The State of Automotive: Digital Trends Disrupting the Industry

The automotive industry has arrived at a major inflection point, signaling a period of intense change and the evolution of the entire industry. What has been traditionally thought of as “automotive” will, over the next few years, come to be known more broadly as the “mobility industry”—the next generation of products and services enabling the transportation of people and goods. These products and services include traditional products such as cars, trucks, buses, trains, airplanes, and ships, for example, combined with new technologies in material and digital sciences, and business models such as ride-sharing and shared ownership.

Four subsets of innovation combining to drive the industry's transformation to mobility:

- Connected cars
- Autonomous vehicles
- Rides shares
- Electrification

Each of these factors is disruptive enough on its own and would require adjustments of business models, but when taken together they add up to an outright transformation of the industry. This transformation represents significant opportunity, not just for original equipment manufacturers (OEMs) and savvy Tier 1 and Tier 2 players within the industry, but also new, non-traditional players emerging from the technology space. We anticipate that there is considerable revenue to be found in the automotive/mobility industry in the next five to 10 years—an increase of up to 30% of the existing revenue pool, or $1.5 trillion USD[1] , by one prominent estimate.

However, the transformations coming for this industry are so broadly disruptive that companies in the automotive value chain that do not move fast enough will find themselves permanently behind and unable to compete. This could potentially upset the landscape, players, and power dynamics within the industry.

In short, the transition to the "mobility" industry is fundamentally changing how the automotive industry operates, thinks, and is perceived. This change is part evolution and part revolution, and those companies failing to adapt may find themselves obsolete also-rans by the end of the next decade.

The savvy players within this industry will ride this transformation to compelling success, while those that move too slowly or fail to adapt may not survive to see the next era.

1 McKinsey, Automotive Revolution – Perspective towards 2030, Advanced Industries - Jan. 2016

A look back at automotive sales

After six years of consecutive increases, 2015 was a record year in the automotive industry, with some 17.5 million vehicles manufactured in North America. 2016 started with predictions for an even bigger year in automotive sales. Preliminary 2016 totals are projected at 17.55 million (IHS.com projection). This will be an historical record for automotive production. IHS further projects 2017 to be approximately 17.1 million units. This downturn is thought to be part of a trend—production numbers will bounce up and down over the next few years—primarily due to large number of leases returning, combined with longer loan terms for consumers, and the large amount of inventory going into 2017.

Some analysts feel production volumes have peaked and will be flat for years to come. Perhaps due to greater engine efficiencies and the relatively low cost of oil (and thus gasoline), the light/utility truck categories in particular did very well across the world in 2016. As the year ended, 15 plants were running overtime in late December (NA), with only two of those being non-truck plants.

Looking purely at the traditional aspects of the industry and how they exist in 2016, it is clear that individual segments will continue to be driven by consumer behavior. For example, for the immediate future low fuel prices will continue to drive the SUV/small truck segments to profitability, as consumers choose the convenience (or, in some cases, necessity) of size over gas mileage and efficiency.

For the first time in well over half a century, the automotive/transportation industry is deep in the process of redefining itself and it's purpose.

U.S. auto sales fell in August 2018 as truck-fueled advances by many automakers couldn't make up for plunging demand for passenger cars and an estimated double-digit drop at General Motors. The seasonally adjusted, annualized rate of sales for August came in at 16.69 million, the lowest in a year, signaling an expected second-half slowdown in the market is underway[2].

Hybrids—especially luxury hybrids—should see continued and consistent growth as the hybrid accelerates its move from niche interest to proven technology in which users now expect not only the hybrid engine but up-leveled accouterments and upgrades they have previously demanded only in vehicles in more traditional segments. For many consumers, a hybrid engine is no longer sufficient as the only motive to buy. They are looking for differentiating factors, and the industry has begun to deliver these differentiated vehicles.

But above sales and new vehicle production, the story of the year was being written at a much higher level. In the future, as historians assess the automotive industry in the 2000s, 2016 may well be seen to represent a turning point, a tectonic shift in the industry's development.

In 2016, there was a palpable shift among both industry insiders and outside observers toward describing automotive/transportation industry segments and players as the new 'mobility' industry. The mobility industry, redefined, involves thinking more broadly about how consumers will engage the automobile or vehicle.

The mobility industry is emerging as the next generation of products and services enabling the transportation of people and goods. These products and services include traditional products such as cars, trucks, buses, trains, airplanes, and ships, for example, combined with new technologies in material and digital sciences, and business models such as ride-sharing and shared ownership.

2 https://autoweek.com/article/car-news/new-car-sales-august-2018-winners-and-losers

This shift to becoming the mobility industry may potentially result in something unseen in nearly 75 years—the emergence of truly disruptive OEMs in the industry. For nearly three quarters of a century, the basic OEM players within this industry have largely remained constant and similar. Some players (Studebaker, AMC, Packard) have disappeared or been acquired and phased out, while others (the Japanese and Korean makers) have emerged during this time—but none have had truly disruptive business models.

The OEMs that have emerged over the past 75 years into significant players have offered slightly differentiated versions of the same basic product offered by other, more established manufacturers.

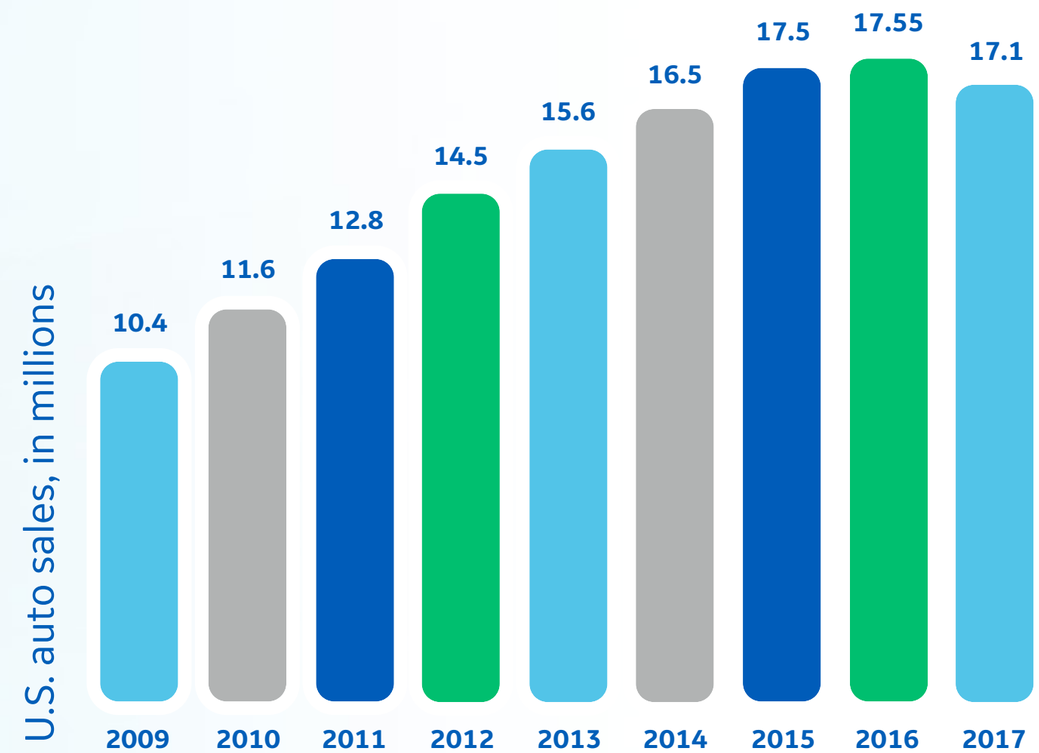
But in this period that, over time, will be seen to have started around 2016, new players are emerging whose products and business models may be fundamentally different, and will require existing players to either vastly adjust their own models, or partner with these emerging OEMs in order to remain competitive. Tesla is the most obvious example for the moment—they are deeper into production, and have a truly disruptive direct-to-consumer sales model that should serve as an urgent wake-up call to the dealer community.

Other players are making significant strides as well. In November, Chinese-backed startup announced plans for a $700 million factory in Casa Grande, Arizona, south of Phoenix—and followed up in December by unveiling the design for its electric vehicle, the Air. All the while, traditional OEMs continue to launch new EV products such as Jaguar's I-Pace, Porsche's Mission E, Mercedes-Benz' Generation EQ, and Audi's e-tron. Even players from non-traditional spaces, from Apple to Google to Uber, may significantly impact the mobility industry, either as OEMs, or as critical Tier 1 suppliers whose products and services are indispensable elements of a winning OEM strategy.

Four distinct and readily observable trends are driving the shift from automotive to mobility:

- Connected cars
- Autonomous vehicles
- Ride shares
- Electrification

These dynamics have been at play for some time, but each has reached an inflection point of some level, moving from the industry's distant future to its immediate future. Taken together, these areas are driving the shift in the industry's definition—and not only did they set for tone for last year, they will continue to even more prominently set the industry's direction in the near-term future.



Connected cars

As connectivity evolves, it is beginning to focus on the in-car passenger experience and not just the experience of the driver. With everything from infotainment to paying for parking through the car, there is now 100 million lines of code in each vehicle. It is expected that, by 2020, more than 90% of cars sold will be connected[3].

Most consumers are aware of OnStar, even non-General Motors customers. OnStar is a wildly popular 'help' button in most General Motors vehicles that can provide anything from emergency services to directions. Ford drivers are familiar with Sync and MyFord Touch, which link users' apps accounts to their vehicle. FCA offers a similar service with UConnect, BMW offers ConnectedDrive, and other major OEMs have similar competing services or features that have familiarized consumers with the basic capabilities of connectivity. This is because consumers now expect a connected experience in all aspects of life, including their cars. Where design and product quality were the differentiators of the past, today it's all about the experience.

OEMs have continued to think seriously about matching consumer behavior with automotive services, such as knowing when a driver's vehicle needs gas and automatically recommending a service station that meets the driver's preferences—even identifies a station that features a car wash, is co-located with a restaurant, or is next door to a coffee shop. This increased integration of consumer preferences and behaviors into in-vehicle services has driven noticeable growth in the connectivity space—and affects manufacturing because OEMs need to invest more in research and development, meaning they will need to offset this and save margins in manufacturing by reducing cycle times and waste.

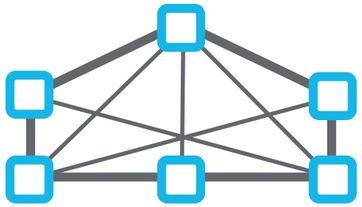
The connected car movement offers the automotive industry significant opportunity for revenue growth. World Economic Forum predicts by 2025, advancements in infotainment alone will add $65 billion of operating profits to the overall industry value chain. This will be the result of infotainment hardware unit sales ($41 billion) growing at a compound annual growth rate of 4% from 2016 to 2025. OEM-driven applications and services are expected to contribute $14 billion in value creation as connected head units grow from approximately 23% of the market in 2016 to roughly 70% of the market in 2025[4] .

3 Source: Accenture research deck "The digital transformation of the automotive sector: From manufacturers to providers of mobility"

4 https://www.accenture.com/t20170116T084448__w__/us-en/_acnmedia/Accenture/Conversion-Assets/WEF/PDF/Accenture-Automotive-Industry.pdf

According to a new report, shipments of connected vehicles are expected to increase over the next several years.

Counterpoint Research's report forecasts a growth of 270 percent by 2022 to represent more than 125 million connected vehicles to be shipped.



Due to newer regulations, all vehicles sold in Europe after April 2018 must be fitted with 'eCall' technology which automatically dials the 112 emergency number in the case of a serious accident. This will force all new cars sold in Europe to have at least a connected feature[5].

Biometrics security systems were debuted with retina scanning technology that scans the eye to identify individuals.

The connected movement is bringing new partnerships to the forefront. For example, Cisco announced a partnership with Hyundai focused on bringing gigabit-speed ethernet connectivity to smart cars, thus enabling faster-than-ever over the air updates and setting the foundation for better self-driving technology and connectedness.

Cisco estimates its technology will save automakers $35B over four years by eliminating the need for many routine dealership trips. It could also boost the development of autonomous technology, given the amount of information self-driving cars need and send for analysis every second they are monitoring the road. Hyundai[6] reports that the Cisco technology will be integrated in production vehicles in 2019.

Further, The Consumer Electronics Show has become a premier platform for unveiling advancements in connected vehicles. At a recent show, Toyota shared its self-driving Concept intended to make an emotional connection with its occupants. Through an artificial intelligence agent named Yui, it talks to occupants about various landmarks, restaurants, and activities such as biking and hiking. Biometrics security systems were debuted with retina scanning technology that scans the eye to identify individuals. This means added security, as in the car won't start if you're not an authorized driver, and it also opens opportunity for personalization such as adjusting the seats, mirrors, steering wheel, or loading your Spotify account.

There is one final aspect to these kinds of connectivity services that will have a consequential impact on all of the industry's players—the importance of data and the role it will play in connectivity. Unquestionably, the personalization of the in-vehicle experience—as well as the development of the kind of technology necessary to make autonomous vehicles practical as a mass solution—will generate, by some estimates, up to two petabytes of data per vehicle per year. At sales volumes between even 15 million and 17 million in the United States alone, the mobility industry could be generating up to 30 zettabytes of data annually within the next few years.

Seamlessly managing all this data is the ground level of digital transformation in the mobility industry. Connectivity to digital data will rule the driver engagement segment. OEMs are developing the platforms for the inevitable availability of ubiquitous internet connectivity, which will drive the availability and use of all types of data, and services providing this data. Tier 1 suppliers, too, are working to add the capability to provide these platforms and/or services.

5 https://www.iottechnews.com/news/2018/apr/03/report-more-125m-connected-vehicles-2022/

6 https://www.cbinsights.com/research/autonomous-driverless-vehicles-corporations-list/

Autonomous vehicles

While years prior marked the beginning of exciting progress and developments around autonomous vehicles, today, automotive companies are beginning to focus the majority of their research and development spend on preparing for autonomous and electrification trends.

Today, it seems inevitable that the autonomous vehicle is going to become mainstream. Elon Musk has predicted the autonomous vehicle (AV) is "just going to become normal. Like an elevator. They used to have elevator operators, and then we developed some simple circuitry to have elevators just come to the floor that you're at, you just press the button. Nobody needs to operate the elevator. The car is just going to be like that."

With each model year, the industry sees new driver-assist functions become options or standard features. And, this is no longer limited to just premium models. This trend is helping to move the driving public from their current comfort zone of being in control and driving the vehicle to a new reality where humans will participate in the process of being transported, but the actual transportation will be fully automated.

Levels of autonomous driving[7]

- **Level 0 -** Automated system has no vehicle control, but may issue warnings.
- **Level 1 -** Driver must be ready to take control at any time. Automated system may include features such as Adaptive Cruise Control (ACC), Parking Assistance with automated steering, and Lane Keeping Assistance (LKA) Type II in any combination.
- **Level 2 -** The driver is obliged to detect objects and events and respond if the automated system fails to respond properly. The automated system executes accelerating, braking, and steering. The automated system can deactivate immediately upon takeover by the driver.
- **Level 3 -** Within known, limited environments (such as freeways), the driver can safely turn their attention away from driving tasks.
- **Level 4 -** The automated system can control the vehicle in all but a few environments such as severe weather. The driver must enable the automated system only when it is safe to do so. When enabled, driver attention is not required.
- **Level 5 –** Other than setting the destination and starting the system, no human intervention is required. The automatic system can drive.

7 Wayback Machine, September 2017. Archived from the original on 3 September 2017.

In self-driving vehicles, because there is no driver, the experience is all about the passenger. However, on some level, people will always want to drive, but not in the context of 2.5 hour commute or urban congestion. They will want to drive on weekends and for fun. And so, automotive manufacturers need to consider an experience in self-driving cars that also allows a place for the driver and provide them a good experience.

The possibility of cars driving themselves is becoming a reality thanks to collaboration between several advanced technologies, such as millimeter-wave radars, cameras, ultrasonic sensors, lidar scanners, GPS technology, vehicle-to-vehicle and vehicle-to-infrastructure connectivity, and proprietary algorithms. But, with it, comes risk. Any technology connected to the Internet has a higher threat to cyber security. This is all new territory for automotive manufacturers, and it is driving partnerships between Silicon Valley and the automotive world in unprecedented ways.

This cooperation and partnership between OEMs and technology leaders is a key dynamic going forward—though this is perhaps a more jarring realization for the new, technology-based players than the traditional industry. The OEMs have long integrated technology into vehicles, going back decades. Partnering with technology companies is an extension of a mindset, if not the actual model, that's been prevalent in the industry for a generation.

The challenge for technology companies is that, while they are well ahead of the OEMs in terms of developing the technology to make AV work, they lack the manufacturing and supply chain capabilities and infrastructures to effectively dominate the AV market. Thus, we anticipate more collaboration, such as that of Nvidia, a company well-known for their work in making computer graphics cards, who has teamed up with Bosch and Daimler in the race to develop autonomous automobile technology.

To further bolster the race to AV, consumer acceptance of fully autonomous vehicles is on the rise. In the United States, 47 percent of consumers feel autonomous vehicles will not be safe, compared to 74 percent in 2017[8].

It's clear that everyone is betting on an unprecedented payoff from autonomous vehicles. In 2018, BMW opened their second autonomous driving campus to work on self-driving pilot projects, this one near Munich, Germany. Yet, an important element to the long-term success and proliferation of autonomous vehicles—similar to electric vehicles—is the willingness and commitment by municipalities and governments to invest in the underlying infrastructure needed to support AV at large scale, such as AV lanes, off-ramps, AV-specific parking scenarios, and so on.

8 https://www2.deloitte.com/us/en/pages/manufacturing/articles/automotive-trends-millennials-consumer-study.html

Ride shares

Driven by the success of ride-sharing, Uber, Lyft, and other new business models—the very nature of what we consider "mobility" is shifting the definition of consumer engagement with the automobile or vehicle.

The signs of this shift are readily apparent. Lyft generated more than $1 billion USD in net revenue in 2017 as it took advantage of the flailing of its rival Uber and is still on a roll. New mobility models, such as pay-per-use models such as car sharing, carpooling, "e-hailing" taxi alternatives, and peer-to-peer car rentals are attracting investments and seeing impressive growth rates. Meanwhile, automotive manufacturers have heard the call and are entering this space with partnerships and investment in some of these new business models.

For example, Volkswagen announced that they've chosen the convergence of two of the trends we've reported on within this report, ride sharing and electric, in an effort to create a competitive offer. They are launching an all-electric ride-sharing service called WE in Germany next year. It will be in direct competition with Uber and Lyft, and they have plans to extend it to major cities in Europe, North America and Asia as early as 2020.

The Volkswagen Brand Board Member for Sales, Jürgen Stackmann, said at their launch event in Berlin, "We are convinced that the car sharing market still has potential. That is why we are entering this market with a holistic single-source concept covering all mobility needs from the short journey that takes just a few minutes to the long vacation trip. Our vehicle-on-demand fleets will consist entirely of electric cars, and will therefore provide zero-emission, sustainable mobility. That is an intelligent way to relieve the strain on urban areas."

In addition, BWM Group's ReachNow app now combines car sharing and ride hailing using a single shared fleet of cars. The service is live in Seattle, WA and there are plans to expand into other U.S. cities.

Not to be outdone, General Motors has launched a new peer-to-peer car rental service in Chicago, Detroit and Ann Arbor, Mich. that will let owners rent out their personal GM-branded vehicles through its Maven car-sharing platform.

Ridesharing, for example, is seen by many observers as a win-win-win for the players involved:

- OEMs will benefit from stronger fleet sales as their models are adjusted for new behaviors and usage patterns
- Cities will benefit from decreased traffic and congestion
- Environment will benefit from decreased emissions as the number of vehicles owned and driven by individuals decreases

How autonomous vehicles are influencing ride sharing

However, it is important to note that, in anticipation of changing consumer expectations about how they will engage with vehicles, most of the major OEMs are beginning to consider how ride sharing trends will impact their forthcoming development and design. This will result in some changes in both the physical development of vehicles and the software built to be inside them. For example, what would be the differences needed in a vehicle that is shared, rather than privately owned?

The mainstreaming of autonomous vehicles would really change the game for the ride sharing trends. Car sharing is rarely economically viable in cities with fewer 500,00 people. Self-driving cars would enable fleet owners to easily move around their inventory of vehicles, maximizing coverage with smaller fleets and, thus reducing the fixed cost base. And, vehicles with self-parking capabilities could help reduce inner-city congestion by self-parking in less busy areas.

Eliminating the cost of the driver is another benefit potentially offered by autonomous vehicles that would affect the ride sharing market. McKinsey estimates that 45% of the costs of operating an e-hailing vehicle relate to the driver; meaning taking the driver out the equation offers early adopters a huge competitive advantage over competitors that do not adopt an autonomous fleet[9].

There is still much that is to be seen in the world of ride sharing. These shared-mobility business models could be additionally disrupted if cities decide to regulate self-driving taxis in a similar fashion to how they regulate public transportation. Time will tell and, certainly, consumer response will continue to show us the way.

9 https://www.mckinsey.com/industries/automotive-and-assembly/our-insights/how-shared-mobility-will-change-the-automotive-industry

Electrification

While there is significant hype around the electric vehicle (EV) segment, the near term should prove more excitement than ever around EV. Electric vehicles have been improving steadily for the past few years. And recently, we've seen significant movement toward the mainstreaming of EVs, with improved battery technology, evolving emissions standards, and the consumers demanding cleaner vehicles and better clean technology. Europe has been leading the way on EV adoption, but the recent legislation around emissions in North America is expect to prompt them to catch up.

The signals are all there. We've seen recent announcements from General Motors CEO Barra indicating that GM will create a prototype vehicle capable of a 180-mile range with less than 10 minutes of charging and will have 20 EVs models by 2023[10], Volvo plans for 50% of sales to be 'fully electric' by 2025, Ford Motor Co. is making a serious push into electrified vehicles, committing to spend $11 billion on EV research and development, beginning with a Mustang-inspired crossover EV due in 2020 and an estimated 40 hybrids and EVs on the market by 2022. And, Tesla continuing to post big growth numbers, and new OEMs charging forward with their own electric portfolios, many believe EV traction can't be slowed.

Even with these positives to look at, however, enthusiasts and observers might do well to slightly temper this optimism. The strength of the EV market for the next couple of years remains to be seen; there are significant challenges in moving from a small, niche segment of the market, as EVs are today, to a full-on industry or market takeover, especially in light of the continued low cost of oil globally. Historically, when the price of driving a traditional combustion engine vehicle is not prohibitively high or doesn't approach levels where drivers feel a pinch, EV sales lag a bit slower than expectations. Should the per-barrel price of oil remain low, we might expect a shallower adoption curve for EVs regardless of the extent to which the technology behind them matures.

In Q2, 2018 EV sales up 77% YoY. Tesla moves to be number 1 globally and the US electric car market share hit record numbers[11].

This said, we expect that EVs will continue to drive new demand in the market; we do forecast steady growth in the EV segment and do not foresee any interruption in the advancement and maturity of the technologies that make EVs increasingly practical options. Most OEMs and Tier 1s have started their R&D on E-drive technology. As the most expensive system in a vehicle, the drive-train will be one of the components with the most change and impact on vehicle cost—and these changes and price fluctuations must be effectively managed if EVs are to succeed as a mass-market segment.

Battery range has traditionally been one of the biggest obstacles to broad market adoption of, or consumer comfort with, electric vehicles. The industry is closer than ever to overcoming this obstacle. Battery technology is continuing to improve, and the auto industry is starting to give the market small EVs that have a range of in excess of 250 miles on one charge. For the market to see significant mass adoption, most analysts believe that the average range will need to improve to 300-400 miles on a single charge. For now, battery technology companies are years away from doubling the mileage of EVs.

And to further simplify charging, several manufacturers have been perfecting technology that allows you to simply park atop an inductive plate in your garage or at work. BMW and Mercedes-Benz have been working on an induction charging system and Audi's 2019 e-tron Quattro will offer inductive charging. All electric Volkswagens built on the modular electric platform will be able to fit an inductive-charging system, so we expect the technology should start to gain traction in the automotive realm by the end of the decade.

10 http://gmauthority.com/blog/2018/09/general-motors-ceo-barra-continues-emphasis-on-all-electric-future/#ixzz5SoBn6gsg

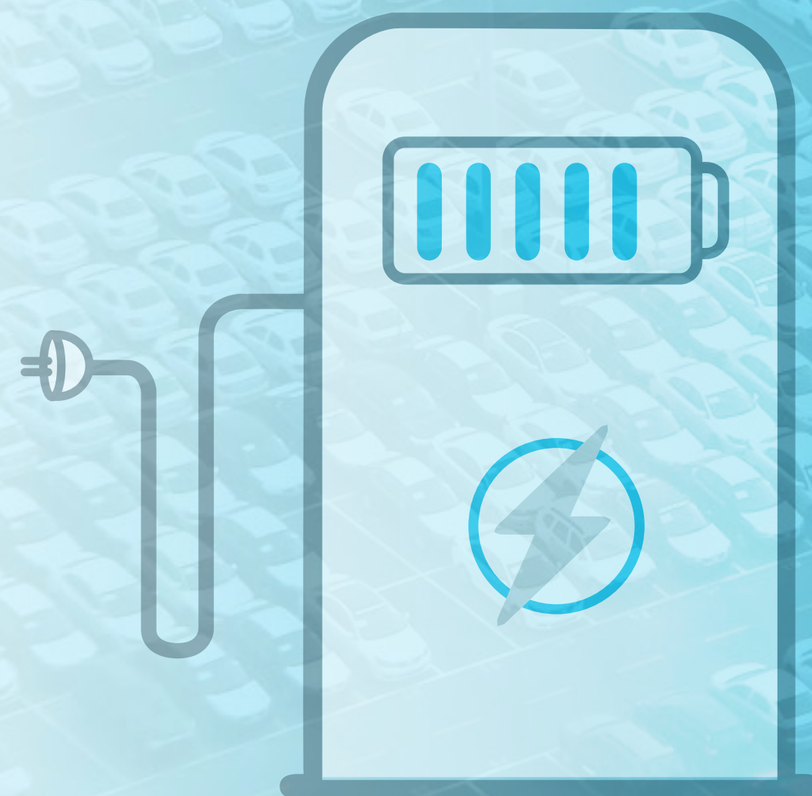
11 https://seekingalpha.com/article/4203609-ev-company-news-month-august-2018

This gives government leaders at every level, in partnership with the industry and potentially some NGOs, a brief window of opportunity to get out in front of addressing the need to build a sufficient and convenient infrastructure to support high numbers of electric vehicles on the road. This infrastructure must include everything from building mass charging stations capable of supporting dozens or even hundreds of vehicles at once, to developing the utility grid and power sourcing necessary to provide additional electricity to power millions of electric vehicles without inordinately taxing the rest of the power grid.

Without mass charging stations, most consumers are not truly comfortable in purchasing a full EV as opposed to a hybrid; the concern about going someplace and not being able to find a station to charge their vehicle enough to return safely home is enough to give many potentially interested consumers pause. And without the additional power generation capability to support high numbers of electric vehicles on the road, even a complete charging infrastructure may not be sufficiently supplied to support the increased demand. Addressing these infrastructure issues is critical to driving mass adoption of electric vehicles—and if the political and community leadership isn't there to ensure that infrastructure, EVs will not reach their full use potential.

The infrastructure challenge is not unique to EVs; hydrogen fuel cells are another promising technology that could move automotive further from fossil fuels, but they too have yet to reach mass adoption due to the lack of existing or proposed infrastructure, as much as or more than the need to beat the issues around immature technology issues. Ironically, the biggest obstacle to mass adoption of cleaner or "greener" mobility solutions may not be overcoming technology challenges but generating the political and municipal will to build the infrastructure to support mass adoption of these technologies.

The bottom line: without 300-400 miles per charge and mass infrastructure, EVs will continue to show steady growth.



Nearly all automakers are kickstarting major electric vehicle initiative in response to this automotive industry trend. Mercedes-Benz will offer 50 electric versions of all it's models by 2022. BMW will mass-produce electric cars by 2020 and make 12 different models by 2025. GM will add 20 new electric/fuel-cell vehicles to its products by 2023. Ford pledges to form a team to accelerate global electric vehicle development. Volkswagen will spend $82 billion on a multifaceted initiative to develop electric vehicles, mobility services, and autonomous driving by 2022. Toyota is spending $13 billion to introduce 10 (or possibly more) electric vehicles in the early 2020's[12].

However, the EV market isn't "there" just yet. Hybrids, rather than true EVs, remain a bigger growth opportunity in the short term. Range anxiety among consumers and the limitations of current technology serve to restrain the expansion of the EV market somewhat. Without improved long range battery/power capability, and absent the kind of mass infrastructure investment to support significantly more use of electric vehicles, pure EVs will continue to show slow growth.

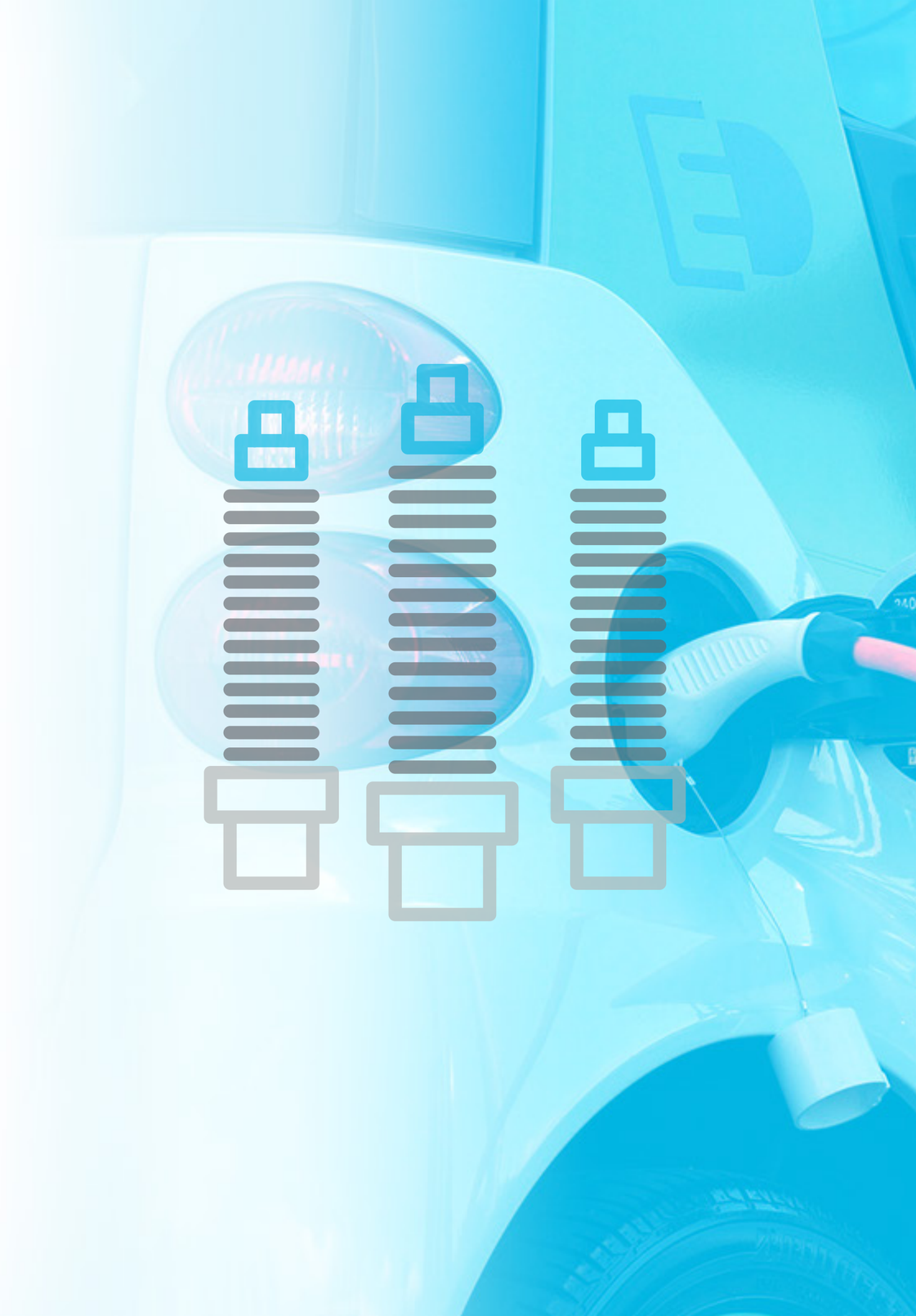
Battery and drivetrain technology will drive the electrification trend. For example, FCA's (Fiat-Chrysler Automobiles) hybrid Pacifica, built in Windsor, Ontario, uses a 16-kWh battery pack made by supplier LG Chem that is stored below the second-row seats. It also uses a dual-motor variable electric transmission, developed in-house, known as the eFlite. The battery and mini-van's innovative drivetrain give it an all-electric range of 33 miles and a full range of 566 miles.

For its part, Toyota says it will replace at least 60% of its lineup in major markets by the end of 2021 with more powerful and economical powertrains. Toshiyuki Mizushima, President of Toyota's Power Train division, says "We'd like to differentiate ourselves from others in terms of the value-added technology, further evolving the engine and transmission."

Suppliers will be critical in providing electrification. FCA's CEO Sergio Marchionne says "The single largest drawback to electrification to us as OEMs is that we're no longer in control of the components side; all batteries will be made by others. It's really a question of capacity and access to that capacity[13]." These dynamics are shaping a new supply chain model for an industry that has finely tuned its supplier relationships for over 100 years.

12 https://www.jazelauto.com/the-top-4-automotive-industry-trends-to-watch-in-2018/

13 http://www.autonews.com/article/20161226000100/OEM06/312269966



"What an amazingly awesome country. You guys rock!"

-Tesla's Elon

Which countries are leading the electrification effort? Norway has 100,000 EV's on the road today. That's 3% of its 5.2 million vehicles—far surpassing other western developed countries. They have achieved this by offering incentives for EV owners, through lower road and value added taxes, with no charges for EVs on toll roads and ferries, allowing EVs to park free in municipal lots, to use bus lanes, and for companies using EVs in their fleet to pay 50% less in company car taxes. Norway is targeting 400,000 EVs on the road by 2020 and has passed a ban on fossil fuel-powered cars by 2025 (prompting a tweet from Tesla's Elon Musk: "What an amazingly awesome country. You guys rock!")

With both national governments and private sector companies driving such significant shifts toward electrification and greener propulsion, we anticipate significant opportunity in the electrification space for both OEMs and Tier 1 and Tier 2 suppliers in the next five years—as well as significant risk for those companies in industry that do not move quickly enough to match the shifts in market expectations.

What's next?

With the heavy media attention and high levels of consumer fascination around autonomous vehicles and the connected car, the automotive/mobility industry will have a high profile as it tackles the issues surrounding data security and privacy. Leaders from other industries would do well to pay close attention to the solutions developed or applied by automotive/mobility in this area—and be prepared to "borrow" these solutions or adapt them for their own industries as the IIoT generates ever-increasing levels of data for their own companies and products to handle.

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Contact Information

Americas: 1-855-YOUR1GE (1-855-968-7143)
gedigital@ge.com

www.ge.com/digital

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