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Telematics Industry
Insights by
Michael L. Sena

THE DISPATCHER

IN THIS ISSUE

EVERY WEDNESDAY EVENING, beginning in late June and continuing until mid-August, classic car buffs gather in Vadstena, a small town on the eastern shore of Sweden's second largest lake, Vättern. Vadstena is not far from the town of Motala where the first radio broadcast transmitter in Sweden was located. Radio programs were transferred from studios in Stockholm to Motala—as the crow flies, half way between Stockholm and Gothenburg—where they were broadcast to the nation. Also in Motala there is a museum with one of the most interesting collection of classic cars I have ever seen. AUTOLIV ELECTRONICS (now VEONEER) had its headquarters located in Motala and still has manufacturing there. There is something about this part of Sweden that seems to make it a natural location for a classic car meeting site. The two beauties in the photo arrived early and took pole positions on the grass close to where there would be country music (what else?) played from a bandstand and barbecue served up to the car owners and all of us who came there to soak in the atmosphere. On the left is a two-toned 1960 *Chevrolet Impala*, and on the right a 1955 *Chevrolet Bel Air Sport Coupe*.

THE DISPATCHER

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Who Are the Companies Making Driverless Claims

*The third competition of the **DARPA Grand Challenge**, known as the "Urban Challenge", took place on November 3, 2007 at the site of the now-closed George Air Force Base (currently used as Southern California Logistics Airport), in Victorville, California (Google map). The course involved a 96 km (60 mi) urban area course, to be completed in less than 6 hours. Rules included obeying all traffic regulations while negotiating with other traffic and obstacles and merging into traffic. Tartan Racing, Carnegie Mellon University, claimed the $2 million prize with their vehicle "Boss", a Chevy Tahoe.*

THERE ARE MAJOR differences between, on the one hand, airplanes flying without a pilot at the controls after takeoff and before landing, unmanned aerial vehicles (a.k.a. drones) being flown remotely, trains moving between airport terminals without an engineer, and ships at sea gliding through the waves without a captain at the helm, and on the other hand, cars and trucks driving themselves on public roads. The DARPA Challenges unleashed a swarm of whiz kids who believed otherwise. Sergey Brin, one of Google's founders, decided that his company was going to spend its cash hoard on being first to develop a driverless vehicle and scooped up some of those kids. Elon Musk chats up his stock price by saying he already has solved all the problems of cars driving themselves so TESLA owners can watch videos instead of having to worry about keeping their eyes on the road. Clueless investors have been lost in the smoke everyone is blowing. Car executives, who (should) know better, watch their stock prices and market capitalizations tumble and have no alternative but to play along.

GM plays with CRUISE AUTOMATION; VW plays with AURORA—no wait, VW plays with ARGO AI so it can play with FORD too; BMW plays with MOBILEYE; VOLVO plays with ZENUITY and NVIDIA; TOYOTA plays with DENSO, LUMINAR and BAIDU together with GEELY. And TESLA? TESLA tries to do everything by itself.[1]

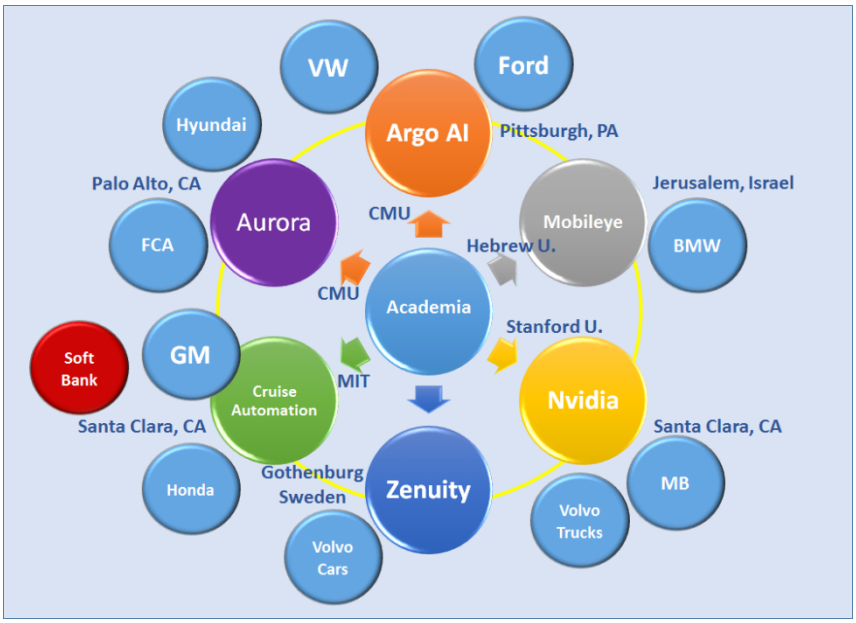
While the sizzling headlines in places like *WIRED*, where you would expect them, and in *FORBES* and *BLOOMBERG*, where you wouldn't, have cooled down somewhat in the wake of failed predictions (e.g., We will be on the roads in 2014, then 2016, then 2018, now 2021), money is still pouring into the coffers of start-ups claiming that only they have the secret sauce.[2] The sauce is spiced with varying amounts of AI, deep learning and magic vision to make cars and trucks see what humans see and what they cannot see, and to make them drive without the need of unpredictable humans at the wheels.

1. See **THE DISPATCHER**, November 2018.

2. Just before VW left AURORA for ARGO AI, AURORA brought in $530 million in funding from investors, one of which was AMAZON.

Everyone's got the singularity answer

The diagram below shows my selection of the six principal players in the game involving companies that are trying to deliver driverless car solutions to existing OEMs. I have left out TESLA because, as I said, it is working mainly with itself.[3] I have left out UBER because its relationship to VOLVO CARS is too opaque to understand and VOLVO has its primary partnership with ZENUITY, a company it partly owns. The diagram shows the six companies, their headquarters locations, the academic institutions where its principals were trained or with which it continues to have some form of affiliation and the car OEMs that are their main partners and/or investors.



Write-ups on MOBILEYE[4], NVIDIA[5] and ZENUITY[6] can be found in the referenced issues of **THE DISPATCHER**. In this issue, I will focus on ARGO AI, AURORA and CRUISE AUTOMATION.

Argo AI: Peter, Bryan and the Argonauts

ARGO AI was founded by Peter Rander and Bryan Salesky in 2017. Since I have not been able to find a reason for the company's name, I will make up one. It is named for the boat named *Argo* that is named for the great craftsman, Argus, who built it for the mythological hero, Jason. Jason, a favorite of the goddess Athena, made an expedition in the boat with the so-called *Argonauts* in search of the Golden Fleece. Among the *Argonauts* were other Greek heroes, including Hercules and Orpheus. Following many trials and tribulations, the Argonauts return with the fleece. So, one could say, Peter and Bryan, together with their co-workers and with help from the automotive gods, Ford and VW, are searching for the Golden Fleece

*The technological **singularity** (also, simply, the singularity) is a hypothetical future point in time at which technological growth becomes uncontrollable and irreversible, resulting in unfathomable changes to human civilization.*

Eden, Amnon H.; Moor, James H. (2012). Singularity hypotheses: A Scientific and Philosophical Assessment. Dordrecht: Springer. pp. 1–2.

3. **THE DISPATCHER**, November 2018, p. 7.

CMU – Carnegie Mellon University, Pittsburgh, Pennsylvania

MIT – Massachusetts Institute of Technology, Cambridge, Massachusetts

4. **THE DISPATCHER**, 5 April 2017, p.1.

5. **THE DISPATCHER**, May 2019, p.18.

6. **THE DISPATCHER,** February 2019, p. 13.

ARGO AI's Bryan Salesky and Peter Rander looking quite pleased with where they are. Those are Pittsburgh smokestacks in the background.

in the form of cars that can drive themselves.

Salesky graduated from the University of Pittsburgh with a Bachelor's Degree in Computer Engineering, worked at the National Robotics Engineering Center in Pittsburgh and then was Director of Hardware Development for Self-Driving Cars at Google. In 2007, Salesky was in charge of the software engineering team for CMU's DARPA Urban Challenge winning entry. Rander got his Bachelor of Science in Engineering at the University of Detroit and then went to Carnegie Mellon University for his Masters and PhD. He spent two years as Uber's engineering lead. They were both born in Michigan, but are now dedicated, naturalized Pittsburghers. "Our headquarters is in Pittsburgh, PA, a city long known for its builders and doers and, more recently, for its pioneering role in the research and developent of self-driving technology." The company also has offices in Mountain View, California and Dearborn, Michigan.

FORD's Jim Hackett and VW's Herbert Diess shank hands on their new deal.

Salesky and Rander started ARGO AI to build self-driving cars that will operate under controlled conditions to meet specific requirements. They make it clear that they are not attempting to develop driverless vehicle technology for all conditions. This may be the main reason FORD took a strong interest in the company when it was founded, in addition to the fact that the founders have strong backgrounds in robotics engineering and, with Rander, automotive experience from his college days. In February, 2017, FORD announced it was investing $1 billion in ARGO AI over a five-year period. FORD'S CEO at the time, Mark Fields, said it would be introducing its own "fully autonomous" vehicle in 2021 and ARGO AI would work with its own engineers to develop this vehicle. It is important to state that while FORD had a majority stake in ARGO AI, it did not acquire the company. The company's five board members were Raj Nair, Ford executive VP and CTO, John Casesa, FORD GROUP VP for Global Strategy, Salesky, Rander and an independent director.

The basic idea was that Ford would build the cars and Argo would build the virtual driver systems—sensors, software, cameras, algorithms and computer power—to drive them.

Enter Volkswagen

On the 11th of June of this year, VW terminated its relationship with AURORA that had been extant since early 2018. When the last of several trials between the two companies ended, VW declined to renew its contract. The VW executive who had been overseeing the partnership, Johann Jungwirth, left VW on June 1st. He was VW

CEO Matthias Mueller's guy to run autonomous driving projects, but when Herbert Diess took over from Mueller in April 2018, he replaced Jungwirth with Alexander Hitzinger. Whether VW believed that AURORA's technology was good or unnoteworthy seems to be a matter of debate, but the main reason for VW distancing itself from AURORA was VW's desire to develop a closer relationship with FORD, which it had started in January 2019 with the two companies committing to a global alliance on commercial vehicles.

VW pledged $1 billion to ARGO in funding and threw in its *Autonomous Intelligent Driving* (*AID*) company which it valued at $1.6 billion. Clearly, the amount of cash investment is meant to give both VW and Ford equal stakes in ARGO AI. Munich, *AID*'s base, will become ARGO AI's European headquarters. There were no promises on when the companies would deliver anything, no Musk-like statements like, "We will deliver fully driverless cars at 17.00 on the 28th of September, 2020." The two companies have promised nothing, and Peter and Bryan have said even less.

In my opinion, ARGO AI is a way for the two OEMs to test a working relationship in which their respective staffs sit together with a neutral party in a neutral location and determine if they can 'play nice' together. Whether they ever deliver a vehicle that operates without a driver is totally secondary. This is really a question of whether the companies can survive together better than they can survive separately.

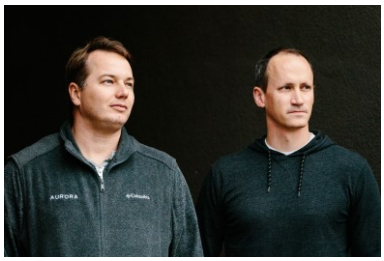
Aurora Innovation: The Dawn of a New Age

AURORA INNOVATION, INC. was founded in October 2016 with its headquarters in Palo Alto, California and with offices in Pittsburgh, PA and San Francisco, CA. The Registered Agent on file for the company is Christopher Paul Urmson, who lives in Mountain View, California. Co-founders are Sterling Anderson and Drew Bagnell.

Urmson is Canadian and completed his undergraduate degree in engineering from the University of Manitoba. He did his PhD in Robotics at CMU and led the 2007 DARPA Urban Challenge winning Tartan Racing Team. Urmson served as CTO on X, Google's self-driving car team, joining in 2009 and taking over from Sebastian Thrun as project lead in 2013. Bagnell completed a Bachelor of Science degree in Engineering at the University of Florida and then went on to CMU for a Master's in Science and PhD, both in Robotics. He was also part of the DARPA Tartan Racing Team, and he headed the autonomy and perception team at Uber's Advanced

The word "aurora" is derived from the name of the Roman goddess of the dawn, Aurora, who traveled from east to west announcing the coming of the sun. Ancient Roman poets used the name metaphorically to refer to dawn, often mentioning its play of colors across the otherwise dark sky. It has a Latin origin meaning 'dawn'. It also has the meaning of 'an atmospheric phenomenon consisting of bands, curtains, or streamers of light, usually green, red, or yellow, that move across the sky in Polar Regions. It is caused by collisions between air molecules and charged particles from the sun that are trapped in the earth's magnetic field." (https://www.collinsdictionary.com/dictionary/english/aurora)

Technologies Center. Anderson completed his Master's and PhD at MIT, worked at McKinsey in Seattle and then went to Tesla where he was involved in the design and launch of the Tesla Model X. These three individuals came together to found Aurora Innovation Inc.



Chris Urmson (left) and Sterling Anderson (right) resigned from high-paying jobs to do what wealth seekers have been doing since the mid-1800s in the area around San Francisco, staking a claim and digging for gold.

A rather rocky start

A few months after AURORA was established, TESLA filed suit against the company and its former employee, Sterling Anderson. It alleged in the suit filed in California State court that Anderson "stole hundreds of gigabytes of data" that included sensitive information, and that he collaborated with Urmson "on Tesla premises using Anderson's Tesla-issued laptop." The lawsuit also alleged that Anderson attempted to recruit Tesla engineers to Aurora in violation of his non-solicitation agreement. Three months later, in April 2017, before the first court date, Tesla withdrew the suit. Anderson had denied all of the allegations from the start, and said that Tesla's withdrawal was proof of his innocence. Nevertheless, Aurora agreed to reimburse Tesla for the $100,000 it spent on an independent forensic audit that was performed.

In January, 2018, during the Consumer Electronics Show, VW and AURORA announced a strategic partnership. VW said at the time it had the goal of becoming a "global leader in autonomous driving". VW was not new to driverless vehicles. In 2005, its Electronics Research Lab teamed with Stanford University on the winning entry in the 2005 DARPA Grand Challenge. Johann Jungwirth said that VW's vision was "mobility for all, at the push of a button" by creating mobility-as-as-service solutions. Urmson said of the partnership: "Our priority at AURORA is to make self-driving cars a reality quickly, broadly and safely, and we know we will get there faster by partnering with innovative automakers like the VOLKSWAGEN GROUP."

Also in January, 2018, HYUNDAI said it would start to work with AURORA, and this cooperation centered around AURORA developing a self-driving platform for HYUNDAI and KIA. HYUNDAI's hydrogen-powered *Nexo SUV* is reported to be the focus of the self-driving exercise.

AURORA is not going to be designing and building vehicles. "Players should play their positions," Anderson has said. He sees AURORA developing and designing the hardware, software and data analytic systems for auto manufacturers to integrate into their production models, and will look for camera and sensor companies

that are good at what they do. The company is not looking to develop full driverless capability everywhere at any time in all conditions. Urmson has said that he knows how hard it is to make a vehicle fully driverless for everywhere. AURORA is taking it slowly.

One door closes while another one opens

As the relationship with VW ended, AURORA announced that it was partnering with FCA to develop self-driving commercial vehicles. FCA says it wants to integrate AURORA technology into its *Ram Truck* line. In June, HYUNDAI is reported to have added up to $30 million to its earlier investment of an undisclosed amount. Rounding out Aurora's OEM partners is the Chinese electric vehicle maker BYTON LTD.

AURORA's most recent funding round was in February and resulted in $530 million in new money. One of the investors was AMAZON. Another was the investment group within the energy company SHELL. At present, AURORA is valued at $2.5 billion.

Will it be AURORA's fate to be gobbled up, either literally like CRUISE AUTOMATION by GM, or figuratively like ARGO AI by VW and FORD? Is that their end-game, or does the company want to eventually shift up from first gear where it is now and become a company providing its technology to multiple vehicle OEMs? Experience has shown that OEMs do not support the independent technology model when it comes to core features, which driverless technology definitely is. If the principles could not manage as employees at Uber, Google or Tesla, it is doubtful that they will be interested in wearing FCA or Hyundai company badges for very long. Somehow, I don't see them being in auto industry in a few years' time.

Cruise Automation: Do you believe in magic

CRUISE AUTOMATION LLC is a wholly-owned subsidiary of General Motors. It was founded by Kyle Vogt and Dan Kan in 2013 and acquired by GM in March 2016 for an undisclosed sum that is unofficially between $500 million and $1 billion. In any case, along with windfalls from the sale of two earlier companies, SOCIALCAM and TWITCH.TV, it was enough to enable Vogt to purchase a house in November of that year in one of San Francisco's most shi-shi neighborhoods for $28.1 million. Vogt grew up in Kansas City, studied computer science and electrical engineering at MIT, but dropped out in his junior year to work with a company in San Francisco on video live streaming. While there he worked together with the company owner's brother, Dan Kan, with whom he founded CRUISE AUTOMATION.

The story is that Vogt decided to attend MIT—after he was accepted, of course—because of his interest in autonomous vehicles. While he was still attending MIT, he was part of the 2004 DARPA Challenge team. That was the Challenge that had no winner. He left MIT without a degree and worked at JUSTIN.TV that became TWITCH.TV in which he had become a part owner. It was acquired by AMAZON in 2014 for $970 million. He had also founded SOCIALCAM in 2011 which he sold for $60 million.

Vogt's and Kan's original idea for CRUISE AUTOMATION was to provide a kit called RP-1 that could be retrofitted to any vehicle to deliver self-driving functionality on highways. Its target price was $10,000. That idea lasted for about a year when the duo decided that it wasn't going to work and they needed to produce a fully autonomous vehicle. They chose to work with NISSAN and it's a *Nissan Leaf*. Funds for these early efforts came from Y-Combinator.[7] CRUISE raised $4.3 million in its Seed round in 2014, and took part in the winter 2014 YC batch along with FLEXPORT, ZESTY, UNBABEL and others. In 2015 the company raised a Series A that brought in $12.5 million. That same year it raised a $2 million Convertible Note backed by Qualcomm, bringing the known total funds raised to $18.8 million before it was acquired by automotive giant General Motors for a reported price of more than $1 billion in 2016.[8]

What did GM think it was buying

It paid in upwards of a billion dollars for a company with zero track record, no product and forty employees. In the statements made around the acquisition, GM's global product chief, Mark Reuss, stated that "CRUISE provides (GM) with a unique technology advantage that is unmatched in our industry." In other statements, GM said it acquired CRUISE AUTOMATION "to add CRUISE's deep software talent and rapid development capability to further accelerate GM's development of autonomous vehicle technology." At this point in the CRUISE's brief history there was no basis for such statements. It seemed clear at the time—and clearer today—that GM wanted a place outside of Detroit where it could attract talented engineers to work because it appeared that talented engineers only wanted to work in start-ups based in Silicon Valley.

Following the GM purchase, CRUISE operated as an independent unit within GM's Autonomous Vehicle Development Team, and the company stayed in San Francisco. Mary Barra, GM's CEO, said that independence was important "to avoid the pitfalls common when a large company acquires a technology start-up." In May

7. Y-Combinator provides seed funding for start-ups. The goal of Y-Combinator is to get a company through the first phase, to a point where the company has built something impressive enough to raise money on a larger scale. There are now 18 Y-C companies valued over $1B. Together, the Y-C companies have raised over $25B from investors.

8. Source: https://news.crunchbase.com/news/y-combinators-10-biggest-exits/

GENERAL MOTORS President Dan Ammann (right) poses in the company uniform at the time of the acquisition in 2016 with CRUISE AUTOMATION co-founders Kyle Vogt (center) and Daniel Kan (left). In November 2018 he would become the new CEO of the company, replacing Kyle Vogt.

2018, SOFTBANK's *Vision Fund* announced it would invest $2.25 billion and GM would pump in an additional $1.1 billion. In October 2018, HONDA brought in $750 million along with a commitment to spend another $2 billion over the next twelve (!) years. All the while, CRUISE was testing in San Francisco and Scottsdale, Arizona. CRUISE stated, and GM confirmed, that commercialization of CRUISE would occur via a ride-sharing (i.e., taxi) service platform, and chauffeuring Cruise employees around San Francisco was a way to test the concept from both a business and technical perspective. How this jibed with GM's $500 million investment in Lyft that it also made in 2016 is still not clear.

As of 1 January 2019, Dan Ammann took over the duties of CEO. In GM's announcement of the change it stated that Kyle Vogt, "who was CEO and also unofficially handled the chief technology officer position, is staying with the company." His *Linkedin* page lists him as president and CTO of CRUISE AUTOMATION. In March, Ammann said that CRUISE would be building up its staff in order to get the CRUISE ride hailing service operational by the end of 2019. Aggressive, many said. Impossible, more likely. On July 24th, GM announced that it had scrubbed plans for commercializing the Cruise taxi service by the end of the year. No new deadlines have been announced. "Our goal is to get there as soon as possible," Ammann said. "We want that moment to come as quickly as we can. But everything that we do right now is going to be gated by safety. And that's why we're increasing our testing and validation mileage just to get to that point as rapidly as possible."

I would like to be a fly on the wall in a meeting with Mary Barra, Dan Ammann, Kyle Vogt, Dan Kan and Masayoshi Son, CEO of SOFTBANK where they are discussing the future of CRUISE AUTOMATION. Barra and Ammann are relaxed. They have ticked the *WE DO AUTONOMOUS CARS* box for their investors and have a place to park their young, bright engineers who might have gone to TESLA until they are ready to bring back to the Mother Ship in Detroit. Vogt and Kan are relaxed, most likely enjoying super salaries and time to plan their next venture while Ammann takes most of the management responsibilities and the heat. Son-san is not relaxed. He plunked down a lot of money when it looked like CRUISE had a technology lead over its rivals. He could have put his money into ARGO, but maybe he didn't see eye-to-eye with Bill Ford. He could have invested in AURORA, but maybe the chemistry wasn't so good with Urmson. Tense times. The magic isn't working.

Cruise is driving around the streets of San Francisco in specially-fitted Chevy Bolt EVs, which has a MSP of $36,620 ($32,870 after the U.S. Federal Tax Credit) and before all the Cruise kit is added. The car has an EPA-estimated 238 mile range on a full charge.*

*The Federal Tax Credit for BEVs varies by car type, and changes over time. The Bold EV had a Credit of $7,500 between January 1, 2010 and March 31, 2019. It was reduced to $3,750 on April 1, 2019 and will be reduced again on September 30, 2019. The Credit will expire on March 31, 2020.

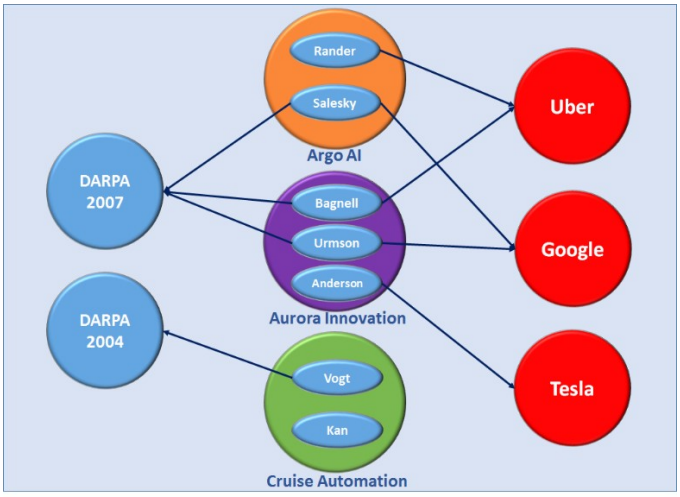
Should we put it in the skunk works

ARGO AI, AURORA INNOVATION and CRUISE AUTOMATION are start-ups working on an idea, vehicles that drive themselves, which currently has no market. What they have in common is that they are 'skunk works' for their OEM partners. The term 'skunk works' is commonly used in business to describe a group within an organization given a high degree of autonomy and unhampered by bureaucracy, with the task of working on advanced or secret projects. Usually, a 'skunk works' is located off site in a place that cannot be influenced by the rest of the organization or where its results cannot be seen by others until they are ready for prime time.

In my opinion, the 'skunk works' concept has its place, for example, for highly secretive projects or for developing a completely new line of business.[9] However, one major problem with using the idea for improving or replacing current ways of working, especially if the 'skunk works' personnel are not taken from the existing staff, is that the company's story, its heritage, what made it successful in the first place, is usually lost. The new kids, in their separate playpen, aren't interested in the way things were done before. At best, they are interested in finding a new way to do something the company should be doing in the future.

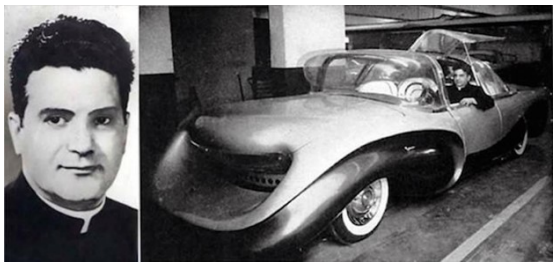
The other problem is that management located somewhere else do not have the experience to appreciate the impact the new techniques will have on the company's business model. By the time the map companies realized they were leaving the cartographic publishing business and entering the map data business, NAVIGATION TECHNOLOGIES (now HERE), TELE ATLAS (now part of TOMTOM), MAPQUEST, MICROSOFT and Google were already there.

The ultimate problem with using a 'skunk works' is that a company is putting its future into the hands of strangers. Salesky, Urmson, Vogt, et al are founders of other businesses, not the business that FORD, VW, GM and the other OEMs are in, which is making and selling cars. Actually, ARGO, AURORA and CRUISE are not even businesses; they are technique developers. Car companies are placing major bets on the people running these 'skunk works'. The fact that they have worked for Uber, Google and Tesla would give me pause, not confidence. I would rather trust someone who wants to be CEO of the company for which it is developing the new techniques.



9. I ran a "skunk works" in Boston for the Stockholm-based company ESSELTE MAP SERVICE. We were EMSUSA. We were not in Stockholm because what we were doing, developing techniques to make printed maps with the help of computer systems, would eventually replace all of the manual processes being used by ESSELTE and every other map company. While everyone in the company knew what was going on, at least we were not within eyeshot, constantly reminding them that they might one day be replaced by a computer or would need to learn a completely new skill to replace the one they had been performing for their entire work career. We were in Boston and not Stockholm because that is where the people and computer systems were at the time (1978-1982). Before we transferred the technology over the Atlantic and closed down the operations in Boston, we brought key staff to Boston to work with us and learn how the new systems and processes functioned. These staff formed the core of the team that gradually converted all of Esselte's production to the automated methods.

Another Aurora: Father Juliano's 1957 ESV



Father Alfred A. Juliano is pictured behind the wheel of his newly built, one-of-a-kind Auroras.

IT'S FUNNY WHAT you can find when you're looking for something else. As I was searching for information about AURORA INNOVATION, I came across an article about a car called *Aurora* that was built in 1957 by Alfred A. Juliano, who, at the time the car was built, was a Catholic priest. Father Al had two callings. Before he was ordained, he studied art and wanted to become an automotive designer. He applied for a scholarship to GENERAL MOTORS to study design under Harley Earl, the first styling chief in the U.S. automobile industry. By the time the call finally arrived from GM, the call from a higher power had been received and answered.

Father Al thought he could serve God and mankind equally well and founded AURORA MOTOR COMPANY to build what is probably the first 'experimental safety vehicle'. His company was funded by his congregation. It is not clear if the money was in the form of gifts or loans or stock options, but he received $30,000 to build his *Aurora ESV*. The money was used to buy the Buick chassis on which it was constructed, to form the 18-foot fiberglass body and produce the bulging plastic windows. It was said to be dent, rust and corrosion proof and had hydraulic jacks controlled from the dashboard to help with tire changes. The car's safety features were its hallmark. They included seat belts, roll cage, padded instrument panel, side-impact bars and a collapsible steering column. Its nose was designed to scoop up pedestrians. Impressive!

Its maiden voyage did not go well. It broke down fifteen times on the way to NYC. The firm went bust, Father Al had to leave the priesthood due to financial irregularities and the car never moved beyond a prototype. Some have claimed it is the ugliest car ever built. That's unfair. The *Fiat Multipla* (right) still holds that distinction, although there seem to be some distinct similarities between the two vehicles. Bulbous both. The prototype was discovered in 1993, renovated and shown to the public in 2005.

Dispatch Central

Europe's Galileo Suffers Major Outage

GALILEO IS EUROPE's Global Navigation Satellite System (GNSS). When fully operational in 2020 is intended to provide positioning and timing information particularly for European services and users. GALILEO was created by the European Union (EU) through the *European GNSS Agency* (GSA) headquartered in Prague in the Czech Republic. It is a civilian, commercial service and was developed as a complement to and potential substitute for the government-run services provided by the U.S. GLOBAL POSITIONING SYSTEM (GPS) and the Russian GLONASS. It offers more accurate and precise positioning information than is available with GPS or GLONASS.

GIOVE-A, the first GALILEO test satellite, was launched in December 2005. It was another six years before the first operational system satellite was launched. In December 2016, GALILEO started offering Early Operational Capability (EOC) which is used by APPLE, SAMSUNG and Google smartphones in addition to GPS and GLONASS. As of July 2018, 26 of the planned 30 active satellites were in orbit, but only 22 of these are in operation. Full Operational Capability (FOC) was expected in 2019 with the complete 30-satellite GALILEO system (24 operational and 6 active spares) in orbit by 2020.

Prague, we have a problem

On July 11th, the GSA said in a statement that GALILEO was "suffering from a full system outage due to a technical incident related to its ground infrastructure." An Anomaly Review Board was set up to analyze the exact root cause and to implement recovery actions." During the outage, smartphones that use GALILEO are relying only on GPS and GLONASS. When trying to restore services a malfunction was found in the calculation of time and orbit predictions (ephemeris). Why the error affected both Precise Timing Facilities (PTFs) within the GALILEO ground control system, one at Fucino in Italy and the second at Oberpfaffenhoffen in Germany, has not yet been explained. System redundancy in the form of such doubled facilities was supposed to prevent such breakdowns.

ESRI and Mobileye Cooperate on Maps

JACK DANGERMOND, ESRI's co-founder and President, and the *Energizer Bunny* have a lot in common. Both of them just keep on going and going and going. Dangermond was born in 1945 and grew up in Redlands, California, a town that is one hundred kilometers due east of Los Angeles, where his parents owned a plant nursery. He attended Redlands High School, completed his undergraduate work at California State Polytechnic University, Pomona, studying landscape architecture and environmental science. He then earned a Master of Architecture degree in Urban Planning from the University of Minnesota and a Master of Landscape Architecture degree from the Harvard University Graduate School of Design in 1969. His early work in the school's Laboratory for Computer Graphics and Spatial Analysis led directly to the development of ESRI's ARC/INFO GIS software. He has been awarded 13 honorary doctoral degrees.

Jack Dangermond has been the face of geographic information systems (GIS) from its beginning fifty years ago when he and his wife, Laura, founded Environmental Systems Research Institute (ESRI).

In 1969, he and his wife Laura co-founded ESRI with its headquarters in Redlands, CA. The original idea for the company was that it would perform land use analysis using an automated method based on the manual overlay concept developed by Ian McHarg.[10] The initial release of ARC/INFO in 1982 ran on minicomputers. Other companies, notably INTEGRAPH, had software and hardware systems that could be used for digital mapping, but ARC/INFO was the first off-the-shelf system that structured the data topologically. This allowed topographical data to be imbued with the intelligence necessary to perform both network and planar analyses, but also to produce a range of cartographic products from a single database. Today, ESRI is the largest GIS software developer in the world.

In July, ESRI and MOBILEYE, an INTEL COMPANY, announced at the annual ESRI User Conference that they would collaborate on bringing data collected by MOBILEYE into the ESRI platform. As a result, ESRI users will be able to visualize and analyze real-time high definition map data and streamed from sensors on vehicles equipped with MOBILEYE's *Vision System*. "*Mobileye Vision* from a passing vehicle will automatically inform city workers that a stop sign has an obstructed view, for instance," said Jim Young, ESRI head of business development. "The sign will show up on an ESRI map and a service crew can be dispatched to fix it. Just like edge computing, this is edge mapping." Keep on going, Jack.

10. Ian L. McHarg (b. 20 November 1920, d. 5 March 2001) was a Scottish landscape architect and writer on regional planning using natural systems. He was the founder of the Department of Landscape Architecture at the University of Pennsylvania in the United States. His 1969 book Design with Nature pioneered the concept of ecological planning. It continues to be one of the most widely celebrated books on landscape architecture and land-use planning. In this book, he set forth the basic concepts that were to develop later in geographic information systems.

Who in the World is Franky Zapata

LOOK! UP IN THE SKY! It's a bird. It's a plane. No, it's Franky Zapata, a French inventor and daredevil. Don't look for credentials from *Institut des sciences et technologies de Paris*. Franky is a trained mechanic. He got his feet wet (literally and figuratively) by developing a water jet ski and then making a name for himself in competitions. In April 2016, he introduced his first design for his *Flyboard Air*, a flying platform propelled by four micro turbojets, each delivering 250-horsepower. Jet fuel for the jets is carried in a backpack strapped to the pilot who is standing in boots firmly fixed to the platform. Each engine is controlled by both a hand control and body movement interpreted by stabilization algorithms.

Franky Zapata circles above the Paris crowd on Bastille Day. Eleven days later he would try to cross the English Channel, making the crossing on his second attempt. Can he have been inspired by young Frank Walker in the 2015 film ***Tomorrowland*** *seen below in a clip from the movie.*

Zapata seems to have been well prepared for his big public debut during the 2019 Bastille Day parade in Paris with President Emmanuel Macron and leaders from other EU countries looking on. He flew around the crowd with a rifle in his hands with the full knowledge and approval of the authorities. On the 25th of July, Zapata attempted to cross the English Channel on the same date one hundred years after another Frenchman, Louis Bleriot, became the first person to fly an airplane across the well-travelled body of water. Bleriot completed the flight from Calais to Dover in thirty-six minutes and thirty seconds. Zapata's attempt ended in disappointment. The refueling was supposed to occur on aboard a vessel eleven miles from his departure point at Sangatte, west of Calais. It took him only ten minutes to cover the distance, but the seas were rough and he missed the boat as he came down, falling into the sea. He was picked up by the boat's crew, unhurt. He said he would try again. He did, and made it on the 4th of August.

OEM Q2 profits are up and down

THE UPS INCLUDE GM, VW, TOYOTA and FCA. FCA announced on July 31st that it earned a $1 billion profit for the second quarter of 2019 due mostly to higher sales in North America. VW said its Q2 operating profit rose 29.9% to €5.13 billion ($5.7 billion) compared to €3.94 billion in Q2 2018. VW attributed the jump to its launch of higher-margin SUVs and rising sales at Porsche and Skoda. GM had net revenue of $36.1 billion for the quarter, which was down 1.9% from the same quarter one year earlier. However, profit was up by 1.6% to $2.4 billion. China sales decreased by 12.2% from the previous quarter. Toyota profit was up 8.7%, but the company is cutting its full-year profit forecast by 6% due to a stronger Yen.

The not-so-good news came from FORD, JLR, DAIMLER, TESLA and others. FORD said on July 24th that it had a second quarter profit of

$148 million compared to $1.07 billion in the same period in 2018. It blamed restructuring costs in South America and in Europe, where it is laying off 12,000 employees (20% of its workforce there) and closing six of its twenty-four (?) manufacturing facilities. Analysts also pointed out that the company cannot expect to increase sales while it cuts vehicles like the *Focus* from its program and replacements like the new *Escape* and *Explorer* are not ready for the market. One car that no one will miss is the *Ka*, the minicar produced by Fiat for Ford in Tychy, Poland. Ford has now cancelled it.

JLR is having a rough old time of it right now. It had a quarterly pretax loss of £395 million ($492 million) loss in the three months to the end of June as sales fell by 12% to 128,615. The loss amount is double what it was for the same period one year ago. The home team is doing its bit to help the company. Sales in the U.K. were up 2.6% year-on-year. However, profits were hit by a number of factors, including lower sales in China due to the tit-for-tat tariff war between the U.S., EU and China and difficulty getting new products into the market. Management is positive that the future will be brighter.

DAIMLER lost €1.6 billion ($1.8 billion) in this year's second quarter. It has reduced its 2019 profit forecast for the second time in a few weeks. In the comparable quarter last year, the company had a €2.6 billion operating profit. What happened? A mass recall resulting from faulty airbags and government probes and legal cases over the diesel emissions cheating scandal has caused the company to set aside more cash in provisions to cover possible costs. Also, lower global demand and delays in getting new product to market has added to the problems. It now expects a profit for 2019 "significantly below" the €11.1 billion it earned in 2018.[11]

For Q2 2019, TESLA reported $6.349 billion in total revenue and a loss of $408 million. This compares to a loss of $742 million in Q2 2018. In spite of the loss, TESLA had an 18.9% gross margin on its cars even though it had an overall decrease in its cars average selling price (ASP) and less revenue coming in from regulatory credits. Even though CEO Musk could put a positive spin on the loss, he could not explain away the fact that one of his key executives, CTO J.B. Staubel, has decided to leave the company. This news put TESLA's stock into a tailspin, losing 11% when the news was announced. A fourth death of an *Autopilot* user, and a subsequent suit by the driver's family, will not help.[12]

11. According to IHS MARKIT, a London-based financial information and services company, the German economy has slipped into a mild recession during the second quarter of 2019. "The automotive industry is the one that is most vulnerable," wrote Chris Williamsson of IHS MARKIT. "It's the trade war that is having a negative effect on German cars."

12. A *Tesla Model 3,* whose driver had just turned on *Autopilot*, drove into a semi-trailer that had run a stop sign on a Florida highway. The *Model 3* drove under the truck, killing the *Model 3* driver. The accident occurred on March 1st. It is very similar to the accident that occurred in 2016, also in Florida, in which Josh Brown was killed.

A Dispatcher's Musings: Palo Alto Dreaming

"California Dreaming" was written by Michelle Phillips (far left) and John Phillips (far right) when they were living in New York City. It was a hit song by the group The Mamas and the Papas *seen here singing on the* Ed Sullivan Show *in June 1967. Cass Elliot and Denny Doherty rounded out the group.*

WHO WOULDN'T WANT to be the CEO of a car company based in Palo Alto? If you are doing a crossword puzzle and see the question *Car company based in Palo Alto, CA?,* there is only one answer: TESLA. You might settle for second best, say, Sunnyvale, Mountain View, Menlo Park or, worst case, San Francisco. How can Detroit or Whitley, UK (JLR) or, above all, Gothenburg (VOLVO CARS and AB VOLVO) compare? Silicon Valley is where it's all happening, right? They say that's where the brightest and best congregate, even if they weren't lucky enough to get into Stanford University where, it's said, all the brightest and best stars are educated today. Where is Stanford? Why it's in Palo Alto, natch. A list published by online news group QUARTZ had eleven car OEMs and four major tier one suppliers with offices or 'labs' in the area in and between San Francisco and San Jose. Outposts now, but who knows what can happen in the future? Palo Alto- and Elon Musk-envy are rampant in the auto industry these days.

Many companies have moved their headquarters, even though it seemed that the founding place was written into the firm's DNA. In 1963, IBM moved from NYC to Armonk, NY, one of the first big companies to abandon its founding city. BOEING moved its headquarters in 2001 from Seattle to Chicago. Sergio Marchionne succeeded in moving FIAT's head offices out of Turin, Italy to Amsterdam. Moves usually start with CEOs and company boards finding faults with their locations, such as the high cost of real estate for required expansion, poor transportation infrastructure, troublesome unions, uncooperative politicians, inability to recruit good management and staff due to high costs, poor quality of services and high levels of crime.

When a car company CEO is quoted on more than one occasion stating that his or her firm is experiencing some of these problems, the headquarters city is wise to take note. If the the CEO's statements are peppered with hints that the possible solution to the problems lies in places where there is an oversupply of the brightest and best staff and the conditions to make them want to be there, then the founding city at least knows its competitor. It's Palo Alto or a place that is very much like it.

There's a whole generation with a new explanation

Within the space of a week this past summer, the CEO of VOLVO CARS, Håkan Samuelsson, was in the pages of Sweden's major newspapers. This time he wasn't the subject of unbridled praise as is usual; he was being given rebuttals on two of his complaints about VOLVO CARS' founding city, Gothenburg. The first article was a reaction to a statement he had made in an interview at the annual week-long political gathering on an island in the Baltic Sea where the country's political leaders present their latest ideas and business leaders have an opportunity to promote their causes in a public forum. He complained about the difficulties his company has had recruiting high quality international managers (i.e., non-Swedes) to Gothenburg. He cited problems with housing and schools and then said that the city's level of crime was discouraging prospects from relocating.[13]

Asked what he thought about the criticism, the country's Prime Minister, Stefan Löven, replied diplomatically: "Obviously, I have respect for his views; if VOLVO says that's how it is, then that's how it is." Gothenburg's chief of police was less tactful. He wondered out loud what facts Samuelsson was using to back up his claims about high crime. He suggested that the CEO was taking his information from social media. There was an inference to the fact that Samuelsson is not a Gothenburger and still maintains his home base in the Stockholm area. "From an international perspective, Gothenburg is a very safe city," said Erik Nord.

The second article was a reaction from the head of the Swedish Association of Engineers to a statement from Samuelsson on the need for many of the company's engineers to leave VOLVO CARS because they lacked the competencies the company needs to be competitive in the future and to make space for new engineers who have those competencies. "How the heck are we going to do it with the same people? It's totally impossible!" he said.

Ulrika Lindstrand, chairperson for the Association, replied: "He gives a picture of engineers as disposable products: they know what they know, and when what they know has been used up, they need to be replaced by someone who knows something else. That is an old-fashioned view. In our view, engineers are a durable resource that actually can be recycled if the right efforts are made to develop their competence." She went on to question why VOLVO CARS needed to bring people to Sweden from the U.S., China and Germany when it had a corps of loyal, Sweden-trained employees who wanted the best for VOLVO and who were more than willing

Gothenburg's Älvborgsbron is silhouetted against the western sky (above). It looks a bit like the Golden Gate Bridge in San Francisco (below), don't you think? "San Francisco", the song with the line "There's a whole generation…", was sung by Scott McKenzie and written by John Phillips (Mamas and Papas). As far as I know, there's no equivalent song for Gothenburg.

13. Volvo has managed to recruit at least one international manager recently. On July 4th, it was announced that Carla De Geyseleer, a Belgian national, will join VOLVO as the new CFO, replacing Hans Oscarsson who will take the position of CEO of GEELY SWEDEN HOLDING AB. We assume that Ms. De Geyseleer will take up residence in Gothenburg and find the city agreeable.

to retrain to help the company succeed in the future. The Association's recommendation is for VOLVO CARS to decide what competencies it needs and work with the Association to develop the types of training and re-training programs required to ensure that the right competencies are there when they are needed.[14]

It is high irony that just Håkan Samuelsson, of all people, is making statements about bringing in people from foreign lands. He replaced a German, Stefan Jakoby, who did not speak Swedish and did not at all understand the workings of the Swedish company. Jakoby had taken over from a Brit, Steven Odell, who was steeped in the Ford culture. He couldn't wait to sell VOLVO so that he could get back to the Ford fold. Samuelsson was a good choice to replace Jakoby BECAUSE he is Swedish. (The Volvo Cars board overlooked the fact that he did his university studies at KTH in Stockholm and not Chalmers in Göteborg, as most Volvoites). VOLVO CARS is not where it is today—currently selling cars like hot cakes—because it has brought in foreign talent who need to tick a box on their career bucket list. Those foreigners who have contributed to that success, like Lex Kerssemakers, have made Sweden their home, Volvo their vocation and Swedish their second language.

14. An article in the July 2019 issue of ***THE ATLANTIC*** describes a phenomenon called 'minimal manning' problem-solving generalists learn to do the jobs that were previously done only by specialized worker. In the examples given, including the one on which the article is based, life on board a new, high tech U.S. Navy ship, it is not people being replaced, but people being constantly trained to do multiple jobs, and to do them well.

Somewhere over the rainbow skies are blue

The funny thing about us humans is that we are coded to believe things are better somewhere else, on the other side of the mountain or ocean, over the rainbow.[15] How else would those of us living here in Sweden have gotten here in the first place, beginning around 11,000 years ago and right up to today? It's understandable that companies feel they could be much more successful if and only if they were where all those other wildly successful companies are. They could have their pick of all those brilliant minds. Isn't that why they are successful? Let's leave the issue of what is actually happening in Silicon Valley for the moment. Let's hold off on all of the downsides to being a TESLA in Palo Alto and the problems of running a business in places that have become so popular that they are experiencing the business equivalent of over tourism. Let us look at the issue raised by Håkan Samuelsson. ***"How the heck are we going to do it with the same people?"***

15. A rainbow is a meteorological phenomenon that is caused by reflection, refraction and dispersion of light in water droplets resulting in a spectrum of light appearing in the sky. It takes the form of a multicolored circular arc. Rainbows caused by sunlight always appear in the section of sky directly opposite the sun. People on the other side of the rainbow don't see it because the sun is on the wrong side for them. When they see a rainbow where your rainbow once stood, you don't see it. The song, "Over the Rainbow", from the movie *The Wizard of Oz*, was officially released on 1 September 1939, the date given as the official start of World War II.

If any company felt it had reasons for moving, that it had outgrown the suburban village it had chosen for its headquarters, that company is MICROSOFT. I wonder how many times the board suggested to Bill Gates or his successor as CEO, Steve Ballmer, or his successor's successor, Satya Nadella, that if the company was going to survive it would have to pick up stakes and set them down again

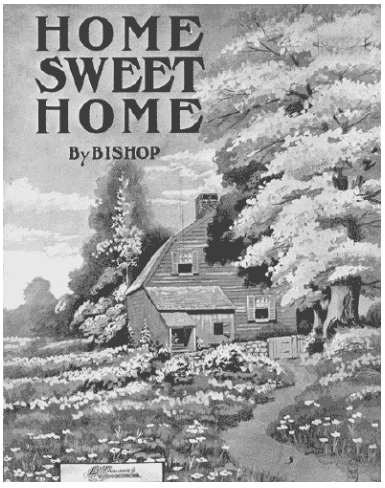
in the Valley of the Stars. MICROSOFT had moved before, from Albuquerque, New Mexico where it was founded by Gates and Paul Allen in 1975 to Bellevue, Washington in 1979. Albuquerque was where its first client was based, MICRO INSTRUMENTATION AND TELEMETRY SYSTEMS. Bellevue is just outside of Seattle, where both Gates and Allen grew up. It was hometown for them and became home to MICROSOFT. MICROSOFT moved again just before its initial public offering in 1986 to a former chicken farm not too far from Bellevue, in Redmond, Washington where it is today. Redmond is another twenty kilometers to the east of Bellevue, and the move was made to get space. It started out with just six buildings on 29 acres for 800 employees. Today there is space for 40,000 employees in 15 million square feet (1.4 million m^2) of office space on 502 acres. It continues to grow.

Something bad happened to MICROSOFT in the first decade-and-a-half of the 21st Century. Some say what happened was Steve Ballmer. But one guy cannot ruin a company, even if the guy is the CEO.[16] An article in the July 24th issue of *VANITY FAIR* stated: "Amid a dynamic and ever changing marketplace, MICROSOFT became a high-tech equivalent of a Detroit car maker, bringing flashier models of the same old thing off of the assembly line even as its competitors upended the world." The similarities to MICROSOFT back then of most of the car companies today is striking. They are thrashing around, as was MICROSOFT, trying to compete with Google as an ad broker and with APPLE by buying NOKIA's failed mobile phone group, and writing it off a year later as a $7.6 billion loss. In 2000, MICROSOFT had a market cap of $510 billion when APPLE had a market cap of $4.8. In June 2012, APPLE's market cap was $541 billion and MICROSOFT's was $249.

16. Steve Ballmer lived down the hall from Gates during the two-year period Gates was a student at Harvard. Gates dropped out, but Ballmer graduated with his class in 1977. Ballmer joined Microsoft in 1980.

Be it ever so humble, there's no place like home

In February 2014, something good happened to MICROSOFT. It ditched Steve Ballmer and promoted Satya Nadella, who had been at the company since 1992. When Nadella was promoted he was Executive VP of MICROSOFT's Cloud and Enterprise Group. Since he took over, the company's share price has gone up to an all-time high of $138.90 on July 12th 2019, with a market cap of $1.064 trillion, the highest of the highest. What did he and the rest of MICROSOFT do right? It didn't move the company to another place. It didn't fire all of its staff to bring in fresh minds. It definitely did not chuck its existing business and try something new.



"Home, Sweet Home" is a song adapted from American actor and dramatist John Howard Payne's 1823 opera Clari, or the "Maid of Milan", the song's melody was composed by Englishman Sir Henry Bishop with lyrics by Payne.

MICROSOFT turned its ship around by selling what it always sold, but doing it in a different way. **It changed its business model**. Instead

of selling software under a fixed-term contract, it sold it on a metered basis. A new head of sales, Jean-Philippe Courtois, developed a program to ***retrain*** around 40,000 staff to make this transition work. He hired 5,000 new specialists to analyze how customers were using the cloud-based services so those 40,000 knew how to best sell them more of what they were buying. One key component was to remove all of the non-productive administrative burdens that get in the way of people doing their real job. Meetings and especially internal performance reviews—which really were a way of documenting why people were fired to avoid lawsuits—were slashed. Finally, incentives were geared around the bottom line. The more you sold, the more you earned.

"Changing a corporate culture is an enormous task, and Mr. Courtois admits that it is a work in progress. MICROSOFT, he says, has shifted from a 'fixed mindset' to a 'growth mindset'."[17]

17. *THE ECONOMIST* July 6th 2019. Bartleby: Send in the Clouds.

The MICROSOFT turnaround as explained by Bartleby is that the shift has thus far been successful because it has involved not just a strategic insight (focus on *Azure* cloud-based services, run on Apple iOS and Android), but a change in approach across the workforce. **In my opinion**, it is the holistic view that is missing in all the thrashing around that we see today in the car company management suites and board rooms. "Let's get rid of the dealers and sell direct." "Let's concentrate on car sharing." "Let's drop selling cars altogether and put everyone on subscriptions." "Let's make everything electric and driverless." "Ask the AI experts; they must have the answer." "Let's move to where everyone is an expert."

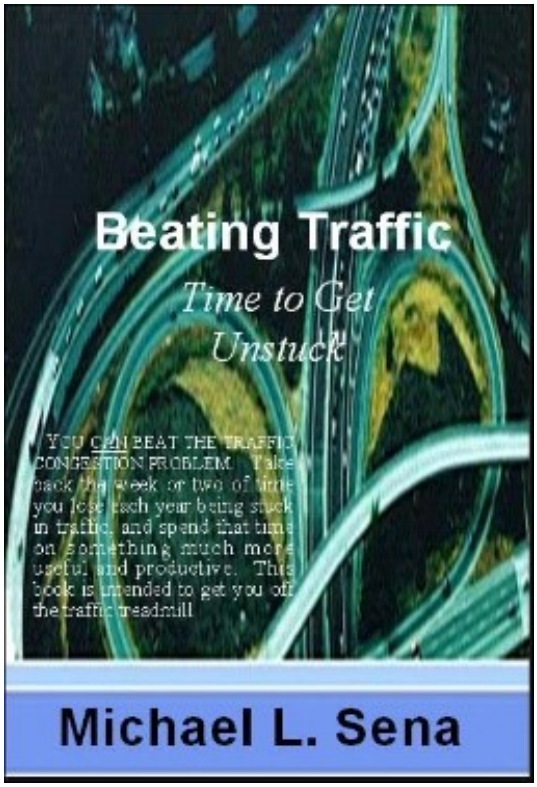
Palo Alto is not all that it is cracked up to be. As Elon Musk snuggled down into his sleeping bag at the TESLA plant in Fremont, CA, trying to catch a few hours of sleep in the midst of his production problems with the *Model 3*, what probably kept him awake was the thought that his factory was in the wrong place. "If only we had put it in a place where people know how to build cars, like Detroit," he may have mused. As he gazed out of his office window after accepting the resignation of yet one more of his 'starxecutives', looking at the big rainbow that had formed, he probably wished his company was in a place where it wasn't possible to walk out his door and directly into another office where there was even more money to be made. "Wolfsburg looks good right now," might have been words he muttered. As his stressed out staff struggle daily to get TESLA's into the hands of their new owners and keep them running when they break down, a thought might come to Elon: "Maybe it's time to open up dealerships."

Fremont, California is just across the San Francisco Bay from Palo Alto. Mr. Musk does not actually live in either Palo Alto or Fremont or even San Francisco, but in Bel Air, California, a town northwest of Los Angeles, close to Beverly Hills.

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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