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THE THINKER by Auguste Rodin (1840-1917) was not originally cast as an isolated sculpture, but as part of The Gates of Hell (La Porte de l'Enfer) depicting a scene from the Inferno, the first section of Dante Alighieri's DIVINE COMEDY. The sculpture was commissioned by the French Directorate of Fine Arts in 1880 and was intended to be the entrance of the Decorative Arts Museum. Rodin should have finished this monumental work in 1885, but he continued to work on it until his

death. The museum was never built. THE THINKER (also called THE POET) appears inside the frame just above where the two doors meet. During his lifetime, Rodin supervised the production of many copies of this sculpture, both in its original size

(i.e., the one above the doors) and also in monumental size. One of the monumental versions was created in 1908 for Prince Eugen of Sweden, himself a noted artist. I took this photo of the Swedish THINKER this summer during a visit to the Prince's home



at Waldemarsudde. His home is now a museum and very much worth a visit when visiting this lovely city. The sculpture, the home and its garden surroundings are truly inspiring.

THE DISPATCHER

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Ready or Not, Here Comes the Waymo Taxi Robot

Waymo? Alphabet says the name stands for "A new way forward for mobility." And from that you get *Waymo*? I like my explanation better: We are going to get Way Mo(re) than you all.





1. Waymo uses LiDAR in its hardware solution and creates highly detailed 3D maps of the streets on which it drives its vehicles. Before a street is mapped by Waymo its vehicles are not permitted to drive on them. Its vehicles are designed for no driver engagement while the driverless function is engaged. IN A FEW months, *Waymo*, a subsidiary of Alphabet (we still know it best as Google) will start offering people in Phoenix, Arizona rides in cars outfitted with its driverless hardware and software. There will be no human driver or socalled 'safety driver' in the driver's seat unless Waymo decides on its own to put one there. During the past several months of testing, Waymo has had an employee in the back seat "observing the vehicle's behavior". However, when commercial services begin, this observer will be dispensed with. The Chrysler Pacifica minivans will serve as taxis for whoever is up to the challenge of letting a robot car take them to and from wherever they want to go within limits.

Waymo was granted a license to operate in Arizona as a *Transportation Network Company*, and its new service will not be a test but a real commercial operation running on public thoroughfares. Public road testing with volunteer riders was conducted within a limited area around the Phoenix suburb of Chandler. Waymo had developed high resolution detailed 3D mapping for this area.¹ Whether the commercial operation will be limited as well is not clear. Waymo says it will expand service as it expands its highly detailed mapping coverage, first in the entire Phoenix metro area and then to other metro areas in the U.S.

I have written on numerous occasions in this newspaper that before any vehicle equipped with driverless software and hardware operating without a human driver behind the wheel is allowed on public roads it should be tested and certified as safe by a legally authorized testing authority. The automobile industry, the technology companies developing the hardware and software for driverless vehicles (e.g. Waymo), and many of my friends in the academic, public and private sectors have all made the argument that the only way to ensure these systems are safe on public roads is to test them on public roads without drivers. The State of Arizona and NHTSA are doing nothing to prevent Waymo or anyone else who feel ready for undertaking the move from test mode to business mode, in spite of a number of voices shouting louder than mine. So, we shall now see the result. Hopefully, it will all turn out well and no one will be needlessly injured.

From project to Alphabet subsidiary

In 2009, Google co-founder Sergey Brin initiated the Google Self-Driving Car Project. He brought in Sebastian Thrun as its first director while Thrun was still a full professor and director of the Stanford Artificial Intelligence Laboratory. In 2005 while at Stanford, Thrun led a team that won the 2005 DARPA Grand Challenge and its \$2 million prize.² In 2011, Thrun left Stanford and joined Google as a 'Google Fellow'. Chris Urmson, who was on the winning Carnegie Mellon 2007 DARPA Urban Grand Challenge team, joined the Self-Driving Project in 2009, and took over the lead from Thrun in 2013 when Thrun left to fry other fish. Realizing that the project needed to ratchet up its business capabilities, Brin recruited an automotive professional, John Krafcik, in 2015. Krafcik had been CEO of Hyundai Motor Company. A year later Waymo was formed as a subsidiary of Alphabet Inc. with Krafcik as its CEO. Urmson exited to go off and co-found Aurora, a self-driving technology company.

Not surprisingly, Waymo also describes itself, as a "self-driving technology company with a mission to make it easy and safe for people and things to move around." It claims to have plans to offer logistics services and to cooperate with public transport authorities to offer complementary rider services, but for now it is the taxi business that is taking all of Waymo's focus.

The establishment of Waymo coincided with a major restructuring of Google beginning in 2015. Larry Page and Sergey Brin founded the company in 1995 when they were still graduate students at Stanford. It was going to be a search engine company, they thought, and the pair managed to convince investors, including Jeff Bezos, to put money into their idea. They almost sold it for \$1 million in 1999, but decided to hold on. They took it public in 2004. Somewhere around that time they finally came up with a business idea. They were not in the search engine business; they were in the ad brokering business with their search engine delivering placement based on their own 'special sauce' algorithm.

Google grew, amassing a horde of cash, and with the cash they bought companies, ideas and people.³ After two decades of operation which looked to outsiders as partly focused (the ad business)

2. DARPA (DEFENSE ADVANCED RE-SEARCH PROJECTS AGENCY, part of the U.S. Department of Defense) GRAND CHALLENGE is a prize competition for American autonomous vehicles. The 2005 Grand Challenge was intended to encourage development of technologies required to develop fully autonomous ground vehicles capable of completing on an off-road course within a specified time.

3. In July 2017, Google had \$86.3 billion in cash. Microsoft had \$131.2 billion and Apple had \$246.1 billion. and partly chaotic (the X stuff), Google's board decided to initiate a reorganization. It formed a new company and called it 'Alphabet', turning Google into a wholly-owned subsidiary. Google is the largest of nine subsidiaries, alone generating 99% of the revenue and most of the profit. In addition to Waymo, the other subsidiaries are Calico (biotech), Next (home automation), Access&Energy (broadband), Verily (life sciences), Sidewalk Labs (urban planning), Google Capital, GV (Google Ventures) and Google X (research projects).

4. One acquisition that vanished is Motorola Mobility. Google acquired Motorla Mobility in in 2011 for \$12.5 billion, ostensibly to control its large number of patents. Google sold the business to Lenovo in 2014 for \$2.91 billion excluding the patents.

Alphabet is definitely not in the altruism business

No matter how you look at it, Alphabet is still Google; the other subsidiaries are spare change. Google—and therefore Alphabet—is

in the ad brokering business. All of its activities in one way or another reinforce this business or they disappear.⁴ How does this model work? On the surface it looks like everybody wins. The searching user gets what he or she is looking for, the advertiser gets to present its wares to the search user and the potential to make a sale, Google gets a commission for presenting the ad and receives payment from the business

customer for delivering data that it has collected from the user's device. It is this last piece, the selling of personal data, which has not been completely transparent to users.

Offering taxi rides in cars without human drivers will be no exception to applying the Google business model. Waymo will apply the same tactics that Google uses with all of its business customers, as shown in the diagram below.



Google, like its social media cohorts, distinguishes between users of its services and its customers. Users provide the raw material for Google, Facebook, et. al. to deliver income generating products and services to its customers.



Applying the Google Advertising Model to Waymo Taxi Business

The main actors in the model are Waymo, Google, the Car OEM, the Ride User and all of Google's Business Customers who will sell services and deliver ads to the Ride Users. Since Google decided not to build its own vehicles, it is cooperating with OEMs like FCA and Jaguar to integrate its 'car brain' software and hardware. FCA and its Chrysler Pacifica Hybrids is the first to work with Waymo on a commercial service, but there will surely be many others.⁵ Waymo will need to work closely with the OEMs on design and the integration of their hardware and software, developing a close partnership. Google will probably pay the OEM a commission on ad clicks that use its large display infotainment systems in the Pacificas to search



for places of interest or do some on-line shopping during the journeys.

Waymo has been testing different fare schemes for pricing the rides. Since Alphabet surely knows that the Disney aura will wear off after one or two rides, whether people choose to take

the Waymo taxi versus an official taxi, an Uber-type taxi, their own car or, public transport will come down to economics. Eliminating the human driver doesn't just cut out a cost, it removes a source of income. Taxi companies provide the cars and pay for insurance and maintenance. They generally lease their cars to drivers in return for a daily fee, usually in the range of \$75 to \$150 flat fee or 30% of gross fares. Then the driver needs to pay for the fuel used and return it full at the end of the shift. The 2017 U.S. Bureau of Labor Statistics lists the <u>median income</u> for taxi drivers as \$25,880/year. The Pacificas get around 33 miles on a battery charge, so most driving will be on fuel. Add in the cost of all the expensive equipment for making the cars driverless, and it's going to be very difficult to beat either official taxis or the Uber variants. Waymo will save the driver cost, but it is going to have to pay all of the other costs itself.

My guess is that Waymo will subsidize the rides with ad income plus the money it will generate from the data it collects from passengers, pushing the fares it charges for rides toward zero, just like it does for using its search engine and its maps. In theory, it could do that without the added costs of driverless technology, which, if all the development costs were added in would probably be equal to the cost of a drivers for the useful life of the taxi (3.3 years), but how much fun would that be for the Googlers and Googlettes?

5. Waymo placed an order for 62,000 Chrysler Pacifica Hybrid in early 2018 to put into test fleets around the country. They will be delivered over the following twoand-a-half years. A report in Jalopnik following the purchase point out that for each of those purchases, Waymo would be able to claim the federal tax credit of \$7,500. Plug-in hybrid with batteries the size of those in the Pacifica Hybrid are eligible for the full credit. That would mean a \$465 million tax break between now and 2020 for Waymo, when the purchases are scheduled to be completed.



The Sunshine Cab Company added spice to the lives of TV viewers between 1978 and 1982. When Elaine Nardo (in the taxi, played by Marilu Henner) shows up at Louie's dispatcher cage to apply for a driver's job, he speaks respectfully to her until he learns she wants to drive. "All the while I thought you were a human being," he said, "but you were busting my chops."

They are in this for the long haul

Alphabet and all of its subsidiaries have a common plan. It is to make your life's experience "seamless". Seamless means to Google that every single one of your contact points to the Internet will belong to Google: your Android phone (preferably their Pixels) and Android infotainment system, your Chrome browser, G-mail account, Google+ social media service, Google Photos to put a face on you and all of your contacts, Google Cloud Platform for all your data storage needs, Google Assistant to capture your spoken thoughts (and soon your non-spoken ones too), Nest to control everything in your home, Sidewalk Labs to control everything outside your home, Verily to let your health services know how you are feeling. Waymo will take you to all the places you need to go and continue the seamless nature of your life while you travel in a Google cocoon.

All of this will take time and careful planning, but Page and Brin as well as then Google CEO Eric Schmidt promised to continue to work together until 2024. They made the pact to work together for twenty more years one month before Google's IPO in August 2004. Schmidt lasted until January 2018 when he transitioned to technical advisor. They are in it for the long haul. They have made a lot of progress toward reaching their seamless goal, but there is still much left to accomplish. I, for one, prefer my life with seams.

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THE TAXI BUSINESS ruined itself. Take yourself back ten years in New York City, before Uber was formed, or back twenty-eight years in Stockholm before the taxi business was deregulated. You could find yourself waiting a long time for a taxi when the weather was particularly bad, when a big event was taking place in the city or when a lot of people were out late partying. I remember a long walk back to my hotel in the snow after an office Christmas party in Stockholm in 1980 when there were no cabs to be found. My wife missed half an event in connection with the ITS World Congress held in New York City in 2008 when all taxis were busy. Before 1990 in Stockholm there was only one major taxi company. Permits were issued by the city council, but only after a thorough check of the prospective driver's background. The waiting time to receive the sought-after permits was up to twelve years. Taxi supply was restricted.

Deregulation and mobile app platforms that allowed anyone to enter the taxi business changed all that. There were more taxis, making it easier to get a ride, but pricing fluctuated, quality of drivers diminished and tax evasion became rampant. It was the taxi business model that was broken. It depended on restricting supply to hold up prices, but it was the taxi business owners, not the drivers, who benefitted. Now, both are suffering and bikes and scooters are squeezing them even further.



Tesla Inc.: The Most Misunderstood Car Company

WHO 'GETS' TESLA? If market valuation of a car company was based on the number of cars sold, Ford would be valued at \$2.4 trillion or Tesla would be valued at \$400 million. If investor interest in a car company was guided by a belief that the management of the company was stable and de-



pendable and its board of directors responsible, Håkan Samuelsson and his able team at Volvo Cars would already have followed through with its IPO and had piles of money for its invest-Tesla ments, and would be borrowing from banks just to stay

in business. As we know, these metrics are not applied when it comes to Tesla. This photo of the interior of a new Tesla Model 3 is all that is needed to explain why Tesla has the valuation and share price it has, and why, in spite of the antics of its CEO (and, until the 30th of September 2018 when the SEC forced him to resign, Chairman), and in spite of the fact that Tesla has been losing around a billion dollars a quarter during 2018, investors continue to be willing to give him and the company money.



The Tesla Roadster was the company's first car, introduced in 2008 and sold until 2012. It was a battery electric vehicle (BEV) based on the Lotus Elise chassis. It was the first highway legal serial production all electric car to (1) use lithium-ion battery cells, and (2) travel more than 320 kilometers on a single charge.

Let's get one thing out of the way before we start. Elon <u>Musk did not found Tesla Motors</u> (now Tesla, Inc.) nor give it its name. The company was founded in 2003 by Martin Eberhard and Marc Tarpenning. Eberhard came up with the idea of naming it after Serbian-American Nikola Tesla, inventor of the AC induction motor, which he and Tarpenning had decided to use in their new electric car. Musk bought his way into the firm in 2004 and became the chairman of the board. Eberhard remained CEO until 2007 when he was asked to resign by the board, which, by this time, was filled with Musk's family and friends. Tarpenning served as CFO until he was forced out in 2008. Neither of the original founders are amused by the constant references to Musk being a co-founder. Eberhard is suing on the issue of Musk and others claiming to be founders.

What's so special about Tesla?

This article is not about Elon Musk; it is about a vehicle OEM that is having a major impact on the automobile industry. Is Tesla punching above its weight? Is its five years of fame during which time it

became the leading supplier of electric plug-in vehicles about to come to a crashing end when the big guns of the industry ramp up their own production of BEVs, or does it have the kind of staying power to compete for real? If you just look at the numbers in the chart to the right I compiled you could easily conclude that it has no business having the market cap that it has at present. It's around the



same as GM's and BMW's. Tesla has been losing around \$1 billion a quarter during 2018 having lost \$2 billion during 2017. Its sales are still puny (but growing quickly). Its share price of \$265 on the 28th of September was a huge dip from its previous closes, mainly due to the U.S. Securities and Exchange Commission charging Musk with fraud. When an agreement was reached over the following weekend, the price surged to \$305 on Monday, October 1st.

Tesla is not just a technology company masquerading as a vehicle OEM. It is not one of the six luxury car brands that cost over \$200,000 apiece which together sold only 29,600 cars in 2017.⁶ Tesla is actually more of a car company than most car OEMs because it provides much more content for its cars than they do. In a 2016 Goldman Sachs report produced after its analysts toured the company's Freemont, California plant, the team wrote that "Tesla is now 80% vertically integrated, which is rare in the automotive industry where companies are focusing on the assembly process and engine manufacturing."⁷ It is now standard that close to 80% of the value of a vehicle is outsourced. Tesla is building electric power trains for other OEMs, including Daimler for the Smart ED2 and Toyota for the RAV4EV.

In an attempt to reduce costs and spread risks, car OEMs have reduced the amount of value they can obtain from each one of their 6. The six luxury car suppliers are: Aston Martin, Bentley, Ferrari, Lamborghini, McLaren and Rolls-Royce.

7. According to Automotive News, outsources its windshields, brakes, power seats, power steering mechanism and thirty other components, but its battery pack, motor, onboard charger, universal connector, class a stampings and plastics are all in-house, as are most of the software and vehicles. Mass market car makers especially have put more and more emphasis on extracting value (i.e. profit) from parts services and accessories, often selling vehicles at cost or at a loss. They have also allowed independent suppliers to enter their supply chain at every point, competing with their own parts, services and accessories and thereby reducing their own opportunities to extract profits.

As the diagram to the right shows, Tesla has built its processes to capture most of the value from each of its customers. I will get to

how it does this, but the key point is that it has designed its vehicle and the way it is bought, delivered, serviced and operated to return the maximum amount of profit to Tesla, Inc., not to tier one or tier two suppliers, not to independent suppliers and not to national importers and local dealers. This model has been fought



against tooth and nail by all of the industry groups that have an interest in preserving the status quo, but Tesla has persevered and seems to be prevailing.

Whoever controls the narrative controls the outcome

At some point between 2004 and 2012 when the Model S was introduced, Musk and those in the company whom he trusted sat down somewhere and designed a new kind of car company. The fact that they started with an electric car and not an internal combustion engine car was crucial. The company they were going to design had to be based on a car that would be powered like any other wireless computer appliance because their car was going to be a wireless computer appliance made for moving people. Their strategy was to emulate typical technological product life cycles starting at the high-cost end and gradually working down to lower-priced models. Musk wrote in a blog post that "new technology in any field takes a few versions to optimize before reaching the mass market and in this case it is competing with 150 years and trillions of dollars spent on gasoline cars."⁸

Like a wireless computer appliance, it would need constant remote updating for both software and firmware. No one thinks about taking their iPhone or laptop to a workshop for updating as one takes a car to a workshop today. Why should they take their car appliance 8. When asked why Tesla started with producing a \$100,000 spports car rather than a \$40,000 Honda Musk responded: "The reason we started with a \$100,000 sports car is that when technology is new it tends to be expensive. It just takes time to optimize the right design and work up to economies of scale. It would have been a \$70,000 to \$80,000 Honda Civic."

to a workshop? SOTA and FOTA require a full commitment to connectivity, including a wireless platform with a mobile network operator that will provide flexible terms and global service.⁹ OEMs have been talking about OTA for years, but the best they have been able to do is update map data or infotainment systems. Tesla can update all of its vehicles' firmware and software because it has designed its car like a computer, not tried to connect independent electronic control units on a CAN or other networks accessible via a gateway. And Tesla, with its in-house telematics service provider platform, controls all contacts with its vehicles.

Constant updating would mean having access to a high-speed Internet connection for extended periods of time. While the updating is occurring, the car (appliance) would need to be stationary and powered. By providing its own batteries, a proprietary power source and a Tesla connection, whether in the home or on the road, Tesla would be able to optimize the time required for charging.



There was one last piece required to be put in place to complete the virtuous circle being designed by Musk and his team, and it would prove be the most difficult to successfully execute. Tesla believed it needed to control the end-to-end process for every customer contact, from

learning about the vehicle, to ordering it, completing the purchase and taking delivery, servicing and learning about the latest improvements. Car OEMs have divided these customer touch points among a slew of specialist organizations, some in-house and some independent. Recently, car OEMs have begun trying take back control of the narrative by forcing dealers to be single-brand retailers and by opening 'experience centers'.¹⁰ Some have also begun to sell direct to customers. They are missing the point. You don't get to enter the virtuous circle at one juncture and hope to gain the full benefits.

And now for the pièce de résistance

If all this isn't enough to put wrinkles on the foreheads of the CEOs of all the world's legacy car companies, there is one last piece of the Tesla story that we don't hear too much about but is certainly discussed behind closed doors when Musk makes his pitch for more investment money and a large part of why the company's share

9. AT&T was chosen by Tesla in 2013 as its global provider of electronic SIM chips and high-speed network service.

Up until January 1, 2017, owners could use the company's Super-Chargers for free, and that still applies for those who purchased before that date. After that date, buyers get around 1500 kilometers per year for free and then they have to pay. Their cost is guaranteed by Tesla less than what they would have had to pay for fuel.



10. See The Dispatcher, October 2013.

price is in the stratosphere. While Tesla's share price is still below the mesosphere where Google and Amazon reside, it is well above the atmosphere where the other car companies dwell. The reason is <u>data</u>. Tesla is collecting tons, gobs, oodles, masses, tons of data. Maybe not as much as Amazon or Google or Facebook, but still not a shabby amount—and it will only grow as more Model 3s are sold and more of its drivers turn on Autopilot.

11. Morgan Stanley analyst Adam Jonas said in a note that data might be more valuable to Tesla than something like the Model 3. "There's only one market big enough to propel the stock's value to the levels of Elon Musk's aspirations: that of miles, data and content," he wrote in June, 2018.

Two years ago, the then-head of Autopilot told a conference crowd at MIT that Tesla had logged 780 million miles of data, with 100 million of those miles coming while Autopilot was "in at least partial

control". Also in 2016, Musk said that Tesla was collecting just over three million miles of data per day. By July 2017, the total number of fleet miles driven was up to five billion, and by September 2018, it had reached 9 billion. As Tesla sells more cars—and it is selling more cars—the amount of data that it will collect will expand accordingly.¹¹



So far we do not see any signs that Tesla is monetizing this data in the same way that Google and Facebook monetize their users' data by selling it in raw or pasteurized form to business customers. It may simply use it to continue to grow its own business, increasing its verticality by selling more electrification into homes and businesses, as it is already doing with its subsidiary SolarCity's products.¹²

Tesla strikes me as a combination of Ford Motor Company in the 1920s and Apple today. It is striving for complete vertical integration, as Ford did, in order to capture every last ounce of value from the money it earns from selling its range of products, and it is applying the best strategy and tactics for selling technology as Apple does. Unlike Ford with its Model T, it will not stick with a single product after its sell-by date passed. It is adding products successively, stripping out pieces that both add cost and dependency on external suppliers, such as the instrument panel in the Model 3. Mirrors are next. Then will come the steering wheel and pedals. How long will it take before the tires are redundant? 12. SolarCity markets, manufactures, and installs residential and commercial solar panels in the US. It has also provided other energy services. In 2016, the company merged with Tesla, Inc. and now offers energy storage services through Tesla, including a turnkey residential battery backup service that incorporates Tesla's Powerwall. The company, in partnership with Panasonic, operates the Tesla Gigafactory 2 in Buffalo, New York, where it manufactures solar module components.

Looking for love in all the wrong places

Now that you 'get' Tesla, what are you going to do about it? I have a few suggestions for the OEMs who are reading this. For the hardware, software and service suppliers, you can infer from the recommendations how you fit into the picture.

- Throw away all of your market forecast reports and don't order any new ones. See *Musing of a Dispatcher: Pollyanna Projections* where I explain why. You will have more money to spend on items of importance and more time to read books and articles that will help you really understand what is going on in the world.
- Slow down on your investments in driverless cars. There are other factors that will determine whether or not you stay in business long enough to deliver cars that drive themselves. The most important is how you communicate with your cars and update the software and firmware.
- Start now to design a car from the ground up so that it, and the future models that will be based on the design, can be updated remotely and to the greatest extent possible, automatically. It needs to be completely new, not an adaptation of the CANned solution you have been nursing along for the past few decades.
- Get your connectivity strategy worked out. You need to communicate with your vehicles all around the world, managing at the same time to respect all the laws and regulations that have and will be coming into effect. Don't waste time on out-of-date technologies that will add cost but will simply get in the way of the make-over you need to perform to stay alive.
- Put on hold any new investments in customer service activities and establishing your own customer contact centers until you have a car that does not require massive numbers of people speaking different languages to deal with a simple problem. This is an area that you can continue to out-source to companies that are specialized in performing the task.
- Step out of the race to the bottom with mobility services. The winner will be a group that can deliver the cheapest solution for moving an individual from point A to point B. You are competing with electric skateboards, electric kick scooters, electric and standard bicycles and who knows what else. <u>You cannot win</u>. Even companies like Uber are investing in bikes and scooters.
- Really, really think hard about whether it is time to start selling and delivering your cars directly to your customers using the Internet with wireless apps as the primary interface. It works for Tesla to a certain degree, but there remain problems with delivery and servicing for mechanical faults.

United Nations Climate Panel Issues Its Report

The INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE (IPCC) is a scientific and intergovernmental body established in 1988 under the auspices of the United Nations, set up at the request of member governments, dedicated to the task of providing the world with an objective, scientific view of climate change and its political and economic impacts.

******************* TALANOA DIALOGUE T. The Talanoa Dialogue is a process designed to help countries implement and enhance their Nationally Determined Contributions by 2020. The Dialogue was mandated by the Parties to the United Nations Framework Convention for Climate Change to take stock of the collective global efforts to reduce the emissions of greenhouse gases, in line with the goals of the Paris Agreement. The Talanoa Dialogue was launched at COP23 under the Presidency of the Republic of Fiji, and is a year-long process that will culminate in political discussions at COP24 in Katowice, Poland from 3-14 December 2018, where political leaders will be expected to signal their commitment to increasing the ambition of their NDCs.

GLOBAL WARMING OF 1.5°C is an IPCC special report "on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty." The report was produced in response to a Decision of the 21st Conference of Parties of the United Nations Framework Convention on Climate Change, which was responsible for the <u>Paris Agreement</u> adopted in December 2015. This Decision requested that a special report be produced by 2018 addressing the impacts of global warming of 1.5°C.

The full report is 1200 pages containing 5 chapters plus annexes, has 14 coordinating lead authors, 60 lead authors, 133 contributing authors and 17 review editors. Its main purpose is to provide input to the *Talanoa Dialogue at the 24th Conference of the parties (COP24)*.^T The *Talanoa Dialogue* will "take stock of the collective efforts of Parties in relation to progress towards the long-term goal of the Paris Agreement, and to inform the preparation of the nationally determined contributions."

I have read the 34-page *Summary for Policymakers*. If you decide to read the *Summary* or the full report, it is important to understand the term *Global Warming* as it is used in the title. *Global Warming* means the estimated increase in global mean surface temperature (GMST) averaged over a 30-year period expressed relative to pre-industrial levels (i.e., before 1850). We humans have increased global warming by 1°C since the second half of the 19th century; 1.5°C is 0.5 above the current level.

How do you like your toast?

Findings of the report can be summed up as follows:

Human activities have caused a temperature increase of between 0.8OC and 1.2OC from pre-industrial levels (i.e., the multi-century period prior to the onset of large-scale industrial activity around 1750. The reference period 1850–1900 is used to approximate pre-industrial GMST);
If we keep doing what we're doing, we will reach a level of global warming of 1.5OC by between 2030 and 2052;

- If we stop there—really stop—some bad things will happen, but civilization will not be toast;
- If we keep going at current levels beyond 2052, by 2100 we will reach 2.0°C global warming and we definitely will be toast.

What are the bad things that will happen? The report states that "evidence from attributed changes in climate and weather extremes for a global warming of 1.5° C will result in further detectable changes, including increases in GMST, hot extremes in most inhabited regions, heavy precipitation in several regions and the probability of drought and precipitation deficits in some regions."

The report is not intended to provide recommendations for how to slow down global warming. That will be up to the *Parties to the Agreement*. It is encouraging that it has devoted a chapter of the report and ten pages of the summary to the role that land use planning and development and natural resource exploitation in global warming. Unfortunately, the *Parties* thus far have focused on what could be described as low hanging fruit or easy targets, that is, the <u>transport industry</u>. The charts to the right tell the real story about why global warming is occurring and what and where are its primary sources.

Politicians reason why; Citizens do or die

Transportation (transport is the term used in Europe) accounts for 14% of greenhouse gas emissions. Burning fossil fuels in internal combustion engines (ICE) is the principal cause. If we simply wipe all cars, trucks, buses, trains and other vehicles that run on fossil fuels off the face of the Earth, we can eliminate 14% of greenhouse gases. However, if we turn all our current ICE vehicles into electric vehicles, we will simply increase the greenhouse gases attributable to electricity and heat production, which is 25% (a large part of the industrial emissions, which account for 21%, are also related to generating energy. Steel production alone causes one-quarter of global industrial emissions because of the amount of coal used). Currently, over 40% of the world's electricity production is based on coal-fired plants, so we will need to burn more coal to create the electricity to run our electric vehicles. In other words, without changing the way we produce electricity, electric cars do not help us stop global warming at 1.5°C. How governments can close down the only major source of electricity that is not based on coal, gas or oil-nuclearusing the excuse that it is bad for the environment simply boggles my mind. Now let's look at from where the greenhouse gas emissions are coming. China accounts for 30% of them, and 'Other' another 30%.¹³ The source for 65.5% of China's electricity generation

The two diagrams below are provided by the U.S. Environmental Protection Agency using 2014 data from IPCC.

https://www.epa.gov/ghgemissions/global-greenhouse-gas-emissionsdata



The diagram below is provided by the U.S. Environmental Protection Agency using 2017 data from the Carbon Dioxide Information Analysis Center, Oak Ridge National Laboratory, U.S. Dept. of Energy.



is from coal and only 3.5% nuclear. Its electricity production from fossil fuels followed its expansion as an economic power, quadrupling from 1,000 terawatt hours (TW-H) in 2000 to 4,000 in 2014. By comparison, the U.S. accounts for 15% of greenhouse gas emissions and generates 33% of electricity with coal and 30% with nuclear. There is a terrific interactive chart on the U.S. Department of Energy site that shows by state how the source of electricity affects the actual emissions of all-electric, plug-in hybrid, hybrid and gasoline vehicles.¹⁴ North Dakota has around 65% electricity generation with coal, similar to China. All-electric cars in North Dakota generate around 7,000 pounds of CO₂ equivalent compared with 11,000 for gasoline. By comparison, in my old coal state of Pennsylvania, which now generates 42% of its electricity with nuclear and 24% with coal, all-electric cars put out only 4,000 pounds of CO₂ equivalent.

Our politicians are simply focusing on the wrong things, like reducing the allowable emissions from cars and taxing air travel. This is small beer in the context of the big picture. Yes, it's important, but not THE MOST IMPORTANT. Of course we should move to fossil-free fueled vehicles, but we should prioritize two things, and do them quickly. First, all the DARPAs of the world should immediately start funneling all their (actually, our) money to challenge our best and brightest minds to develop ways of removing greenhouse gas emissions from the atmosphere. There are numerous projects that have shown promise, but are either deemed too expensive or lacking a business model. Can there be a better business model than the survival of the human race!!! Second, we need to start building nuclear power plants (preferably fusion, where more money is needed for research) as fast as we can everywhere and close down all fossil fuel-fired facilities even faster. As important, we must stop closing those nuclear plants that are in operation. That means you, Sweden and Germany.¹⁵

The planet will survive, humans won't

I have used the term 'Save the planet' as a figure of speech when writing about the problems with global warming. It's us we need to save. Planet Earth will be around for at least 4.5 billion more years unless it is hit by a body large enough to blow it up. Humans and many—although probably not all—of our cohabiter flora and fauna may survive global warming of 2.0 for a while, but not for long. We are not going to save humanity unless we stop making electricity and generating energy with fossil fuels. That is the main problem we are facing. We do have another choice: We can all revert to being hunters and gathers. 13. If we look at the 'Other' countries accounting for another 30%, many generate electricity with fossil fuels. Brazil, for example, generates over 60% of its electricity with oil and coal; South Africa is 69% coal and 15% oil.

14. (<u>https://www.afdc.en-</u> ergy.gov/vehicles/electric_emissions.php)

15. There is a social debate about nuclear power. Proponents, such as the World Nuclear Association and Environmentalists for Nuclear Energy, contend that nuclear power is a safe, sustainable energy source that reduces carbon emissions. Opponents, such as Greenpeace International and NIRS, contend that nuclear power poses many threats to people and the environment.

Presently, the vast majority of electricity from nuclear power is produced by *nuclear fission* of elements in the actinide series of the periodic table.

Nuclear fusion reactions have the potential to be safer and generate less radioactive waste than fission. These reactions appear potentially viable, though technically quite difficult and have yet to be created on a scale that could be used in a functional power plant. Fusion power has been under theoretical and experimental investigation since the 1950s.



It's only been around 10,000 years since farming was invented, which started the whole industrialization thing that has led to global warming. Our DNA is still programmed to hunt and gather.

Dispatch Central

"If you don't care where you are or where you are going, you will never feel lost."

Anonymous

16. https://www.nhtsa.gov/technology-innovation/automated-vehicles

17. The Highway Trust Fund is the principal Federal funding source for surfact transportation projects. A small portion of the Fund is used to fund mass transit. The Fund receives money from a Federal Fuel Tax of 18.4 cents per gallon of gasoline and 24.4 cents per gallon of diesel fuel. The growing number of electric cars and increased fuel efficiency is resulting in declining revenue for the Fund.

"It's soon going to be very difficult for Stockholmers to park their own bicycles when all the stands are filled with commercial products." Johan Sundman Project Leader Stockholm Transport Department

U.S. DOT Issues Automated Vehicles 3.0

ON THE 3RD OF OCTOBER, 2018, the U.S. Department of Transportation issued Preparing for the Future of Transportation: Automated Vehicles 3.0 (AV 3.0).16 It was accompanied with the statement that "this document builds upon Automated Driving Systems: A Vision for Safety 2.0 (ADS 2.0) (released on 12 September 2017 and reported on in the November 2017 issue of THE DISPATCHER) and expands the scope to provide a framework and multimodal approach to the safe integration of AVs into the Nation's broader surface transportation system." In the introduction to the AV 3.0 report, Secretary of Transportation Elaine L. Chao describes the report as "another milestone in the Department's development of a flexible, responsible approach to a framework for multimodal automation...and describes the Department's strategy to address existing barriers to safety innovation and progress."

I will take a deep dive into this report in the next issue of **THE DISPATCHER**.

Ж

Senator says BEV's not paying fair share

U.S. SENATOR John Barrasso (R-Wyoming) wants to take away the \$7,500 tax credit for electric vehicles. He calls it a benefit for the wealthiest Americans. He proposes to impose a federal highway user fee on 'alternative fuel vehicles' that would go into the Highway Trust Fund to help pay for the nation's infrastructure.¹⁷ The fee would be collected with the vehicle owner's federal income tax return.

Stockholm unwelcomes dockless bicycles

JOHAN SUNDMAN, project leader for Stockholm's Transport Department's bicycle program, is worried that the city will be overrun with dockless bicycles and electric scooters before his group is able to complete its investigation and report on the how or whether these personal transport devices should be regulated. He reported in the press that his office has already received requests from between ten and fifteen companies that want to place their bicycles around the city. Without permission from the city, a number of companies began to place bicycles and scooters last summer. The city was caught napping. It did not even know if it had the authority to stop them or how it could regulate the invasion. He explained that in the old days (i.e., before mobile apps allowed dockless bikes and scooters), it was impossible for companies to make a profit from the rentals. They needed to have a sponsor that would gain from the advertising value, and the city usually helped with financing. Special cycle stands that included payment were installed by the rental companies. Mobile apps have removed the need for special stands, so the cycles are simply placed out once and then find their own ways into the hands of customers. My wife and I spent a week in Stockholm in September, and the problem is noticeable everywhere in and around the center. Bike stands are filled and sidewalks are clogged with parked cycles. The city is now enforcing a law that states that a bicycle can be parked for a maximum of 24 hours in a public bike stand. If the bike is not moved after three days, it can be impounded.

Once again, the app platform model applies: Ask for forgiveness, not for permission.

J

Driving with one hand tied behind your back

THE SWEDISH TRANSPORT AGENCY has given VOLVO CARS approval to test drive its self-driving cars in Göteborg. According to the AGENCY, Volvo may only drive on designated roads at a maximum speed of 60 kilometers per hour (36 mph). The car may not change lanes while in self-driving mode, there must be a person behind the steering wheel at all times and this person must have at least one hand on the steering wheel at all times. Presumably, the other hand can be tied behind his or her back.

£

The first experience house was in Paris

L'ATELIER RENAULT on the Avenue des Champs-Élysées in Paris seems to be the precursor to today's automotive experience centers. It used to be called 'Pub Renault', according to Jacques Amselem who sent the link to the right. He and his friends used to hang out there in the 80s. Renault had its latest models on display and cool drinks and ice cream could be had for a price. Louis Renault bought the premises in 1910 and used it as an exhibition center and commercial site. It was rebuilt in 1962 and renamed Pub Renault. Interior alcoves were made into old car interiors. It became *Atelier Renault* in 2000, and renovated 2010 for its 100th anniversary with temporary exhibitions, events and shops. That's really staying power.



Swedish Transport Agency

The Swedish Transport Agency stipulates rules and monitors how they are followed, grants permission (driver's licenses and certificates) registers change of ownership and manages congestion and vehicle taxation. The Agency establishes the rules for vehicle size and weight and administers the fines for exceeding the established limits.



https://fr.wikipedia.org/wiki/Atelier Renault

IKEA Imagines Roaming Rooms for Its Furniture



This is one of the designs from IKEA's think tank, SPACE10, who produced a series of designs like the one above for rooms on wheels. It is called *IKEA on Wheels*.

18. Ingvar Kamprad founded IKEA in 1943 when he was just seventeen years old. The firm's name is an acronym with his initials plus an E for Elmtaryd, the name of the farm where he grew up, and an A for Agunnaryd, the town where he grew up. In 2015, he was listed by Forbes as one of the ten richest people in the world. He died in January 2018 at the age of 91, leaving the firm in the hands of his three sons. IKEA FURNISHES INTERIORS. When you enter one of the company's 415 big blue stores in any of 49 countries where it

> operates, you follow the paths marked with directional arrows through displays of sofas, beds, chairs, desks, lamps, rugs, wall coverings and everything else that can be found on and inside the walls, ceilings, floors and windows of any type of interior space. You pass sample bedrooms, kitchens, bathrooms, dining rooms, offices and play rooms that show you how you can put all of the IKEA offerings together to suit your own needs and dreams. To complete your tour, you make a

stop in the cafeteria where you can enjoy a meal at a bargain price or just a small *fika*. Then you pull your own knocked-down furniture from the warehouse-style shelves, wheel them through the checkout section, load them into your car and drive home, wondering during the entire trip whether you are going to be able to manage to put them all together.

The genius of Ingvar Kamprad,¹⁸ founder of IKEA, was not that he could produce and sell well-designed furniture. It was that he could produce well-designed furniture at such a low price that almost everyone could afford to buy it. He did this by turning over the responsibility of assembling the product to the buyer and by keeping all other costs as low as possible. This meant sourcing materials and labor in low-cost countries. It also meant keeping capital and operating costs to a minimum. The company could have hundreds of more stores in many more countries, but IKEA has always been careful with how they spend their capital, and before they build a store they try to be sure that the people who will be served will appreciate the model. Store are run with the absolute minimum number of staff.

Thus far, IKEA stores are big boxes that sit alone, surrounded by parking, or are an anchor in a shopping mall at the edge of a city where land is inexpensive. They are traffic congestion magnets, but if you are a city lucky enough to have been chosen by IKEA to receive the gift of a store, you don't complain.

What would Ingvar think about autonomous rooms?

Kamprad drove a 1993 Volvo 240 until his death. He reportedly often took the bus. It is highly doubtful that he would spend the money it would take to buy a car that drove itself. He said of himself: "I'm stingy and I'm proud of the reputation." He did not have a chauffeur and flew economy class. What is more important is whether he would have believed that driverless vehicles and autonomous rooms were good or bad for his business. He was above all a pragmatist. He said: "What is good for our customers is also in the long run good for us."

IKEA has a group called Concept Innovation that is looking at what might be good for customers in the future. It commissioned its own future living lab called SPACE10 to study the impact of autonomous vehicles. The project, called Spaces on Wheels, has tried to imagine what automobile interiors may look like when they don't have drivers. "We don't have ambitions of manufacturing cars," says IKEA's Göran Nilsson, Concept Innovation Manager. "But in a future where people no longer have to worry about driving, vehicle interiors can expand to a point where we no longer are designing cars, but rather small spaces. Then it's suddenly an area where we have a lot of experience in." The designs for different spaces on wheels was the result of their study.

What I don't find is a complement to the design sketches that describes how rooms on wheels fit with IKEA's business model. Kamprad didn't invent immersion shopping (that was John Wanamaker), but he adopted it as the key to his business model. If people were going to buy his knocked-down furniture, they were going to have to see what it would look like when the last turn of the hex key was made. The low-priced Swedish meat balls with *lingon* were an advance reward for the work to come. IKEA could have entered the competition for furnishing moving rooms years ago, for example, by fitting out bookmobiles, like the one to the right, or the campers and caravans so popular in Sweden. There is nothing special about the designs because there is no driver, and they would certainly not be approved as road worthy if they were in use while moving.

The major challenge IKEA is facing is how it will get its products delivered when its customers are not driving their own cars to its stores and providing their own pick-up and delivery service. This is what should be keeping the three Kamprad brothers awake at night and the SPACE10 team fully occupied. That's probably what Ingvar is thinking right now. Below are additional SPACE10 concepts for rooms on wheels



Office on Wheels



Hotel on Wheels



Health Care on Wheels



Café on Wheels



Library on Wheels, the bookmobile, is not one of SPACE10's designs, but one that most of us have experienced.

Musings of a Dispatcher: Pollyanna Predictions

Pollyanna is the name of the principal character in a book written for children titled Pollyanna by Eleanor H. Porter and published in 1913. Pollyanna, a young orphan, had a very optimistic outlook on everything. The name has become a term for a person characterized by 'irrepressible optimism and a tendency to find good in everything, often in the case of even the most adverse or discouraging circumstances', according to its definition by Merriam-Webster. There is also a peiorative definition of the adjective 'Pollyannaish', meaning optimistic to the point of of naïveté or refusing to accept the facts of an unfortunate situation.

19. Click on the URL below and scroll down to MATRIX COMPILA-TIONS. http://www.michaellsena.com/ar-

ticles/

My CONSULTING FOCUS during the past thirty-five years has been on process and methods. Usually, I have been brought in because there is a sense that the way things are working can be improved, and I begin with an analysis of current methods and recommendations on where improvements could be made. This may—and normally does-cause some level of discomfort among both management and staff because making changes can be painful. What I have observed about the companies that work on forecasting and financial strategy is that they understand and live by a simple rule: Company executives and investors buy newspapers and hire process consultants if they want bad news, but buy forecast reports if they want to hear good news about how much money they are going to make. The more money they believe they can make, the more they are prepared to pay for the forecast.

I have a personal anecdote to illustrate the market forecast phenomenon. During a period of four years, between 1988 and 1992, when I was working mostly with digital cartography and navigable maps, I wrote a quarterly newsletter called MATRIX COMPILATIONS. Some readers of THE DIS-**PATCHER** received this fourteen-to-sixteen pager in the mail. I licked the stamps, stuffed the newsletter into the legal-sized envelopes and placed them carefully in the mailbox myself. Like THE DISPATCHER, it included a combination of technology and business topics related to the changing nature of how maps were produced and used.¹⁹ For the September 1990 issue, in the section called Projections, I prepared an estimate of the current total global sales of printed maps. I did this in order to give the suppliers of equipment and software for map production some idea of what the potential was for their own future sales.

My phone (this was before the Internet and mobile phones) started ringing off the hook several days after I mailed the issue. That never happened before. Everyone wanted to know if I could refine my numbers to match their specific product or service. Could I project the numbers out to 2000 or beyond? I even had companies calling that were in the market forecasting business asking me if they could package and sell my analysis and use it as the basis to make projections. I remember thinking about this as a possible inflection point in my consulting business, of moving out of the realm of designing processes that should produce better quality and economic results to predicting where people should invest their money. <u>At the time, I could not see how I could make uncertainty</u> <u>certain</u>. It was one thing for me to make an estimate of what the current state of affairs was, but quite another to tell people that this is what the market would look like in ten or more years.

Can we really see the end of history?

My hesitancy at becoming a market projection guru resulted from a gut feeling that there are just too many things that can happen between when a projection is made and when its time window closes. I had read an essay a year earlier that had a definite effect on my thinking about soothsaying. It was The End of History? by Francis Fukuyama.²⁰ The question mark turned the title into a question: "Is the world seeing the universalization of Western liberal democracy as the final form of human government?" In his essay, he argued that the answer was yes. He wrote his essay just before the fall of the Berlin Wall and two years before the Soviet Union collapsed. He predicted that it was only a matter of time before the Soviet Marxist/Leninist system imploded. China had already cast off the Marxist/Leninist mantle and was in the midst of reform that had begun in 1978 with the Chinese Communist Party decollectivizing agriculture and moving to a consumer-friendly one-party country. The last world war had put the final nails in the coffin of the national socialist form of totalitarianism, he argued. Everything was falling into place, said Fukuyama. I bought into his prophecy. Totally. It described a world in which I definitely wanted to live.

What a difference a year can make. In August 1990, the United States and its allies began Desert Shield, a massive military action to remove Iraq from Kuwait, which Iraq had invaded. A major recession became a formal fact. And a hole in the Ozone Layer that scientists had discovered was finally made public. Were these just blips on the radar screen of our space ship heading toward the inevitability of Western liberal democracy, or were they actually cracks in the water tight theory given form by Fukuyama? Two years later, a liberal Democrat entered the White House, the new Russian Federation had its first President, and the war in Bosnia was still at an early stage. Things were looking up again.

Don't worry, be happy and buy my prophecy

I truly wanted to believe in the New Economy that we were told had emerged by the middle of the 1990s, but my doubts that we had seen the end of history persisted. Everyone seemed to be convinced that gravity did not apply to the stock market any longer, that any idea related to the Internet was destined to make the ideator into 20. This essay is not a short read, but it is worth the time spent reading it. <u>http://www.wesjones.com/eoh.ht</u> <u>m</u>

Fukuyama does not take credit for coming up with the notion that a particular event or set of events signals a point when the world will stop changing, that it has reached a perfect stage in its development. That distinction, he says, goes to Georg Wilhelm Friedrich Hegel, a German philosopher and leading figure of German Idealism. Hegel viewed Napoleon's victory against the Prussian troops at Jena on October 14, 1806 as confirmation that the ideals of the French Revolution would now be completed. a zillionaire. A one-page business plan was all it took. Google and Amazon had been founded. A book appeared in 1999 that could win the title for The Most Pollyannaish Prediction of the Century: Dow 100,000: Fact or Fiction, by Charles W. Kadlec. I did not read the book, but it seems that the author looked at the Dow Jones Industrial Average at the time, which was at around 11,000, multiplied it by the rate it had increased during the previous ten years, which was a little more than three, then simply multiplied the current value by nine to get to around 100,000 in 30 years. There were few arguments with his arithmetic at the time—everything seemed possible in 1999—but his book was taken less than seriously because it was mainly an advertisement for his investment firm. We have fifteen months to go before Kadlec is proved right or wrong, but the unlikelihood of the Dow reaching 100,000 from its current position of 26,000+ has not hurt his career.²¹ It seems that no one really cares if bad predictions are made as long as they are far enough into the future to not matter.

A few big cracks started appearing about the same time as the ink was drying on the first copies of Kadlec's book, including the bursting of the dot.com bubble. Then came September 11th, 2001, the invasion of Iraq (again), and the Great Recession that began in 2008. At the same time Russia started its political backsliding and China had firmly established its position as a new and powerful player on the world's economic and political stage after its entry into the World Trade Organization in 2001. Climate change had become one of the most heatedly debated subjects. Most worrying was the rise of religious fanaticism and global terrorism and its impact on the world order. Mass migration had not yet begun.

Did the rosy pictures of a 'universalization of Western liberal democracy' end, and were the predictions of endless consumerism modified to match what was actually happening in the world. Hardly. The Bains, Boston Consulting Groups, McKinseys, Garnters, Frost&Sullivans and many more kept up their steady stream of positive prognostications. BCG wrote in 2015 that by 2025 the autonomous car market would be worth \$42 billion. Two years later it had revised that figure down to between \$22 and \$26 billion. In 2017 the same firm wrote that by 2030, 25% of all passenger miles in the U.S would be in shared, electric vehicles. What could they possibly know that would lead them to make such predictions! They say they interviewed several thousand consumers "in the eight automotive markets about the features they want most" in order to come up with their razor sharp estimates.

What they don't say anything about is how world events may affect how all these consumers feel in fifteen or twenty years. Car sales



"A bullish perspective on future markets predicts a decade or more of spectacular prosperity and growth, with the Dow headed for 30,000 and a continual spread of freedom and creativity around the alobe."

From the Foreword

21. Charles Walter Kadlec is a Managing Director, Director, and Member of Management Committee at J. & W. Seligman Co. Incorporated. He is the President and Director at Seligman Advisors, Inc. Mr. Kadlec is also the President and Director at Seligman Services, Inc. He is responsible for managing the Seligman Time Horizon Funds and the Harvester Fund. Mr. Kadlec has 30 years of industry experience. dropped in the U.S. by almost 50% in the Great Recession. In 2017, when the forecasters were writing about autonomous, shared and electric vehicles there was a person in the White House who could make any crystal ball turn cloudy, and yet the predictors are dead certain they have seen 2030 and can tell those of us who have not what it will be like. "Just buy my report."

Don't look for answers where answers can't be found²²

My principal learning from re-reading Francis Fukuyama's essay is that what we do is a result of what we believe, and what we believe is based on the collective understanding of those with whom we live. Together, the group to which we are associated develops a consensus about how the group should function to ensure its continued existence. This is neither written in the stars nor in our genes and it is different for different groups of people and changes over time. To highlight this theory, Fukuyama refers to Max Weber's book, The <u>Protestant Ethic and the Spirit of Capitalism</u>, and how the alteration of belief from one form of Christianity to another transformed the Protestants "from people who like to sleep well to people who liked to eat well."

To put this in more familiar terms, if a horse-drawn coach maker had bought a report on the future of horse-drawn carriages from a professional forecaster in the late 19th century, it might have said that by 1930 the horse-drawn carriage market would triple in size, and the fledgling automobile sector would manage to sell a few units to the idle rich. The forecaster would have made this projection based on how many horse-drawn carriages there were at the time, how many there had been thirty years before, the rate of population and income growth as well as the answers he got from people he interviewed.

Question: "Do you think you will be riding in a horse-drawn carriage in thirty years or driving your own automobile?"

Answer: "What's an automobile?"23

Whether people in Gothenburg, Guangzhou or Glendale will buy cars that drive themselves in 2030 is an unknown in large part because we don't know what the world will be like in 2030. But you can make some good guesses about how people in different places will react to new ideas if you spend time with them and open your eyes and all the rest of your senses. Does it have a good collective transport system or none at all? Is it high or low density? Are cities connected by good roads, rail and air service or not? Your guess about the possible success of your idea will be better than a researcher at Bain or any of the other forecasting companies, and there is no reason to waste money making their bosses any richer than they already are by buying their puerile predictions.²⁴ 22. A line from a verse in a 1985 song by Bob Dylan, *Trust Yourself*.

23. Steve Jobs bet the Apple orchard that a lot of people would pay money to have the Internet on a mobile phone. He introduced his iPhone in 2007, just about the time that the world's economy was going to hell in a handbasket. His bet paid off, but it would have failed if he just built the phone without having all the services that went along with it. Everyone at the time was placing their bets on Nokia and Sony because they were the market leaders. They were the horsedrawn carriage makers and Apple was the outsider. Jobs had his company build a tool that he himself wanted and believed that many others wanted as well, and he didn't base make his bet using a forecast of how many people would buy the tool. How would they possibly know? Apple's share price just prior to the introduction of the iPhone in January 2007 was \$10.85 and its market cap was \$70 billion. In September 2018, the share price was \$220 and the company was valued at over \$1 trillion.

^{24. &}quot;You don't need a weatherman to know which way the wind blows."

A line from another one of Bob Dylan's songs, **Subterranean Homesick Blues**

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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