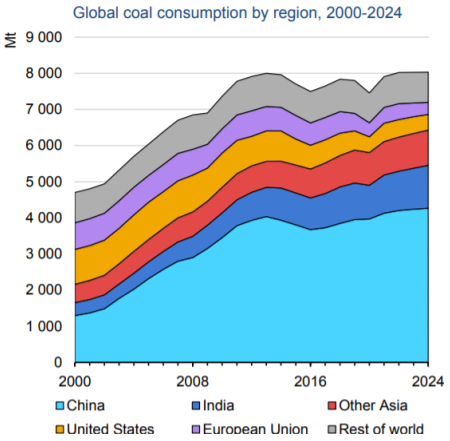
China and coal: The 50%+ strategy

IT'S A STRATEGY. It must be a strategy, to produce at least as much of anything as the rest of the world combined. That is what China seems to strive for. It does it with aluminum (56% of global production), steel (55%), batteries (77%), and countless other products. They produce only 32% of motor vehicles as of 2022, but China's automobile export machine is shifting into high gear, and reporters in the automotive sections of newspapers and magazines are writing glowing reports of their BEVs, so it is just a matter of time with cars.

It's a certainty that China does not like news reporters pointing out that it is consuming 50% of the world's output of coal—but it is and we are. In the June 10th edition of *THE ECONOMIST*, under the headline *Ember alert: Who is keeping coal alive?*, it shows a graph produced with data from the INTERNATIONAL ENERGY AGENCY of global coal consumption between 2000 and 2024. The burning of coal comprised 40% of the energy-related carbon emissions in 2022, so China is responsible for 50% of those emissions. According to the article, China is also planning 270 gigawatts of new coal-fired plants by 2025, more than any country has installed today.

I have just read the chapter in Hans Rosling's book, Factfulness, in which he urges us to "control the size instinct, and get things into proportion".[21] So if you take China's total





On a per capita basis, China is consuming twice as much coal as the U.S.
China 24,559 Terawatt hours
$24.559 \times 10^3 / 14.2 \times 10^8 = 1.73 \times 10^{-5}$

U.S. 2,741 Terawatt hours
$2.741 \times 10^3 / .33 \times 10^9 = .83 \times 10^{-5}$

[20] https://www.efuel-alliance.eu/efuels/what-are-efuels

[21] Rosling, Hans. Factfulness: Ten Reasons We're Wrong About the World—And Why Things are Better than You Think. Sceptre (2018).

emissions in 2021 (12.5 billion tons) and compare it to the U.S. emissions (4.8 billion tons) by dividing both by the countries' respective population, it shows that China has only 60% of America's CO_2 emissions per capita. Sweden's is less than one-half of China's on a per capita basis. But if you take that tact, the world should be beating up Palau, Curacao, Faroe Islands, and Qatar. The knife cuts both ways.

I have a suggestion for the Friday for Futur*ists*, Glue Our Hands to the Road*ists*, and Splash Paint on the Painting*ists*: Move your protests to China. That's where more than 50% of the world's action is, even on a per capita basis.

The real origin of the Cybertruck

IN THE JULY 2020 issue of *THE DISPATCHER*, page 9, I suggested that the design roots of TESLA's *Cybertruck* (shown here) lay in the *Lockheed F-117 Nighthawk* or in a skateboard ramp. It turns out that it was a lot simpler than what I had thought. The carpel for both the design and the name is a car that Elon Musk purchased in 2013. It is a *Lotus Esprit S1* that was used in the 1977 James Bond film, "The Spy Who Loved Me" starring Roger Moore as Bond. The car was nicknamed 'Wet Nellie' because it was part car and part submarine. Musk has admitted that the car's design served as inspiration for his *Cybertruck*. It might be a stretch, but the cyber security could have popped into the naming conventions in conjunction with the spy connection. What's the backstory?

The car was treated like any film prop

Q, the genius inventor who supplied Bond with all of his high-tech gadgets, especially his cars, designed him a car that could operate under water because Bond was investigating the hijacking of British and Russian submarines carrying nuclear warheads. He needed to get down to where the action was taking place. Three of the *Lotus Esprit S1*'s were used in the movie, and one of them (shown right) was modified at a cost of $100,000 so that it actually worked as a submarine. When the movie was over, it was stored with other props from the movie in a storage locker on Long Island. Years passed, whoever was paying the rent on the locker stopped paying, and in 1989 the locker's contents were auctioned off.

A Long Island couple bought it for $100. They had no idea at the time what they had purchased, but when they found out they decided to get as much out of it as they could. They restored the car's finish and interior, but not the operational parts, and put it in shows. In 2013 they decided to sell it and put it up for auction. The auction house they chose was RM SOTHEBY'S, and they accepted a bid for just under $1 million. The buyer turned out to be Elon Musk. He said at the time that he was going to convert it to a battery electric vehicle and restore its submarine functions. That did not happen, and he told his followers in 2017 that he had given up on the idea. But, in 2019, he sent out another Tweet saying that was Wet Nellie which served as the inspiration for his latest vehicle model, the *Cybertruck*.

Wait! Wait! The story's not over

Who designed the *Lotus Esprit S1*? It was Giorgetto Giugiaro. He designed it at the same time as he developed a design concept for HYUNDAI in 1974, the *Hyundai Pony Concept* (shown right). HYUNDAI announced recently that it will be working with Giugiaro to create a production version of the Pony. In addition to the LOTUS and HYUNDAI, Giugiaro was also the man behind the *DMC DeLorean,* which looks like a first cousin to the other cars. Giugiaro was named *Car Designer of the Century* in 1999 and inducted into the AUTOMOTIVE HALL OF FAME in 2002. Too bad that the Musketeer couldn't afford to have Giugiaro design his pickup.

Nvidia's market cap approaches stratosphere

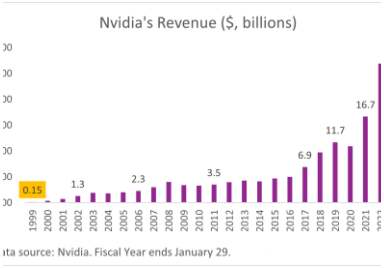
LET'S START WITH the name: NVIDIA. First, it is pronounced 'invidia'. In Latin, *invidia* is the sense of envy, an intense gaze associated with malice and the "evil eye". It is also the Roman name for *Nemesis*, the Greek goddess who personifies retribution for arrogance. She's often portrayed in the color green, which is closely associated with envy. In magic folklore envy or the "evil eye" is the principal vice that motivates demons. It's also what drives the "biting eye" of witches who would cast their spells with poisonous tongues. It was a deeply held belief by the ancient Greek & Romans that envy originates from the eyes.

NVIDIA's logo is green and is a stylized eye. The eye connects to a concept of vision. The company aspires to "unparalleled

visual experiences that would be the envy of everyone to behold". I guess if your first business was delivering awesome graphics processing units (GPUs) to gamers, mythological symbolism adds credibility. My question would be: Why did they drop the "I"? I'll save that for another time. I want to look at NVIDIA's value to the automotive industry, particularly for highly automated driving.

Background

NVIDIA is not a startup. It's been around for thirty years. It went public in 1999 at a share price of $19.69. If you had invested $1000 in the company just after its IPO, or $19,690, your shares would be worth around $1 million today.[22] It has a market capitalization in the neighborhood of $1 trillion, a feat that precious few companies have achieved. It had steady growth during its first twenty-five years, and then the top blew off. How did it get here?



Its founders, Jensen Huang, Curtis Priem, and Chris Malachowsky, agreed that the company would follow the Basket Principle, as in "Don't put all of your eggs in one basket". Huang is the only one of the three who is still leading the company, and he has not given up on the team's winning formula. Its main business is designing high-performance chips, so-called graphical processing units (GPUs), initially used in video games. Every generation of its NV (for Next Version) chips got better and better. It owns 80% of today's market in specialist AI chips.

The company's two principal baskets are advanced networking and software. Whether it's displaying real-life scenes in video games or training AI models, gobs of processing power is needed. A single NVIDIA chip is very powerful, but thousands of them networked together and operating simultaneously are, well, super powerful. Today, Nvidia controls 78% of the market for AI-tailored networking, in part due to its 2019 purchase of Mellanox. The other basket, software, is centered around its CUDA (Compute Unified Device Architecture) parallel computing platform and programming model. It is proprietary and closed source with an API that

[22] Anthony Di Pizio, The Motley Fool (March 4, 2023) https://www.fool.com/investing/2023/03/04/if-you-invested-1000-in-nvidia-stock-in-1999-heres/

allows software to use GPUs for general purpose computing. It runs only on NVIDIA's chips.

Nvidia in automotive

Here is what NVIDIA says about its automotive offering: *"NVIDIA has built a software-defined, end-to-end platform for the transportation industry that enables continuous improvement and deployment through over-the-air updates. It delivers everything needed to develop autonomous vehicles at scale."* The company calls it Nvidia Drive. It comprises a data center hardware, software, and workflows for developing highly automated driving solutions, from collecting the raw data needed to train the models through validation. It provides the end-to-end building blocks required for neural network development, training and validation, and testing in simulation. The DGX SuperPOD is a turnkey AI data center, and LaunchPad provides a short-term interface to Nvidia AI, to set up the workflow and processes before buying the SuperPOD. Reading about Nvidia's offering brought me back to the days of Intergraph and Scitex selling complete turnkey map production and map finishing systems.

Who does Nvidia say is using its platform? VOLVO CARS, JAGUAR LAND ROVER, MERCEDES-BENZ, HYUNDAI, SAIC, NIO, XPENG, and GAC AION.

With rewards come risks

Never to be outdone when it comes to article titles, The *ECONOMIST JUNE 3RD 2023* issue featured NVIDIA in a Leader article titled *Artificial intelligence: Nvincible?* Will the AI frenzy die out, it asks. Will the bigger IT guys, like Amazon and Alphabet, horn in on its computing market? Will the bigger chip guys, like Intel and AMD, squeeze it out of the chip market? Will the government look at its dominant position as a threat to free trade as well as a security risk and get tougher on to whom it sells its chips and software? *THE ECONOMIST* answers "Probably not" to all of the above. I agree.

After being around for thirty years, CEO Jensen Huang has seen the company through many patches of rough water. The company's strength is not only that it has multiple baskets, but it can put them together in an appealing arrangement that none of its rivals, existing or potential, can match.

Crew Comments

Views on June's V2V lead article

I RECEIVED TWO opposing views on my Vehicle-to-X piece in the June issue. Reader One said I was too optimistic on the usefulness of vehicle-to-vehicle messaging for intersection collision avoidance. Reader Two said I was "mistaken or misguided" on my view that the automotive industry was not in favor of installing DSRC-based V2X technology. These responses provided the perfect opportunity to initiate the new *Crew Comments* section of **Dispatch Central** in which I will discuss comments received from you, the members of the crew, since we are all on this journey together.

Reader One has been engaged in the standardization of vehicle communications since Day One and continues to lead efforts today. He does not believe that V2V communications can be used effectively for collision avoidance for two reasons. First, vehicle position precision is not sufficiently high enough to provide a message to vehicles in the vicinity of the sending vehicle that would be usable for avoiding a collision. The U.S. government says it is committed to 2 meters (6.6 feet), but satellite geometry, signal blockage, atmospheric conditions, and receiver design and features can degrade performance. GPS smartphones typically are accurate to approximately five meters.[23]

Second, interpreting the messages and converting the message into intersection collision-avoidance action is extremely difficult. Is the ratio of messages that would have to be ignored versus one that is useful ten-to-one, one hundred-to-one, or a million-to-one? Would all the warnings just end up distracting the drivers, who would then turn them off? Reader One says that the main use for V2V is merging highly automated vehicles onto highways. No one knows how to do merging without communications, he says, and WP.29 will be addressing this issue beginning in 2024.

In my attempt to deliver my main message in the article, which was to decouple V2I from V2V, it seems that I overstated the intersection crash avoidance case for V2V. I will look forward to seeing the description of the applications that WP.29 will define for V2V beyond highway entrance

[23] https://www.gps.gov/systems/gps/performance/accuracy/

merging, but that one application is absolutely essential for improving the safety of highly automated driving.

Reader Two is a communications expert who has been engaged in ITS work with the public sector since the earliest days of mobile communications. His purpose for writing was not to question or debate the way forward with V2V and V2X, which he says *"is with cellular device-to-device communications,"* but to review the history of connected vehicle programs in the U.S., with which he has a high degree of familiarity. In my article I said: "The automotive industry has not resisted sending and receiving V2V messages per se. What they have resisted is the *EUROPEAN COMMISSION*'s—as well as *NHTSA*'s up to 2020[24]—attempts to tell them how to do it, and the governments' attempts to go beyond simple V2V." Reader Two responded: *"I concur that the automotive industry has not resisted sending and receiving V2V messages, but not with the rest of the statement."* He says that *"specifying a common communications medium was supported by the broad stakeholder community, including automakers…and this was recognized by the FCC[25] when they provided the necessary radio spectrum, where they noted that generally the FCC avoided specifying a technology, but that the needs of connected vehicle safety applications necessitated that a common communications technology be used".*

I will not reproduce the history of the FCC's and the U.S. Congress's decision process regarding their response to the 1997 ITS AMERICA petition to the *COMMISSION* to allocate 75 megahertz of spectrum in the 5.9 GHz band for ITS, in particular for DSRC. It is worth reading.[26] The Congress and the *COMMISSION* gave it, and then the *COMMISSION* took it away. I agree with Reader Two, there were very strong supporters for DSRC inside the automotive producers. These supporters were invested in the technology, either because they had worked on it, wrote their graduate degree theses on it, promoted it to their management, or just believed in it. But I will stand behind my statement that the automotive industry as a whole was not in favor of promoting a DSRC-based V2X

[24] In 2020, the U.S. Federal Communications Commission voted to shift 30 MHz of the 75 MHz that had been reserved for DSRC to Cellular-V2X, and moved the remaining 45 MHz to Wi-Fi use.

[25] FCC – U.S. Federal Communications Commission

[26] https://www.fcc.gov/wireless/bureau-divisions/mobility-division/dedicated-short-range-communications-dsrc-service

communications solution. How can I be certain of that? Because I was directly part of that industry.

I have worked in the automotive industry in various roles for over forty years (and continue to do so) including as an employee of a vehicle manufacturer (AB Volvo), a member of international standards groups, as a consultant to vehicle manufacturers, automotive systems developers, service providers to the industry and consumers, and to public authorities. Since 1996, I have worked with ten automotive OEMs on the development, installation, and deployment of their connected services systems in Europe, Asia and North America. Not one of these OEMs was in favor of installing a single-function device for vehicle-to-vehicle crash avoidance.

Toyota and other Japanese car makers continue with a DSRC-based solution in Japan, which is not compatible with the U.S. or EU proposals. Both Toyota and GM were behind a multi-function DSRC solution in the U.S., but both dropped their support when it was clear they were not going to get the other automakers to join them. VW continues the European version of DSRC, but it is alone. The French Automotive Industry (PFA) has recently come out in favor of 5G-V2X, and recommended that the "safety-related ITS application" spectrum allocated by the ECC Decision of 2008 should be divided in three: 5G-V2X, 802.11p, and Spare. [27]

However, as I said in my June issue article, there were and continue to be strong doubts about using a technology that is not compatible with the evolving mainstream cellular communications technology. The automotive industry has also had negative experience with government-mandated technology solutions, namely European eCall, which affected all carmakers selling their products within the EU, not just European carmakers.

Maybe we can just agree to disagree on how history treated the subject of DSRC-based V2X. Support for it when it was at the top of its acceptance curve was not great enough to push it forward by government mandate. None of the stakeholders showed the willingness to fight to the death in favor

[27] V2X Short Range Radio Technology Choice. French Automotive Industry Technical Position Paper (07/2023).

of it. Cellular-V2X is now able to meet the requirements for both short-and long-range communication, and to do it in a superior way to DSRC. Let's get on with the job of developing V2V to improve safety with or without a driver behind the wheel.

Musings of a Dispatcher

American cities are losing their hearts

THE DISPATCHER

Mobility Industry Insights by
Michael L. Sena
September-October 2023
Volume 11, Issue 1

About Michael L. Sena

Through my writing, speaking and client work, I have attempted to bring clarity to an often opaque world of highly automated and connected vehicles. I have not just studied the technologies and analyzed the services. I have developed and implemented them, and have worked to shape visions and followed through to delivering them. What drives me—why do what I do—is my 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. Most importantly, I put vehicles into their context. It's not just roads; it's communities, large and small. Vehicles are tools, and people use these tools to make their lives and the lives of their family members easier, more enjoyable and safer. Businesses and services use these tools to deliver what people need. Transport is intertwined with the environment in which it operates, and the two must be developed in concert.

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