

HOW YOU GROW MATTERS POST COVID-19: AUTOMOTIVE

What should companies that innovate on products and services be doing to accelerate business recovery and prosperity?

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Introduction

The automotive market is being transformed. It is no longer just about going from point A to point B in comfort. Both OEMs and tier 1 and tier 2 suppliers are rallying around common themes including mobility-as-a-service, electrification, autonomous functions, and over-the-air software updates. COVID-19 has caused car sales to dive, and the demand uncertainty will be around for a while. However, as each country's economy restarts, the automotive industry will get back to its transformational challenges.

Carmakers will release model updates more frequently than the typical multi-year cycles that are standard today. And a more diversified ecosystem and changing demographics will mean software and services are now primary sources of differentiation. The competitive landscape in the auto industry for both OEMs and suppliers will get more complex as the dominant revenue model shifts from car sales to on-demand data services and software upgrades.

Every industry sector is affected by the pandemic, some positively, but most negatively. The pain and opportunities are not evenly distributed. Recent forecasts suggest the global auto industry will see a 2020 global revenue contract by 10% as unemployment spikes and incomes fall^[1]. Capgemini Engineering has identified four areas of business activity for how companies can accelerate business recovery:

1. The customer
2. Supply chain and operations
3. Product development and service innovation
4. Sustainability and planet centricity



The customer

Customer expectations for product and service experiences will be different than before the pandemic, so companies must continuously level-set on their customers' new realities.

Social and physical distancing restrictions will be part of our lives and will influence our behavior for the foreseeable future. Carmakers across Europe and North America have reopened assembly plants by implementing new processes with a focus on safety and cleanliness, from decontaminating the workplace and mandatory masks to tracking the health status of employees. They are also aligning with the way customers are thinking about private, shared, and public transportation. During the rebound, there are vital actions that will help accelerate the recovery.

What's changing?

Empathize with your customers

As people go back to work and economies start to come back to life, carmakers and transportation service providers need to anticipate the customer's new priorities that emphasize hygienic confidence. This has implications for the in-vehicle experience, new sales and marketing strategies, and new mobility service offerings. In the short-term, automakers will promote existing touchless experiences such as keyless entry and voice-based interactions inside the vehicle. Ridesharing companies will certainly

prioritize cleanliness and passenger safety. While vehicle sales are starting to recover thanks to deep discounts and special deals, there is good reason to believe that product design will evolve. Interior seating that is easy to keep clean could become a selling point. Also, bring your own entertainment might emerge as a customer preference as it is in trains and planes today. Until now, automotive companies – driven by a desire to integrate entertainment into the driver's HMI – have explored docking and mirroring solutions but have been hampered by the mismatch in the development cycles of new vehicle platforms and entertainment technologies. That may change in the post COVID-19 world.

At the same time, rideshare companies will need to offer passengers personal contact points and a clean and safe experience. One innovative example of rethinking a vehicle's interior design, including infotainment, is the Citroen Ami, a "non-conformist mobility object" that offers customizable interiors that are easy to keep clean and are replaceable^[2].

Disrupt business models to meet shifts in lifestyles

The decline in demand for new cars has had a significant impact on the financial health of automakers. As a result, they are rebalancing project investments and taking operational actions that are intended to maintain the economic health of the enterprise.

Still, they will need to up their game.

The fear of a second wave of infections could be a catalyst to incorporate new no-touch technologies into a broader range of in-vehicle experiences such as voice-activated commands for auto operation. While e-mobility plans may be delayed, differentiation can be found by recognizing that connectivity is an essential service in the new normal of virtual and remote work. It is also an opportunity for car dealerships and OEMs to offer virtual showrooms, home delivery, and negotiable pricing. These include virtual reality (VR) headsets that allow car shoppers to interact with the vehicles. Recently, Porsche announced the deployment of VR services in its showrooms around the world that let customers experience the company's first electric vehicle, the Taycan^[3].

COVID-19 has also given the public an appreciation for the causal relationship between transportation emissions and air pollution^[4]. This new awareness provides an opportunity for automakers to accelerate the development of electric vehicles and autonomous technologies for next-generation models. Both trends are crucial barometers for industrial leadership by automakers in China, the EU, and North America.

However, there is plenty of uncertainty. For example, even before COVID-19, consumer sentiment for autonomous driving and electrification was not keeping pace with automakers' vision^[5]. In China, passenger electric vehicle sales fell 58% in the first quarter of 2020^[6]. A recent survey of consumer sentiment about future mobility technology revealed that 60% said they knew nothing about electric cars^[7].



Tacking on the knock-off effects of COVID-19, it is inevitable that the swift uptake of electric vehicles and even more advanced driver assistance systems are somewhat of a guessing game.

On the flip side, the sticker price of EVs is coming down. More importantly, life cycle costs are significantly lower than internal-combustion vehicles because they are more efficient, require less maintenance, and the cost of electricity is more economical than gasoline^[8]. Comparing the total cost of ownership over three years between a Tesla Model 3 and Toyota Camry, the Model 3 was cheaper^[9].

Finally, we should always hold out the possibility of breakout ideas. In China, robots delivered food and medicine during the COVID-19 quarantine, and Cruise, a subsidiary of General Motors, is making deliveries for a pair of food banks in San Francisco^[10]. Refraction's robots deliver restaurant food to customers and are equipped with UV lights in the robot's storage unit and use no-touch technology^[11]. French autonomous vehicle maker Navya has been testing its autonomous electric buses in Florida and recently repurposed them to transport coronavirus test samples for the Mayo Clinic^[12].

Things to do

- Reassess the customer journey and workflows that have changed as a result of the crisis
- Futurecast assurance models that help customers get more comfortable with new and meaningful ways of engaging
- Revisit the role of a physical presence versus virtual presence and the way you interact with customers
- Accelerate the transformation from traditional combustion engines to electric power

Supply chain and operations

We won't snap back to the way we worked before. Many companies will reevaluate their global supply chains and streamline the way their people work together, virtually and more autonomously. They must monitor employee wellbeing as part of the new normal to ensure a safe and secure work environment.

At the top of the list of urgent actions for automakers and their suppliers in the new normal is bringing people back to work safely – in offices, factories, and facilities – while maintaining the option for virtual work without compromising employee security or increasing risk. Just as necessary is the need to ensure supply chains are resilient, meet customer delivery and service expectations, and minimize cost, complexity, and risk.

Solve for employee wellbeing

In both Europe and the US, auto plants are beginning to reopen with stringent safety and security standards in place. Volkswagen reopened plants in late April and has detailed over 100 workplace changes to keep workers safe^[13]. Other automakers around the world are following suit, including Ford, GM, and Fiat Chrysler in the US, all with a similarly long list of changes in workplace standards.

There are a variety of factors that must be formalized in order to bring employees back to work safely:

- Decide which workers to bring back and when, how many are required per shift, and which facilities to open first
- Introduce new safety equipment and standards such as masks, gloves, and hygiene protocols, as well as digital tools such as proximity sensors for physical distancing to minimize the threat of a resurgence of infections
- Launch robust contact tracing applications and workplace testing programs
- Upgrade facility management and human resource workflows
- Introduce symptom checkers, cough analysis and skin-tone analysis technology, and triage tools to detect and quarantine workers with early signs of infection
- Establish strict protocols for sharing employee health information and contact tracing with government agencies while protecting employee privacy right

Contact tracing applications and workplace testing programs ensure a swift and safe return to work, but privacy protection needs to be included in HR workflows. The same goes for symptom checkers and triage tools that detect early signs of COVID-19. Companies need to be transparent with their employees about how health information and contact tracing data is shared with government agencies and how they are protecting employee privacy.

Normalize to your upended supply chain

Automakers have experience shutting down and restarting production. The COVID-19 crisis puts a spotlight on the geographic-specific strategy that will be needed to recover as different countries will be reopening plants at different times based on local COVID-19 conditions. So, restarting the supply chain boils down to managing short-term allocation challenges until parts production ramps back up.

In the US, auto supply chains are global, so automakers are used to managing complex supply chains that rely heavily on suppliers in China and Southeast Asia. In Europe, the auto supply chain relies more on local and regional suppliers, many of which do not have the cash to weather a long period of low customer demand. When production stopped in early 2020, many of these suppliers suffered significant financial hardship^[14]. A key concern for OEMs is: which suppliers will survive, and how can we get them back to health or find an alternative source fast? Government support is one option.

The most immediate action automakers need to take is to conduct systematic risk assessments with suppliers to understand business viability and reduce supply chain disruption. The next step is to implement the

mitigation plan, so production aligns with the new demand patterns.

Also, automakers must take into account government regulations that impact business outcomes, such as the European Union's new decarbonization standard, Regulation (EU) 2019/631. Any company that sells into the EU is required to comply. The regulation sets out CO2 emissions targets that, if not met, will result in fines. Some clean air initiatives have already been delayed^[15].

Aligned with the new EU regulation is the development of electric vehicles. The pandemic has caused a delay in EV product development by a few of the large automakers in the US and Europe. The sharp decline in oil prices is contributing to the decision to de-emphasize new electric design and development projects^[16].

Anticipate the downside risks of new ways of working

Automotive supply chains are complex and rely on multiple tiers of companies to deliver subsystems, parts, and components in a highly choreographed process of just-in-time delivery to the assembly floor. Many of these relationships are decades old and highly collaborative. While some automakers are reviewing their global supply chains to assure business continuity, the process of qualifying new suppliers requires significant time and cost that many companies cannot afford in the current market conditions.

One focus for automakers is to add more intelligence into the oversight of the supply chain so they can manage the rolling impact of the COVID-19 crisis during the recovery period of heightened uncertainty. These efforts will help anticipate any supply delays and improve reaction time.

For example, BMW is creating an open platform that will allow data within its supply chain to be exchanged and shared safely, and anonymized across the supply chain. The platform called PartChain improves the traceability of parts and raw materials using blockchain technology^[17].

Another downside risk is cybersecurity, specifically, automakers' exposure to new threats and vulnerabilities as a result of more open collaboration, changing suppliers, and the increase in the number of employees working remotely. Identifying abnormal network activity is difficult with these changes, and companies need to relearn what the new normal activity profile looks like. One new threat is spear-phishing email attacks related to COVID-19, which have increased by 667% since the end of February^[18].

Make problem resolution an essential service

Opex and Capex are top priorities for automakers as sales decline and cash and margin challenges mount. They need to apply innovative engineering processes, methods, and tools, and integrate them into the life cycle management of the vehicle to minimize the total cost of ownership^[19]. Digital twin technology can be used in the design process to improve productivity and speed development. Also, it can be applied to help car owners optimize vehicle maintenance schedules. Digital copies of equipment can be used to train mechanics for any type of maintenance task, and the machine history of the vehicle can be used to predict performance and spot anomalies.

In this time of restricted travel and tighter access control at critical facilities,

the benefits of digital twins and virtual operations pay dividends. For example, using AR technology, expert maintenance crews can teleport into any piece of equipment to explore subsystem behavior, access a machine's history, and track its real-time behavior. Remote support staff can interact with each other, models, the local team, and the machines themselves.

Things to do

- Leverage crisis disruption models to help inform supply-chain risk and transparency as well as product mix over time
- Install symptom checkers, epidemic sensing, contact tracing systems, and dashboards to monitor the global health of the organization
- Continuously test evolving perimeters, create trust levels, and improve network reliability
- Institutionalize citizen tools and adhoc ways of working from home and remotely
- Make digital interactions using digital twins as rich as physical relationships for remote field support, and virtual training and sales
- Invest in intelligent customer support, this is no longer a nice-to-have option, but a must-have, especially for tier 1 and tier 2 suppliers

Product development and service innovation

Companies will accelerate the differentiation of their offerings, so services play an even more critical role, including digital platforms, engineering automation, and broader collaboration to solve challenging problems more quickly.

Automakers build cars and trucks that people love to use every day. That will not change. However, the way they design, develop, and produce cars and trucks will. The necessity of social distancing, even after companies get back to work, is a catalyst for greater automation in factories, offices, and other facilities. Cloud-native automakers and those in the process of transitioning to cloud-based digital platforms have done relatively well during the COVID-19 crisis as demand fluctuates. Car companies will see this as an opportunity to accelerate model-based systems engineering, virtual analysis, and digital threads to reduce cost and streamline operations.

On the revenue side, it may be a clarifying moment to figure out how to make services an equal partner to the physical product to enhance the driver experience. Whether it is services for commercial or passenger vehicles, OEMs need to lead by transforming their core business to stay relevant and

competitive. This is easier said than done because of the high capital cost and core competency of manufacturing cars. Tesla is a good example of a company that has mastered a new way of valuing its vehicles with regular over-the-air updates. However, when it comes to investment in new ridesharing businesses, the opportunities have faded with the pandemic as demand drops^[20].

Give people more freedom, but in a defined way

Automakers work with tiers of specialized contractors to integrate subsystems into the final product. Engineering partners are typically located close to the OEM's facilities. But as the fallout from the pandemic intensifies, automakers have put much of the development work on hold. However, as the recovery accelerates, there is likely to be more collaboration on vehicle development with engineering design partners.

Close collaboration between OEMs and tier 1 suppliers has been successful in the development of ecosystems for advanced driver assist systems (ADAS), vehicle software operating systems, and electric propulsion.

One option is for OEMs to collaborate on joint R&D projects. For example, BMW, Volkswagen, and Daimler, three traditionally fierce competitors, are in talks on a formal collaboration to work on key technologies and industry standards for autonomous driving^[21].

Similarly, tier 1 suppliers are working together to provide more standardized component solutions. For example, Benteler and Bosch are collaborating to develop a high-performance EV platform to support Automobili Pininfarina vehicles that will be made available to OEMs^[22]. Historically, these types of collaborations in the auto industry have a track record of many failed alliances^[23]. Time will tell if things will change in the new normal.

Variable builder models for volatile times

The COVID-19 pandemic has postponed the rollout of new vehicles and models and is putting the brakes on new design projects. By improving the digital continuity thread, which connects product design and engineering to production, automakers can adapt to an uncertain demand curve. They will need agility to ramp-up production, reduce errors, and control costs. An essential requirement is the interoperability of data, knowledge, and know-how.

The winners will be those companies that can virtualize the design-to-manufacturing process. Producing costly physical prototypes and testing prototype vehicles is old-school, and more expensive and time-consuming than building and validating digital versions, conducting model-based systems simulation,

and componentizing the powertrain, so the building blocks are reusable and potentially open source. The design target is a software-upgradeable car with over-the-air upgrades and domain-based vehicle architectures^[24].

Another critical need is investment in connected automation on the factory floor that leverages low latency, higher bandwidth, and edge computation to improve production efficiency. German car manufacturers are creating their own private 5G networks, leapfrogging telecommunications carriers, which have yet to deploy the superfast networks for widespread commercial use.

For example, BMW bought the spectrum for a private 5G network at one of its facilities in Bavaria. M3connect GmbH, a German telecommunications software company, will set up the network and is testing different supplier equipment in a lab^[25]. Similarly, Volkswagen plans to purchase a license for a local 5G network because a dedicated network is the only way to guarantee transmission will be free from airwave interference^[26].

Make implicit know-how explicit

Knowledge sharing becomes imperative when you move to different work styles, such as distributed collaboration, global projects, virtual engineering, and decentralization. The low-hanging fruit includes updating systems and products that are outdated, addressing the lack of documentation, and capturing the know-how of individuals who are familiar with the systems and components needed to get the job done.

As OEMs expand their relationships with third parties on sensitive systems, they must codify the knowledge of subject matter experts from across the ecosystem and disseminate that knowledge digitally within the business. A robust and shared toolchain needs to be available where all technical expertise and know-how have been formalized and conceptualized in technical ontologies.

Innovating in a diverse technology landscape will be a challenge, as will protecting intellectual property rights. Incumbents, both automotive tier 1 and tier 2 suppliers and OEMs, are being compelled to compete on many multiple technology fronts. For example, today's vehicles are loaded with over 70 electronic control units and millions of lines of code. Advanced driver assistance systems depend on sensor fusion, electronic control units, and an array of in-vehicle subsystems. Here, ontologies can play a crucial role in promoting a shared understanding of conceptual structures and improve data interoperability in the automotive industry.

Things to do

- Model the next steps to restart and optimize projects, product roadmaps, and customer expectations
- Virtually validate processes, assets, and products to reduce costs and speed time to market
- Democratize cloud-native automation and simulation environments to mitigate the lack of onsite presence
- Revisit the cost structure for research, technology, and collaboration through ecosystems
- Deploy digital twins for remote control, virtual factory monitoring, and predictive maintenance
- Adopt robust collaborative research platforms and open-source datasets
- Represent organizational knowledge, artifacts, and domains – such as implicit and explicit knowledge, and technical documentation – in ontologies

Sustainability and planet centricity

COVID-19 is a tailwind for companies to consider stakeholder demands for greater environmental responsibility that will impact the R&D agenda for initiatives in preventative healthcare, smart cities, urban mobility, green flight, and other areas.

Governments and businesses will learn many lessons during the COVID-19 recovery. The most profound may be the newfound awareness of our planet-centricity and how fragile our interdependencies really are. There is an appreciation that we are one planet, regardless of national boundaries, and we have become more acutely aware of the need for more equitable healthcare, the importance of addressing climate change, and bringing prosperity to all people.

The COVID-19 pandemic informs our planning and approach for dealing with these global challenges and the need for governments and businesses to embrace environmental stewardship to avoid a global crisis more significant and enduring than COVID-19.

Accelerate to a sustainable future

When reducing the carbon and waste footprints of industry and energy production

becomes a priority and contributes to improved customer experience and profitability, every company is motivated to act. Our obligation is to invest in renewable energy and embed reduce, reuse, and recycle in business processes, including the product development process.

The automotive sector is on this journey but has pushed the pause button with the arrival of the pandemic. As the industry emerges from the downturn, it has the opportunity to rethink transportation's impact on the planet and its responsibility for advancing environmentally responsible solutions.

Automakers and the transportation ecosystem play a pivotal role in moving the world toward a more sustainable future. What's happening in the vehicle and its relationship to the external world is being shaped by several forces that will drive economic prosperity. These include:

Urban mobility and smart cities

Over the last few decades, urbanization has increased dramatically, and so have negative environmental and social consequences. The COVID-19 pandemic gave us a glimpse of what a cleaner, less polluted world looks and feels like. This awareness should be the catalyst for a recommitment to a new model for urban mobility that stitches multiple modes of transport together into a system

that minimizes emissions and maximizes transport efficiency.

Electrification

Some carmakers are going all-in for electric. Others are catering to specific buyer segments with hybrid options. A catalyst for change is Regulation (EU) 2019/631 that requires all automakers that sell into the European Union to meet strict emissions standards. The regulation applies to trains and planes as well. As the COVID-19 crisis lifts, this could be a turning point for the automotive industry.

Autonomous driving

Completely autonomous vehicles, with no human oversight or monitoring, will not happen any time soon. Instead, elements of autonomy will be commercialized in controlled environments such as city shuttles and long-haul goods transport, where parts of the journey will be in a cooperative mode while others will be in an autonomous mode. A significant shift for manufacturing lines will be that the vehicle is a compute platform that requires software engineering approaches to meet critical safety and performance standards. Another essential dynamic for safer autonomy is to model and virtualize any given environment in the world, such as road parts, highways, and urban environments, including the behavior of drivers, cars, and traffic.

Formalize your approach for the next crisis

COVID-19 was unexpected and has hit the auto industry hard. But the crisis has also created a window of opportunity for industry

leaders to aggressively address the next black swan or rare but impactful event^[27]. These usually arrive with shocks that pose a significant or even existential threat to a business. The challenge to traditional risk management models is the dependence on measuring the rate of loss due to some factor of behavior and pricing in the business model or seeking to insure against it.

What's needed is a more holistic view of risk by integrating sophisticated forecasting models to reflect more significant degrees of uncertainty. Crisis management and business continuity planning are also inadequate for businesses that will be subject to a systemic threat with severe consequences.

Things to do

- Align and reprioritize research and technology initiatives to the reality of post COVID-19
- Profoundly understand new business models and the pace of sustainability innovation
- Revisit your formal processes and standards for continuity and crisis management

"This generation has its sights set on something different: moving the planet to a better place. So, as we ignite new categories of economic growth and prosperity, we should prioritize the vulnerable in our society and not take our environment for granted."

WALID NEGM
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