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Insights by
Michael L. Sena

THE DISPATCHER

IN THIS ISSUE

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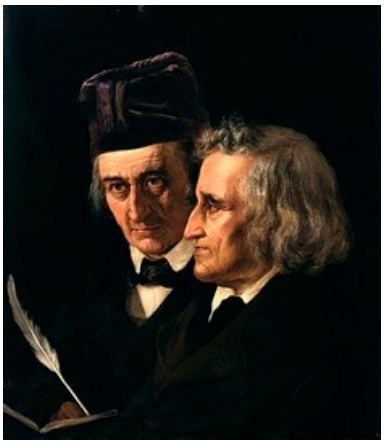
The Plan to Merge Geely Auto and Volvo Cars

Zàijiàn is Mandarin for 'goodbye'.

Is it time to say Zàijiàn to VOLVO CARS?

In February of this year, Volvo Cars and Geely Automobile made a joint announcement that they were considering combining their businesses to accelerate financial and technological synergies between the two automakers. Volvo would bring in its shares of Lynk & Co and Polestar, and Geely would add its shares of the same companies along with Lotus, Geometry and Proton. Volvo would become a brand within a global group worth around $30 billion with well over 2 million in combined annual sales.

VOLVO HAS APPEARED quite often in these pages. It's not so strange when you consider that while I have consulted to many vehicle manufacturers, VOLVO is the only one of them that actually employed me, full-time for four years, part-time for four years and then as a consultant for twelve more years. All that was during the period between 1992 and 2015. VOLVO was a single, unified company when Jan Hellåker offered me a position in his *Traffic and Transport Systems* department within *VOLVO TECHNOLOGICAL DEVELOPMENT (VTD)*, then managed by Lars-Göran Rosengren. *VTD* was the research and development organization for all the companies within AB VOLVO, which included at the time VOLVO CARS, VOLVO TRUCKS, VOLVO CONSTRUCTION EQUIPMENT, VOLVO AERO and VOLVO PENTA.



1. Wilhelm Grimm (left) and Jacob Grimm in an 1855 painting by Elisabeth Jerichau-Baumann.

P.G. Gyllenhammar was the CEO of AB VOLVO at the time. P.G. had big plans for VOLVO. It was going to be an international powerhouse, a conglomerate that would have many legs in many different industries. His planned merger with RENAULT was scuttled in the autumn of 1993 by his own staff, and he left the company shortly thereafter. It was only the beginning of the many changes that would occur over the next two decades.

The story of Volvo Cars after its sale to FORD MOTOR COMPANY in 1999 reads like the Brothers Grimm[1] fairy tale of *Cinderella*. Once it was clipped like a limb off the Volvo

Mother Tree by a pragmatic (some would say hard-hearted, others unpatriotic) Leif Johansson, CEO of AB VOLVO who was responsible for selling VOLVO CARS, it withered for eleven years as an orphan under the foster care of an uncaring FORD. Undernourished and consequently underperforming as a result of being forced to live in the shadows, it was close to meeting a certain end when the Great Recession occurred and FORD was forced to fold up its foreign tents. It had sold ASTON MARTIN in 2007 and the combined JAGUAR LAND ROVER in 2008. It was VOLVO CARS' turn in 2010.

Shunned and unwanted by its European and American cousins who saw no synergies resulting from acquiring VOLVO CARS and who therefore offered no succor, it was saved in 2010 from certain ruin by a knight from the east, Li Shufu, CEO of ZHEJIANG GEELY HOLDING GROUP, a Chinese company that got its start in refrigerators and mopeds. GEELY paid $1.8 billion for VOLVO CARS, 28% of the price FORD had paid. Don't shed any tears for FORD; it had extracted from VOLVO CARS much more value than what it had originally paid.

Li Shufu seems to have a permanent smile on his face. He speaks only in Chinese and the translations reveal that he expresses himself in poetic phrases. [2] When he was tryng to convince the VOLVO unions that they should support his acquisition, they asked him to tell them in three words why he wanted to buy their company. He answered: "I love you." The unions remained skeptical until just before the 10,000-page purchase agreement was signed and only after receiving assurances that their jobs would not disappear into China.

2. Li Shufu in his element, a car showroom. His hobbies are poetry and music, which it is said he pursues in his spare time. With his intense schedule, it is difficult to believe that there is any spare time in his day.

In 2010, VOLVO CARS sold 334,808 cars. In the U.S., once its most important market, sales in 2010 were less than half of what they had been in the year FORD bought them. It lacked new products. But Li Shufu and his financial backers, the Chinese state, saw VOLVO for exactly what it was at the time, an affordable entry into the western automotive market. Li Shufu promised he would run VOLVO with a light touch, leave the jobs where they were while adding new ones in his home market and provide the money VOLVO needed to develop the products it required to reach the one stretch goal he would set: Sell 800,000 cars globally by 2020.

Mostly smooth travel on the yellow brick road

There was only one major bump on the road that VOLVO was now taking. It happened just two years after the acquisition by GEELY.

The company's CEO, Stefan Jacoby, who had been head-hunted away from his position as VW AMERICA GROUP President, seems to have had the idea that he was in charge at VOLVO CARS, not Li Shufu. He was officially 'retired', and Håkan Samuelsson, then on VOLVO CARS' board, formerly CEO of MAN and a long-time employee of SCANIA, replaced him. After the switch, things ran extremely smoothly. Money arrived when it was needed.[3] New models began to appear that were met with high praise from both the auto experts and customers. Additional manufacturing capacity with four new factories China, which quickly became the company's largest market. The number of employeees doubled from 21,000 to 43,000. A long-awaited and much-needed factory was opened in the U.S. A new brand, *POLESTAR*, was launched which would deliver first a plug-in hybrid and then a battery electric vehicle. The company also finally succeeded with moving its image into the luxury segment.

Li Shufu and Håkan Samuelsson sit together in the back of a Volvo.

3. It is reported that Geely has invested approximately $20 billion in Volvo during the ten years it has owned the company. (Source: *DAGENS INDUSTRI*. Fredag 24 april 2020. *Behåll Volvo Cars självständighet*)

Around the seven-year mark after the purchase, interesting things began to happen. Some were unexpected, others were difficult to understand. In December of 2017, Geely had surprised everyone when it announced it would take a 14.9% stake in VOLVO CARS' former owner, AB VOLVO. The share purchase was completed in June, 2018. Would Li Shufu consider reuniting the two VOLVOS? There were a lot of Gothenburgers who were wondering whether dreams really did come true. Only a few months later, in February 2018, Geely struck again, this time buying a $9 billion stake in DAIMLER AG, parent to VOLVO CARS' competitor MERCEDES-BENZ. What was Li Shufu up to?

In 2018, VOLVO CARS announced that it was preparing for a stock market listing. VOLVO CARS had achieved record profits and sales in 2017, with a 27.7% increase in operating profit and global sales of 571,577 cars. The 800,000 goal now appeard more like a waypoint than a destination. The IPO was planned for the autumn of that year, but when the time approached, GEELY decided to pull back. Li Shufu had pushed for an IPO with a value of VOLVO CARS of between $16 and $32 billion. Investors were willing to pay only between $12 and $18 billion. Samuelsson said that trade tensions between China and the U.S. and a downturn in automotive stocks were behind the failed IPO. Pundits said the price was unrealistic.

When the VOLVO CARS' IPO was announced, thoughts began circulating in the Swedish press about GEELY using the profits from the VOLVO CARS share sale to pay for his other investments. It was never quite clear where the money for the AB VOLVO and DAIMLER

investments came from. The road ahead began to look less smooth, especially considering the worsening of relations between China and the U.S.

Was it all as altruistic as it was cracked up to be?

Not much occurred during 2019 except that VOLVO CARS had its sixth record sales year in a row, selling 705,452 cars globally. Around 20% of that total was in China, the company's largest market. Things weren't going quite as well for its sister, GEELY AUTOMOTIVE. During the first half of 2019, GEELY AUTO's revenue sunk by 11% and profit by 40%. Uncertainty among customers about the trade war with the U.S. was given as the reason for the steep drop, but it seems the real reason was that the Chinese state removed certain automotive subsidies and its tax relief efforts to stimulate car sales were proving ineffective. GEELY AUTO spent a pile of money on rebates trying to lure customers, but sales of all of its brands fell by 19%. In order to secure its capital needs, GEELY GROUP took a loan of $300 million that was coordinated by CITIGROUP GLOBAL MARKET ASIA.

In the middle of February 2020, before COVID-19 began to affect business operations in Europe and the U.S., but after it had had a very negative impact on China, GEELY AUTO and VOLVO CARS announced that they were considering combining their businesses to create a company that "would accelerate financial and technological synergies between the two companies". All the brands would remain distinct, but they would be run collectivley by a single CEO and a single board. In a joint statement, GEELY AUTO and VOLVO CARS said the combined group "would have the scale, knowledge and resources to be a leader in the ongoing transformation of the automotive industry". The new company would initially be listed on the Hong Kong Stock Exchange and eventually on the Stockholm Exchange.

If this sounds like GENERAL MOTORS with *GMC*, *CHEVY, CADILLAC* and *BUICK*, or FCA with *FIAT, JEEP* and *CHRYSLER*, well, it is. So far it's a proposal. A joint working group has been created to prepare a report on how or whether to proceed. Any proposal would be subject to the approval by the boards and shareholders of GEELY AUTO and VOLVO CARS, as well as by the regulators, the companies have said. But GEELY AUTO and VOLVO CARS are both owned by ZHEJIANG GEELY HOLDING GROUP which is owned by Li Shufu, and making such a proposal in the first place would surely depend on the government of China having given its blessing before it was announced.

This is clearly another way to accomplish the same result that a stock listing of VOLVO CARS on its own would have achieved, which is to pull value out of VOLVO to repay the investments already made in it. GEELY AUTO sells more cars, but it has a market cap of $14 billion and a share price of just under $1.60 (22 May 2020). It is VOLVO that has the real potential for generating cash, but that cash cannot be released unless GEELY GROUP either sells shares in VOLVO CARS or sells the entire company. It would never sell VOLVO CARS, at least not yet. It's the key to the global automotive treasure chest. The Chinese brands, including LYNK & CO and GEELY, have not yet made their way to Europe and North America. VOLVO CARS is well established and has already introduced *POLESTAR*, essentially an electrified VOLVO that is made in China. Whether the purpose for releasing the cash through an IPO is to enrich the investors or to provide additional funds for more investments is not that relevant. The main result will be that Chinese GEELY AUTO will take over complete control of VOLVO CARS.

This is the Geely Innovation Center in Gothenburg under construction in February 2019. It is only Phase One of a building complex that when completed in 2021 will have 100,000 square meters and space for 3,500 employees.

Voleely or Geolvo or just Geely Car Group

If the decision is made to merge VOLVO CARS and GEELY AUTO, it has both symbolic and literal consequences for VOLVO CARS and all of its non-Chinese employees, for Sweden and for the EU. As it is today, with VOLVO CARS operating more or less as an independent entity that happens to be owned by a Chinese company, with its own CEO, Håkan Samuelsson, and its own board of directors, it has remained a Swedish company with three major markets, Europe, North America and China. It is still considered a Swedish company because Sweden is where its roots are, where its principal R&D and manufacturing are located and where the majority of its employees are located. It is highly unlikely that the headquarters of a new company that has brands associated with China, the UK, Indonesia and Sweden would be situated in Sweden. It is China where the parent company has its headquarters, where the company's founder has his base and where all decisions will be made. There might be a symbolic head office located in Gothenburg to placate the Swedes and the Europeans, but the real power would be in China.

Then there is the question of who would run the new company. Håkan Samuelsson was ready to retire when VOLVO CARS should have completed its IPO in 2018. When the IPO was pulled back, he extended his contract until 2022 when he will turn 71. Naturally, he is the one preferrred by everyone associated with VOLVO CARS, and he might take on the title for a few years just to

smoothen the transition to VOLVO CARS becoming a Chinese brand. However, it is much more likely that the company will be run from the start by 50-year-old An Conghui (see sidebar). He has been part of GEELY since 1996 and was responsible for the building of GEELY AUTO's first car manufacturing factory. He holds a 4.15% share in GEELY AUTO. He currently plays second fiddle to Li Shufu; it's not likely he would accept being moved to the third violin stool in the GEELY orchestra. If he does not run the new company himself, it will be someone else who reports to him.

VOLVO CARS has had non-Swedes running it at times in the past. Steve Odell during the FORD years and Stefan Jakoby were at the helm for a period of time, and things didn't go all that well. VOLVO engineers seem to prefer being managed by Swedes because, in my considered opinion based on my forty-three years of working for and with Swedes, they like to feel they don't need to be told what to do. VOLVO CARS has done so well under the watchful eye of Li Shufu because he has stayed out of the business, allowing his CEO to do his job. In a debate article in Sweden's financial newspaper, *DAGENS INDUSTRI* on the 24th of April, two eminent Swedish business professors argue strongly against pulling VOLVO CARS into the China sphere, principally because they believe the company will lose its engineering excellence.

Although China has become VOLVO CARS' largest market, it still represents only 20% of its total sales. Fully 50% of its sales come from Europe. How will Europeans view VOLVO's models when it becomes a fully Chinese company, and especially as more and more of its cars are produced in China, the locus of battery electric vehicle production? This one is a hard call to make. Much depends on the relationship Europe in general and Sweden in particular have with China. At the moment, relations between China and Sweden are frosty at best, due to a number of political factors and an outspoken Chinese ambassador to Sweden who seems to believe it is his role to lecture Sweden's government and its people on the proper way to show respect for the much larger and more important country that he represents.

"GEELY AUTO is still committed to its brand mission of 'Making Refined Cars for Everyone', which has led us to become China's leading privately-owned automotive brand. However, our vision for the future is not just to be China's leading brand, but to become the most competitive and respected Chinese auto brand in the world."
— An Conghui, President and CEO of GEELY AUTO and Board Member and President of ZHEJIANG GEELY HOLDING GROUP.

It's improbable that there will be a referendum in which people will be able to cast their votes for or against the subsumption of VOLVO CARS by GEELY AUTO. It is the listing of the new company on a stock market in order to extract cash from VOLVO that is one reason it will happen, and the formalization of GEELY as a global company that is the other reason. It's likely to happen. We all probably should start to get used to the idea.

Dispatch Central

"If you set out to make the most robust thing you can imagine, it will take you a long time before you create value for your customer or gain any learnings for yourself. Instead, focus your team on something you can make quickly that will provide an opportunity to gain real feedback. At the start of every new project, ask your team: "What's our skateboard?"

Spotify Agile coach Henrik Kniberg

Battery Electric Vehicle News

Dyson shows ditched BEV, codenamed N526

THE HEADLINE READ: *Vacuum tycoon Dyson unveils cancelled electric car*. James Dyson, who had shelved his planned entry into the battery electric vehicle fray in October of last year, decided he had to show the world what his car would have looked like if he had allowed it to be sold. Here is Mr. Dyson himself with his car codenamed N526. It looks pretty much like the drawing which I included in my article on it in the October 2019 issue of *THE DISPATCHER*.

Dyson was quoted in the *SUNDAY TIMES* in his first comments following the car's cancellation that he killed off his electric car project after it became clear he would have to charge over £150,000 for the vehicle in order to make a profit. "We stopped it because it was not commercially viable," he said, "not because of any failures in research and development." He claimed that the project cost him £500 million of his own money. His current net worth is estimated to be around £16 billion, so his investment was not exactly spare change. He had planned to put in another £2.5 to build an assembly factory in Singapore.

It seems that Mr. Dyson felt that as he had invested so much money in his BEV, he was going to get his money's worth out of the interview he did with the *SUNDAY TIMES*. He claimed that established premium automakers like BMW, Mercedes-Benz and Audi were selling their battery electric cars at a loss. "When we started in 2014, we had good technology and a very efficient car with long range (600 miles/966 km). It was viable. But when other companies started producing electric cars and selling them at a loss, it became too risky for us," he said. The reason they are selling at a loss is to reduce their average CO_2 levels across their fleets and avoid EU fines. "I don't have a fleet.

I've got to make a profit on each car (I sell), so I would jeopardize the whole company. In the end, it was just too risky."

He was aiming to compete with the *Tesla Model X*, which sells for around £120,000 if the options that most people spring for are added into the base price. In order to get back some of the money he invested, Dyson is thinking about licensing the solid-state batteries his team acquired when he bought solid-state battery maker SAKTI3 in 2015. He claims that his battery technology is unique and that other car manufacturers should be interested in using it. The intention was to start with lithium-ion batteries and then start using the solid-state batteries, which, according to Dyson, are more energy dense with less need for cooling.

France most generous with €12,000 EV incentive

IN LATE MAY, French President Emmanuel Macron announced an "historic plan to confront an historic situation." His government would offer incentives to buyers of battery electric, plug-in hybrid and hybrid vehicles of up to €12,000 ($13,150). It is part of an €8 billion rescue plan for the French automotive industry, with the incentives portion totaling around €1.3 billion. What this means in practice can be shown with an example of the *Renault Zoe*. The MRP of this BEV is €32,000. With the rebate the price would be reduced to €20,000 if the buyer traded in an older diesel. The trade-in bonus would be $5,000 and the BEV purchase bonus would be €7,000.

The Macron government has established a goal of having the French car industry producing one million electric vehicles of all sorts by 2025. These incentives are aimed at increasing domestic demand. Plug-in hybrids that cost up to €50,000 and have an electric range of at least 50 kilometers will receive a €2,000 bonus. The government is attempting to make BEVs and plug-ins affordable for lower income citizens. It is not only electric vehicles that obtain rebates. Anyone trading in a petrol car registered before 2006 or a diesel car registered before 2011 will also receive a rebate even if they purchase petrol or diesel car as long as the purchased car meets the newest emission standards.

France is in a good position to promote electric vehicles because so much of its electricity production is based on clean sources of fuel, namely 81% from nuclear and non-hydroelectric renewables. (Note: hydroelectric, which is 9% of electric fuel sources, may not generate harmful emissions, but it is one of the worst

Tesla Took the Edge from Karlmann

It was in our local newspaper that I recently caught a first glimpse of the Karlmann King 2018. I immediately thought of the Lockheed F-117 Nighthawk fighter plane. I also thought of TESLA's Cybertruck. You know, the one that could double as a ramp in a skateboard park. Besides the wedgy sharp angles, the King shares something else with the C-truck: they are both bullet-proof. Most King buyers opt for the bullet-resistant option, which adds at least $300,000 to the $1.9 million base price.

The Tesla Cybertruck that takes its cues from a skatepark ramp.

The Lockheed F-117 Nighthawk was probably the main inspiration for both vehicles

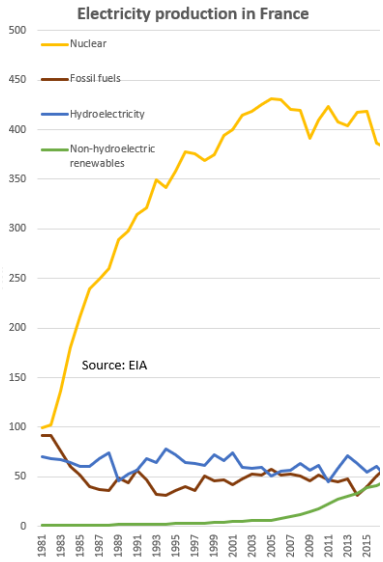
forms of electricity production from the standpoint of the damage it does to fish and wildlife.) It is the French government that owns almost all of the country's nuclear power sector, and it is the French government that benefits by greater an increased use of electricity. Costs for the rebates for electric vehicles can, to a certain degree, be offset by increased revenue from electricity consumption.

Germany, not be outdone, hands out cash too

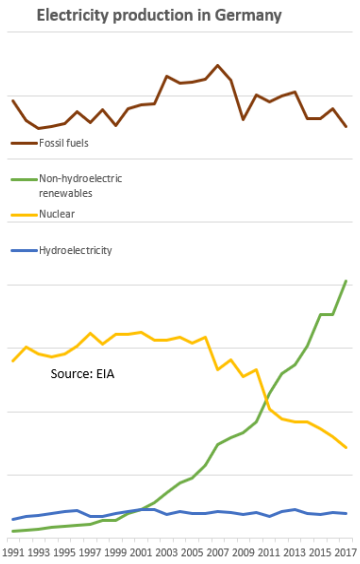
The German government announced on the 4th of June that it would double the existing subsidies on electric vehicles to €6,000 on vehicles that cost up to €40,000. When the contribution from manufacturers is added in the form of rebates and incentives, the total subsidy increases to as much as €9,000 per vehicle. Buyers will also be given tax relief in the form of a reduction in the country's sales tax from 19% to 16%. All this will cost the German government €2.2 billion in direct subsidies for electric vehicles and €2 billion in the form of grants to the automotive sector for research and development.[4]

German finance minister Olaf Scholz commented on the subsidies in the press release: *"This is about renewable energies. This is about all the climate activities which are necessary to get to a (carbon) neutral economy in 2050. We have to start now."*

There was no mention about where the electricity was coming from to power all those electric cars. The country has done a great job increasing its non-hydro sources of fuel, but it is doing it at the cost of clean nuclear power, which it had voted in 2002 to phase out completely by 2022, and fossil fuel is still by far the largest source of fuel to generate electricity. Do electric vehicles in Germany make any more sense in Germany than they do in China, where almost 70% of its electricity production is from fossil fuels, with 66% of that in coal?



4. https://edition.cnn.com/2020/06/04/business/germany-stimulus-electric-cars/index.html



Two countries, Germany and France, the largest economies in Europe[5], pursuing almost identical policies regarding incentivizing the purchase of different types of electric vehicles, but having completely different preconditions. They did not arrive where they are by accident, that is, how they make decisions—both good and bad. Trace their histories back a few thousand years and then fast forward to today and you understand why a license plate in Germany is tied to a city and a person, while in France it belongs to the vehicle for its life. Germany is still made up of tribes formed into states that were united into a country a mere 149 years ago. This helps explain why its politicians promote a technology that weakens its car industry and burns more coal at the same time.

5. Excluding the U.K., which is actually #2, but which does not consider itself part of Europe and is not considered European by it continental neighbors.

Ultimate Co-branding: SpaceX, Model X, NASA

I WONDER WHAT was going through the minds of TESLA's competitors as they watched on two separate occasions astronauts Doug Hurley and Bob Behnken being chauffeured out to the launch pad in a white TESLA *Model X* where their SPACEX rocket waited for them. A second, identical *Model X* led the way. Was it awe and wonder, or was there a bit of envy and maybe a little anger that Elon Musk was getting to use this event to squeeze out free advertising for his automobile company? As Americans, Mary Barra, GM CEO, and Bill Ford must have had mixed feelings. The pride they surely felt at seeing a U.S-built rocket on the launching pad—after nine years of being dependent on Russia for ferrying its astronauts up to the *International Space Station*—must have been dampened by the sight of TESLA's *Model X* getting free advertising in front of 10.3 million concurrent viewers online.[6] In fact, the scene was seen twice, once on Wednesday, the 27th of May when the launch was scrubbed, and then again on Saturday, the 30th of May, when it went off like clockwork.

It wasn't until early May that NASA unveiled the TESLA car that would take the U.S. astronauts to the launch pad. NASA administrator Jim Bridenstine revealed images of the car in a tweet, a platform that became the principal method of communicating important announcements out to the public from U.S. government agencies just about four years ago when a new President took up residency in the White House. The car features NASA's well-known logo for the space agency.

Bridenstine tweeted: *"Here's some Tesla news that everyone should love. Check out the Model X that will carry @AstroBehnken and @Astro_Doug to the launchpad for the Demo-2 mission! #LaunchAmerica."* It was the first time that NASA astronauts rode in a standard car to the launch the launch pad. They have previously made the journey in a specially-designed van. Elon Musk has prided himself on not paying for traditional advertising and marketing. He has gone further, saying that he "despises" advertising and is openly hostile to the idea of paying anything to promote his brand.[7]

It is reported that he has never paid for advertising in the company's seventeen year history. *"Tesla does not advertise or pay for endorsements,"* Musk has repeatedly explained. *"We use that money to make the product great."* TESLA's rejection of paid media is often cited by Musk as one of the main reasons he and his company are often singled out for extraordinarily critical attention in

6. "We're still collecting the data, but some of our metrics are saying that peak viewership for the joint NASA-SpaceX launch broadcast across all of our platforms was at least 10.3 million concurrent viewers," NASA Associate Administrator for Communications Bettina Inclán said during a news conference on Sunday (May 31), shortly after Behnken and Hurley's Crew Dragon capsule arrived at the ISS.

Astronauts Doug Hurley, left, and Robert Behnken pose in front of a Tesla Model X car during a SpaceX launch dress rehearsal at Kennedy Space Center in Cape Canaveral, Fla.

7. https://www.marketingweek.com/mark-ritson-elon-musk-wish-repented-hatred-advertising/

the mass media. He has no truck for marketeers. There is no CMO at TESLA; no in-house marking function or staff; and, no external ad agency with their snouts in the TESLA trough. How much do we think the free advertising that TESLA received during the two days that its *Model X*s were ferrying astronauts and launch technicians around Kennedy Space Center at Cape Canaveral?

At this year's Annual Shareholder Meeting to be held in person on the 7th of July in Mountain View, CA, shareholders will be able to vote on whether the company should be required to reverse Musk's anti-ad policy. A proposal has been brought by one of the company's shareholders that reads: *Should Tesla spend at least $50/car produced to advertise its products/services in order to increase brand and product awareness and interest, achieve other goals (set forth in the supporting statement) and to help mitigate and/or reduce harm to Tesla's goals, objectives, reputation and finances?* The company has recommended that this proposal be rejected by shareholders. Musk firmly believes that his approach is a better use of the company's resources. Let's try to use a concrete example to see if his views hold water.

If the proposal put forward by a shareholder is passed, TESLA will be required to spend about $18 million on advertising, based on 2019 sales figures ($50/car X 360,000 cars sold). If we take an accepted amount for prime time advertising as the amount paid for an ad during the NFL football Super Bowl, which was $5.6 million for a 30-second spot in 2020, and apply that to the 20 minutes that the TESLAs were on display during the SPACEX launch and compare that to the number who watched the Super Bowl versus the number who watched the launch (100 million vs. 10.3)[8], it turns out that the exposure of TESLA during the launch was worth $22.4 million and was totally free. In other words, it was worth $4.4 million more than what TESLA should pay to ad agencies and media outlets. The proposal will probably fail.

8. 10.3 million watched it live. The ride took 20 minutes (https://blogs.nasa.gov/commercialcrew/2020/05/27/astronauts-on-way-to-launch-pad-39a/)

$5.6 X 40 = $224 million/10 = $22.4 million is what that exposure is worth, and it was free.

There are many reasons why TESLA is now worth as much as Toyota, and why its stock is selling at a price that is closer to AMAZON's, the world's highest valued company. But the main reason is that it has a CEO who is running two companies, SPACEX and TESLA, both of which have captured the imaginations of people everywhere. Musk represents those companies as their chief salesman and cheerleader, as well as their CEO. He fought to keep TESLA's Fremont, CA factory open when the State said it should close, and he fought to reopen it again when the State said it was not yet time. He had customers waiting for their cars, and they had waited long enough to drive them. He's on the front line twenty-four hours a day. He is the advertisement.

Musings of a Dispatcher: Vehicle Connectivity

THE TOWER OF BABEL by Pieter Bruegel the Elder (1563)

9. Princeton Professor Alain L. Kornhauser and TECHSTINATION producer Fred Fishkin, joined by Ken Pyle, Managing Editor of Viodi. https://soundcloud.com/smartdrivingcar/zoom-tank-06-02-20-everyone-is-for-connectivitybut

We're all speaking different languages

IN EARLY JUNE, I took part in a ninety-minute online discussion on the topic of vehicle connectivity. It was one of a series of debates/discussions on different mobility-related issues, all open to the public, held as *Zoominars* and organized by the team behind *SMARTDRIVINGCAR*.[9] Two earlier sessions, in which I had also taken part, were focused on driverless mobility and the future of public transport. In this third session, I introduced the topic with a five-minute verbal presentation titled *Two-way Vehicle Connectivity is a Three-sided Coin That Everyone Wants to Own*. My aim was to outline the multiple purposes for vehicle connectivity that are being addressed by different groups, both public and private and mostly independent of one another.

What we have today is something like the painting of *THE TOWER OF BABEL* by the Dutch painter Peiter Breugel the Elder. Each group is, by and large, able to understand only what members of its own group are saying. So instead of everyone working on making the tower higher in order to reach to heaven, each group works on their section of the tower. They develop procedures and standards that work for them, but don't necessarily work for the others. And there is no agreed plan for how the sections will coalesce. Our hope for this day's session was to stimulate discussion among the different groups so that eventually ways can be found for putting everyone in the same room to find common solutions, perhaps starting with a single master plan.

In this *Musings* I will share with you my reflections on what was said during the session and also on comments I received afterward from some of you who listened in. I have put the text of my introduction in quotations and parentheses.

"Two-way vehicle connectivity has three facets. Two of them are mainly of interest to vehicle OEMs and their suppliers. They are vehicle-centric and customer-centric. Vehicle-centric connectivity includes functions such as emergency notification, logistics tracking and over-the-air updating. Customer centric connectivity includes many services that are also provided by mobile apps outside of the

vehicle, such as music streaming, workshop service booking, traffic notifications and car sharing applications. Two-way vehicle connectivity today is a major competitive factor for the OEMs.

It was here I should have made my first pause to let the thoughts sink in on these two parts of the vehicle connectivity puzzle and to open the discussion.[10] These are the issues of primary interest to the OEMs, the mobile network operators and the suppliers of wireless communications. Vehicle manufacturers have been working with and investing in the technologies and the service infrastructures that they support for over three decades. As the exchanges in our session indicated, they are neither understood nor appreciated by people outside of the vehicle industry. I believe the reasons are clear: the OEMs have wanted to control access and participation in the entire ecosystem for service delivery; and, those outside of the gates have decided to simply ignore them and build their own gated communities.

10. One of my most faithful readers and trusted friends who listened to the session told me the next day that I should have stopped after each main point so that the panelists could concentrate only on the issues related to it, rather than going through all of the points and then opening the floor to all the issues at once. In retrospect, this is exactly what I should have done.

"The third vehicle connectivity facet is principally of interest to public sector traffic management authorities. It is focused on communicating warnings to vehicles and providing guidance on which roads to use in case of traffic congestion or emergencies. The public authorities view these roadway-centric functions as their domain, and vehicle-to-infrastructure and vehicle-to-vehicle communication as the tools to accomplish the job. They are grouped together under the term V2X. This third facet is not a competitive factor for the OEMs. If it is legislated, V2X will not distinguish one OEM from another since every OEM will have to include it."

If you attend an ITS World or Europe or North America Congress, this is what is discussed in any presentation or panel on vehicular connectivity. It turned out that our session was no exception. This is where the discussion was parked for most of the ninety minutes. It's one of those juicy topics for debates because it engages so many groups outside of the automotive industry, and lets folks join a team, wear the team's colors at gatherings and cheer on their favorite players. Do you wear the 802.11p colors with pride, or do you wave the cellular-V2X banner like a trooper? The OEMs are not that interested in the V2X game. It's like talking cricket to a rugby player or figure skating to a shot put thrower.

"Vehicle OEMs each have their own, unique views on why they are implementing connectivity and how they intend to benefit from spending the time, effort and money integrating the systems into their vehicles and building a service ecosystem. Some of them, like

GM and Volvo, started with the idea that it enhanced their safety image. Some, like BMW and Ford, believed they would be able to use the data they collected for developing completely new services. Some, like Toyota, saw it as a way to deliver a better driving experience. For Tesla, connectivity is a fundamental part of its business. Today, most OEMs understand that an unconnected car is a lost opportunity for adding value to both their customers and to their own business. But make no mistake: their job is selling cars and they compete fiercely to do so."

One listener who was asked to come into the discussion said he felt we were not talking about the most important function of connectivity that is safety. For him, the purpose of connectivity is to avoid crashes. The fact that tens of thousands of lives have been saved by the *OnStar*-type systems during the past twenty-four years they have been available in cars appears to have flown under the radar screens of those who are not working with vehicle-centric and customer centric systems that are now installed in (almost[11]) all car brands sold in North America and Europe. Yes, it's post-crash, but ADAS systems have done a great job on pre-crash situation. Or maybe it's just that for some people, companies of any sort are on the bad guy side of the street and government authorities (except, perhaps, the law enforcement agencies) are on the good guy side. This sort of rhetoric is heard in political debates, including the U.S. Democratic presidential primaries, in which some candidates declared that if they were elected, business would pay and pay dearly.

11. I was corrected by Roger Lanctot, one of the panelists, when I said that all car companies now had some form of connected vehicle module installed. MAZDA does not have one. Actually, neither does Ford. Its infamous SYNC system uses a Bluetooth-paired phone to dial 911 in case of an accident. And what if you forgot your phone on the day you have an accident?

…and never the twain shall meet

"There seems to be unbridgeable gap of trust between the public sector and the automotive industry. Emissions, fuel economy, safety, space, noise. There's so much about cars and trucks for politicians and bureaucrats to dislike, to legislate against and to tax. Even worse, if the automotive industry appears to be encroaching on a domain that has been served by the public sector, such as the collection of traffic flow data, the delivery of roadway warnings or the provision of emergency services, the public sector reacts by claiming the right to restrict or at least regulate those private sector initiatives. European call is a case in point.

"In the 1990s, wireless telephone systems and the Global Positioning System combined to offer a way to save lives in the event of a car crash by immediately notifying a call center operated by the OEM who would then notify the official emergency service providers. GM OnStar was first to offer this, followed by BMW, Volvo

Cars and PSA and eventually all the OEMs. The European Commission decided it was the sole right of the public authorities to provide emergency services, and in 2002 began a process to ensure that all emergency notifications went directly to the Public Safety Answering Points, or PSAPs. Rather than just setting a standard, the Commission proposed a hardware solution, an in-band modem generating a short data message inside a 112 phone call. After sixteen years, the Commission succeeded in mandating its in-band modem solution. All new type approved cars starting on the 1st of April 2018 had to include the possibility of sending an EU eCall via the 112 voice channel, but the OEMs succeeded in keeping their third party services, which most still use.

With this example, I was leading into the problems that can be caused when governments insert themselves into the product design and development process rather than sticking to the problem definition and functional requirements processes. The automotive industry's solutions for emergency calls using embedded modems communicating both voice and data with third party services provided the flexibility to operate globally, to allow a variety of services to be delivered to customers and to filter out real emergencies from other service needs. With the EU mandating a one-service system, that flexibility would have become wasted had not the auto industry prevailed on the governments of their countries to vote down the proposal initially offered by the European Commission and to open up the service to systems developed by the OEMs which use third party service providers.

"As with EU eCall, with V2X the public sector has gone beyond developing standards and allowing the private sector to develop solutions. The public sector has been promoting an in-vehicle solution communicating with roadside units for sending and receiving data messages. When V2X was first proposed in the late 1990s, digital short-range communications seemed to be the most desirable wireless technique for the in-vehicle systems and the associated roadside units. The technology was popularized for toll-collection. Most importantly, it was viewed as free, like a 112 emergency call. But over the past twenty years, cellular technologies have progressed and any advantages that the 802.11p Wi-Fi-based technologies had appear to be matched and surpassed by cellular systems.[12] Then there is the simple fact that short-range communications do not address the vehicle-centric and customer-centric functions. Like EU eCall, it is a one-trick horse."

12. Wi-Fi is the standard wireless local area network (WLAN) technology for connecting computers and electronic devices to each other and to the Internet. Every laptop, tablet and smartphone comes with Wi-Fi. Wi-Fi is an IEEE standard with the official designation of 802.11. 802.11p is an approved amendment to the IEEE 802.11 standard to add wireless access in vehicular environments, a vehicular communication system. It defines enhancements to 802.11 required to support Intelligent Transportation Systems applications.
This is a bit of an over simplification, but ITS G5 = 802.11p = WAVE (Wireless Access in Vehicular Environments) = DSRC = Wi-Fi. ITS G5 is being standardized by ETSI. It will operate in the 5.9 GHz band and will be used for vehicle-to-vehicle and vehicle-to-infrastructure communication. Its main application areas are those where localized connectivity needs to be guaranteed, such as for electronic toll collection, intersection crash avoidance and commercial vehicle screening and inspection.

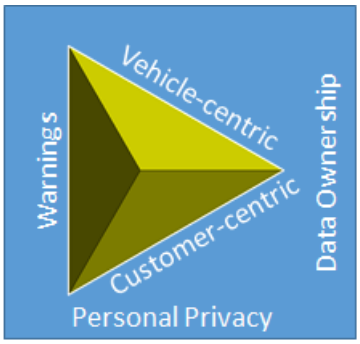
This appears to be the most difficult argument against special-purpose in-vehicle connectivity solutions to understand for those who do not work with in-vehicle systems. During the past twenty-five years since I have been working with wireless vehicle connectivity systems, I have had to answer the question: 'What's the big deal with telematics; isn't it just like a mobile phone?' Well, no, it isn't. For starters, your mobile phone isn't designed to continue to work after it has been hurled at a concrete wall at over 100 kilometers per hour. The embedded system has to work whether you remembered to plug it into the charger or not; whether you paid your phone bill on time or not; whether you put it into your pocket or not. In spite of the fact that they had sixteen years to get the specifications right, the EU eCall has significant shortcomings.[13] There is little evidence that it can do any better when it comes to developing systems that talk to other vehicles or to infrastructure it would build along the sides of roads.

13. For example, if you push the SOS button by mistake, the PSAP operator will hang up and your in-vehicle system's phone will be blocked for use for a full hour to satisfy a call-back requirement in the standard.

My message has been, and was during this particular discussion, that it would be a good idea to keep from making the same mistake again. But if anyone heard that message, it was not apparent in the discussion. Another invited participant said that tests with DSRC-type systems would continue because they could not do the tests unless they installed their own (DSRC-based) systems. I suggested that the same tests could be performed with cars that had connectivity devices already installed, and that rather than having to install special-purpose systems they could talk with an OEM, such as GM or BMW or Volvo, and propose that they provide test vehicles for communicating the desired messages. The reaction to this was similar to what I might have received if I recommended to *Little Red Riding Hood* that she give the *Big Bad Wolf* a duplicate key to her grandmother's house.

Gustave Doré's engraving of the scene: "She was astonished to see how her grandmother looked."

I continued my introduction and added the connectivity issue which I believe will eclipse all of the others.



"In some parts of the world there is a pediment upon which the three-sided coin rests. The pediment represents the combined issues of personal privacy and data ownership. Countries within the European Union have written what is called the General Data Protection Regulation, or GDPR, into their laws, which among other things means that individuals, not companies or governments, are the owners of their personal data. Service providers to the automotive industry within the EU, such as motor clubs and insurance companies, are using this right to insist that vehicle owners, not the OEMs, should determine which companies provide them with

services. Assisted by the European Commission, they are also proposing in-vehicle solutions to the OEMs in addition to developing standards for message routing and content."

The OEMs don't get the point of this issue at all, and if and when they do, they will want to bury it. Those working on transport management and short-range communications see private companies involved in this activity and wonder why the Commission is spending time and tax payers' money on supporting it. Both groups are missing the importance of this activity. It will spread to all parts of the world. In a way, it already is. In the February 2020 issue of The Dispatcher I wrote about how open data is challenging the entire car ecosystem. OEMs have two choices available to them: 1) they can open their in-vehicle systems completely to Google Android and other commercial operating systems and allow their services to operate like mobile apps; or, 2) they can sit down with the service providers who want direct access to all types of data and who also want to communicate back into the vehicle, and they can adapt their systems along the lines that the service providers are currently suggesting.

Some might say this is like being between a rock and a hard place[14] or choosing between bad and worse. I believe this could be the way out of the vehicle connectivity maze.

14. *Facing two equally unpleasant, dangerous, or risky alternatives, where the avoidance of one ensures encountering the harm of the other.*
Idioms from the Free Dictionary

"The public transport management sector has concentrated the debate about connectivity on whether and how V2X should be provided and centered the debate on technology. The private automotive sector and their suppliers have concentrated the debate about connectivity on delivering value to customers in order to enhance their business competitiveness. Service providers have now entered the debate with the claim that they, not the OEMs, are the true guardians of personal privacy.

"But the debate is not really about technology nor is it about who delivers the best value for the money or the most privacy. It is about control. The issue is who controls what is being installed in vehicles and who controls the messages that are being sent and received. The public sector is promoting a short-range communications solution in which the necessary roadside units are controlled by the public sector? Does this approach provide the best service to citizens, or is it desired because governments want to make sure that all data that are transmitted to and from the vehicles are controlled by the public and not the private sector? Will data connectivity managed by private companies, whether they

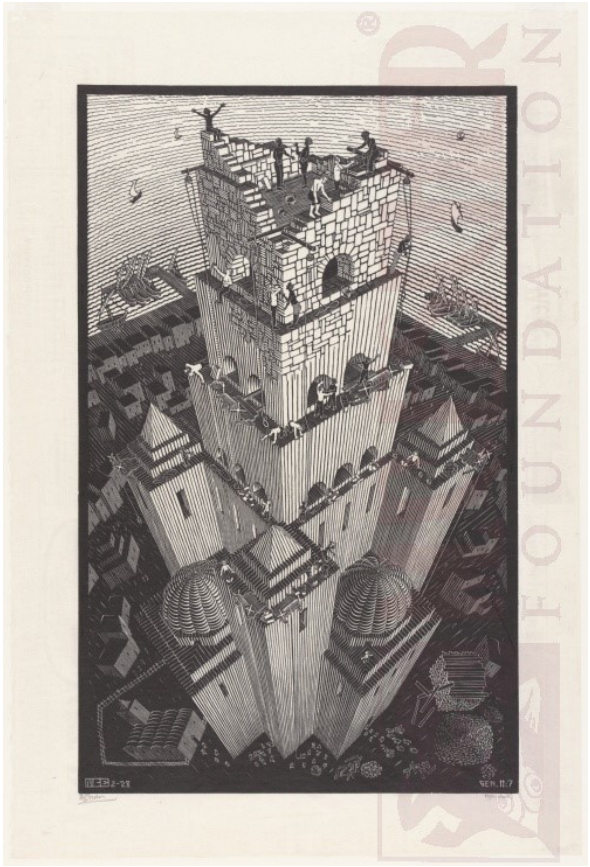
are the vehicle OEMs or IT companies like Google, provide better services in all areas of connectivity? Can the private sector be trusted to deliver services without exercising undue control over its customers by collecting and use their data?"

…though they come from the ends of the earth![15]

I closed my introduction with the following statement:

"It is time that all of these connectivity issues are brought out into the open and discussed together, not individually, because the best solution will not be reached by the toss of a coin."

How did it go, the discussion that followed? Well, after ninety minutes, our discussion confirmed that the status quo has not been disturbed all that much. The managers, staff and guests at *Hotel Heaven* will not have to worry about hordes of new visitors arriving by the tower route for some time to come. Nevertheless, I am beginning to see signs of cross-group cooperation and I intend to do what I can in these pages in future issues of *THE DISPATCHER* to encourage them.



Tower of Babel
M.C. Escher 1928

15. Kipling's poem is often misinterpreted because it begins with an accepted prejudice at the time, never the twain shall meet. But this is a hopeful verse. If people with the will meet on common ground, they can move the earth.

Oh, East is East, and West is West, and never the twain shall meet,

Till Earth and Sky stand presently at God's great Judgment Seat;

But there is neither East nor West, Border, nor Breed, nor Birth,

When two strong men stand face to face, ***though they come from the ends of the earth!***

Kipling, Rudyard (1940). *Rudyard Kipling's Verse. The Ballad of the East and West*

About Michael L. Sena

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

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

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