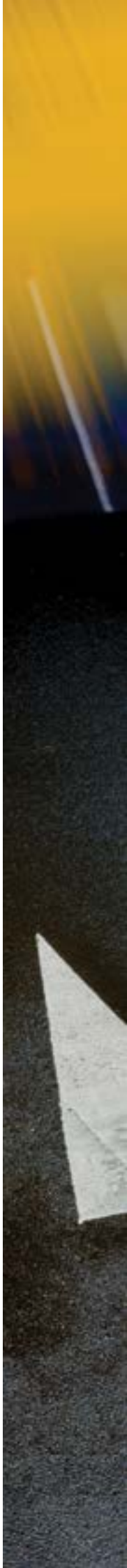
OLIVER WYMAN

DIGITAL OEM #1

AUTOMAKERS IN A DIGITAL WORLD

THE DIGITAL AUTOMAKER

The automotive industry has been at the forefront of technological innovation for years, but established vehicle manufacturers face increasing competition from powerful digital players with deep pockets and proven business models. New technologies and digital and mobility services are evolving rapidly. As a result, vehicles are becoming more connected, more electrified and more capable of driving on their own. The digital evolution is also affecting key links in the value chain, specifically sales and marketing. To lead rather than follow these trends, automakers must become more agile and much better attuned to customer needs. The pressure to adapt is causing major disruption at a number of companies – many of which have been in business for a century or longer – because their business models have historically been slow to evolve. Now is the time to act, however, because the decisions being made today will determine tomorrow's winners. Laggards in the automotive sector could face the same fate as failed companies in other digitally disrupted industries such as telecommunications, media, and consumer electronics.



OVERARCHING TRENDS

The effect of today's transformative forces on economies, industries, companies, societies, and individuals are expected to be more substantial and rapid than ever. Oliver Wyman has identified five megatrend clusters that it believes will shape the world economy: 1) demographic asymmetries, 2) economic globalization, 3) resource constraints, 4) innovation shift and 5) new consumption patterns.

Technological innovation through digitalization will reinforce many of the trends. Abundance of processing and storage capacity and ubiquity of connectivity will increasingly blur the boundaries between the physical and digital universes. As the world becomes more connected – by 2025, 85 percent of the global population is expected to have a smartphone subscription and more than 80 percent will have access to the internet – consumers will increasingly rely on their devices to research and purchase products. Consumers also will use the internet to help them share material assets – such as vehicles – rather than owning them.

Four groups poised to benefit from the disruption caused by the megatrends have been identified. They are the 1) Transformers (e.g. Uber), which bring new capacity to the market and thereby capture customers by servicing them differently; 2) Data Aggregators (e.g. Google), which consolidate vast amounts of data from all the connected products that are required for doing business in this new era; 3) Service Aggregators (e.g. MyTaxi), which place themselves between traditional service companies and their customers and then lure away those customers by adding substantial value to the relationship; and 4) Value Chain Integrators (e.g. Autolib), which digitalize the entire value chain, including established services.

These disruptors can crush industry giants – such as Kodak and Nokia – and completely change entire industries as they did with record stores, book sellers and travel agencies. They have also caused a transformation of financial services and changed the way people buy things such as clothing and fresh food. The big question is: How will the automotive sector respond to the digital disruption?

DIGITAL WAVE HITS

New technologies are already finding their way into the automotive industry, causing traditional players to adjust their business models. Oliver Wyman expects auto companies to face disruption from the confluence of four technological areas: cloud solutions, connectivity, big data analytics and digital collaboration. Cloud solutions not only enable a faster, more cost-efficient launch of applications and services, they are also the basis for providing new connectivity functionalities, such as connected parking, navigation services or autonomous car functions. Furthermore, with improved processing power and better digital tools, big data analytics allow companies to gain insights into customer-specific needs and behaviors, helping them to better target consumers. While innovation around the vehicle itself is slowing, software and services are gaining in importance, putting them in the position to make what was once the core product a commodity.

Attention-grabbing digital breakthroughs introduced by new players are shaking up the conventional thinking of the entire automotive industry. These new entrants are not just small startups capitalizing on a good idea. They are often giants with market capitalizations that are more than 10 times higher than the typical automaker's. Companies such as Google, Apple, and Baidu can leverage their funds to penetrate global markets right from the start. They also can use their wealth and expertise to create vehicles with innovative, disruptive features that are capable of competing directly against established automotive brands.

Connected and self-driving car projects unveiled by tech companies from Silicon Valley and China are proof of a looming collision between consumer technology, cloud computing, and automotive players. Even though Apple's entry into the automotive manufacturing industry is rumored to be postponed until 2021, little doubt exists that the iPhone maker will be one of the future players in this automotive market. But Apple will not be alone. With the development and introduction of autonomous cars, there are even more companies to watch out for. Current component suppliers such as Delphi, ZF-TRW, Robert Bosch and Mobileye are investing heavily to position themselves to benefit from future value pools created by the launch of self-driving cars.

THE BIG QUESTION IS: HOW WILL THE AUTOMOTIVE SECTOR RESPOND TO THE DIGITAL DISRUPTION?

Downstream parts of the automotive value chain also are under attack. TrueCar, mobile.de, RepairPal, Auxmoney, and dozens of others have successfully captured a share of the profits automotive manufacturers used to keep within their brand system via their affiliated dealers and financial services branches in areas such as car retailing, parts, services, and financial products. The new partnership between AutoScout24.de and startup FinTech Solarisbank provides AutoScout24 users with the opportunity to directly receive a financing offer for their preferred car. This is another example of a new player targeting a part of the automotive value chain. Automakers are not bowing to online players. Proof of that is PSA Group's recent acquisition of a majority share in online car repair marketplace Autobutler and Daimler's launch of their comprehensive online sales channel for new cars that includes video confirmation of finance deals.

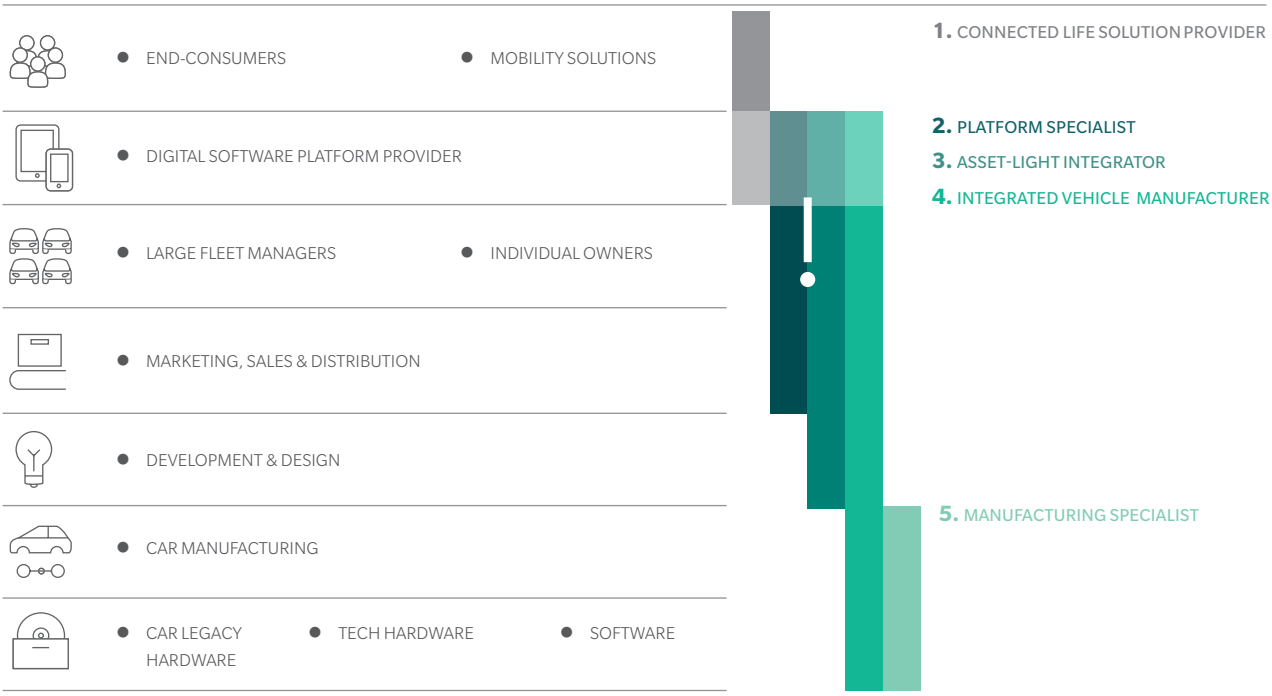
Future automotive value pools will migrate towards digital offerings. Oliver Wyman predicts that by 2040 vehicle sales and vehicle-related services will only account for about 65 percent of the worldwide spend on personal transportation, down from 80 to 90 percent in 2014. While this change might appear to be far off and nobody can predict exactly what levels of income will be generated from the different value pools, Oliver Wyman believes that carmakers and suppliers need to acknowledge that the automotive industry's software revolution has begun which will bring some dramatic changes.

NEW AUTOMOTIVE LANDSCAPE EMERGES

New digital technologies are already changing the automotive landscape, which will evolve into a more open, multi-layered ecosystem. One of the major battlefields will emerge around the customer interface. Upstart service and content providers are positioned to rapidly launch new business models around mobility, infotainment, productivity, and functionality offerings that go well beyond the scope possible from traditional car manufacturers. The digitally enabled vehicle will be equipped with communication technology that opens the door for new services and content, over-the-air updates, and autonomous functionality. Data aggregation and analytics are key to forecasting future demand.

EXHIBIT 1: DIGITAL DISRUPTION IN THE AUTOMOTIVE INDUSTRY

New business models will evolve to form a new structure for the industry



Source: Oliver Wyman analysis

They also will play a big role in filling distribution channels in real time via online configurations by customers, actual sales trends, up-to-the-minute quality data, and discussions in online forums. Sales and marketing will leverage online channels more than ever before. With an increasing willingness of customers to purchase cars online and digital players and startups already active in the online retail of used cars, new car sales will shift more towards online channels at the expense of established car retailers.

The traditional automaker-centered value chain will break up as new networks and partnership models emerge. Digital software platforms will be crucial because they will contain key data on the end customer that can be monetized by making offers that match the person's purchasing habits, driving styles, and travel needs. As value pools migrate towards the service-oriented customer interface, the vehicle itself will become more of a commodity, especially for volume manufacturers. This underlines why standardization and cost reduction through economies of scale and high utilization are crucial to win the hardware game. Integrated data flows will enable flexible production as well as efficient mass customization, bringing down costs and improving plant utilization.

As the line between car manufacturers and service providers gradually disappears, a new and competitive landscape will emerge. New digital players will try to gain access to customers by moving into territories that used to be owned by vehicle manufacturers. New and established players will have to decide whether to fight for the customer or try another tact. While numerous possible approaches exist, Oliver Wyman sees five business model archetypes emerging that will cover the future industry structure.

1. Connected-life solution provider. Companies that pick this model position themselves closest to the end user. The likes of Google and Alibaba offer a purely digital platform to end customers to best match their needs (e.g. closest proximity, cheapest, fastest) and to integrate mobility solutions into connected-life services based on aggregated customer data. Connected-life solution providers would not manufacture and sell cars or operate their own mobility assets. Instead, they choose to offer apps and services that go beyond mobility. By providing customers free access to a self-driving technology platform – in exchange for access to data from their cars – these players quickly reach critical mass, allowing them to sell their valuable, aggregated customer behavior data to mobility providers.

They design and operate cloud-based software platforms, develop advanced algorithms and operate only at the end of the value chain. To generate value, they need to partner with mobility providers and automakers.

2. Intermediate orchestrator. Companies following this model offer a holistic sales and/or comparison platform to end customers. Examples are Amazon or autohaus24. They orchestrate logistics and mobility operations to optimize offerings according to customer needs, however, they do not necessarily operate their own mobility services. Based on aggregated customer behavioral data they provide customers with insights on available capacity while earning a certain share of the transaction price.

These players do not manufacture cars but develop and operate a platform to sell other players' cars or mobility services to customers based on extensive data analytics. Therefore, their main focus is to control logistics and the customer relationship by understanding customer behaviors and establishing trust.

Intermediate orchestrators can maintain their position at the customer interface through their reputation as a so-called "single source of truth" across brands and service providers and by providing the highest perceived transparency on prices across brands. To retain this reputation, the orchestrator pursues a continuous invest strategy to improve quality of existing offerings, realize operational excellence in platform operations and data analytics, and expand in adjacent areas to provide customers with an even wider array of offerings. This player's organization is centralized and heavily focused on technology and innovation. Leaders of these companies seek the best software engineers to ensure further improvement of technology. Amazon and Uber are examples of potential intermediate orchestrators.

3. Asset-light integrator. Companies with this positioning offer vehicles that are innovative and uniquely designed. They establish a strong brand and utilize it to create a distinctive experience for the end customer. New, cutting-edge products and services are primarily available only through proprietary channels such as the company's flagship stores and online channels. Revenue is generated through direct sales and leasing of premium vehicles, digital services that are paid for monthly or with each use, and a selected range of mobility services that support the overall brand image (e.g. car-sharing). Due to their strong brand image these companies can sell their hardware and services at a price premium.

Asset-light integrators design and develop key components as well as apps for self-driving and connected vehicles in-house to make sure they provide a distinctive experience that properly reflects the brand. Furthermore, they design and operate cloud-based software platforms and design and sell cars to end users, thereby controlling the customer interface. Vehicle output is licensed to manufacturing capacity operators, creating a high level of dependence on them. Mobility services are usually provided in cooperation with partners. Asset-light-integrators build a strong brand ecosystem around the product, thereby

locking the customer in its system, a move that results in superior profit generation. Apple is an example of an asset-light integrator. It can leverage existing capabilities and its strong brand to add a vehicle as another device to its portfolio. In an extreme scenario, current automakers could develop into asset-light integrators. This, however, would result in them disposing of their production facilities and capabilities as part of their transformation.

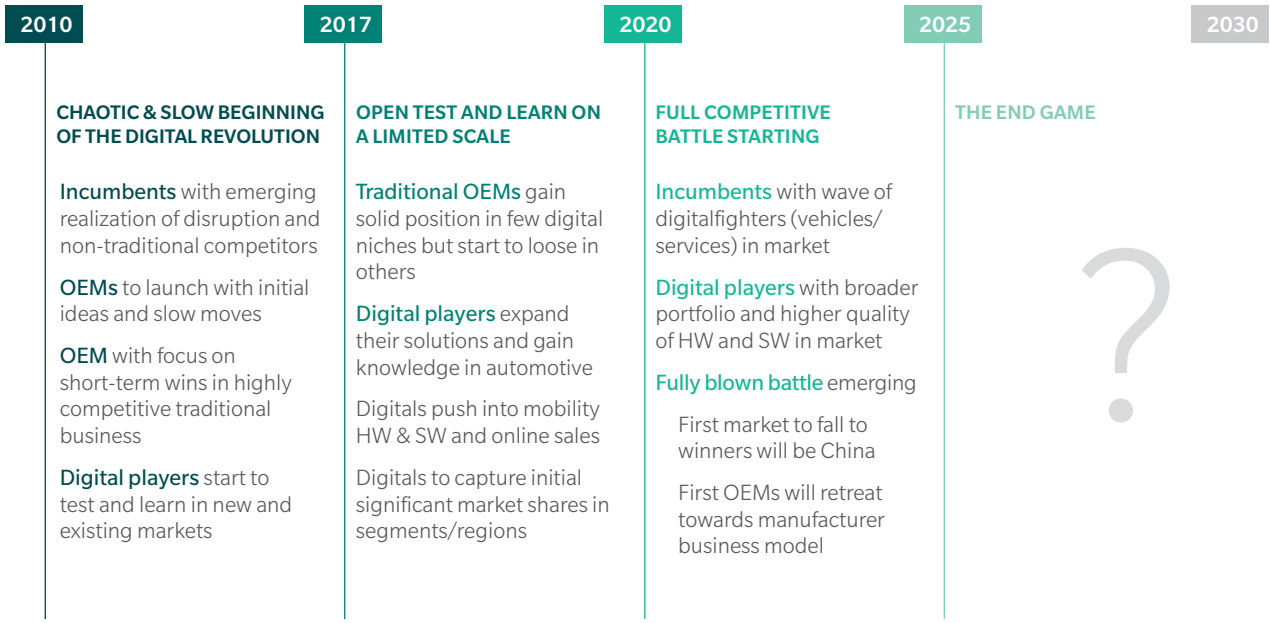
4. Customer-centric, data-driven manufacturer. This business model is an extension of the traditional car manufacturer's model. These players evolve into providers of all types of individual mobility, including selling and leasing of digitally enabled vehicles and providing a full range of proprietary mobility services (car-sharing, intermodal, etc.) based on customer needs. These companies target all customer groups (mobility fleet managers, corporate fleets, aggregators, private buyers) and offer one seamless brand experience across all products and services. With respect to fleet managers, for example, the customer-centric data-driven manufacturer provides a variety of specifically designed services, from white-label solutions to full fleet services. Revenue is largely generated through direct sales and leasing of vehicles. Mobility service revenue comes through the use of two payment models (pay-per-use and monthly subscription). Oliver Wyman, however, expects that by 2040 individual mobility services will account for about 11 percent of the global spend on personal transportation, up from 3 to 5 percent in 2014. Therefore, revenue and profit from customer-centric, data-focused manufacturers will continue to be driven by the traditional business of designing, developing and manufacturing vehicles.

Automakers following this business model, therefore, keep control of a broad part of the value chain including design, production, sales and usage/mobility. They leverage their existing competencies and carry huge upfront cost. Data analytics and machine learning are used to optimize their offerings.

New services are provided under the company's own brand while it selectively partners with others, therefore, ensuring customer access and a seamless brand experience. Products and services are highly tailored to customer needs along the customer life cycle.

5. Manufacturing capacity operator. This model is for companies that sell vehicles to automakers, asset-light integrators and fleet operators. These players operate as white-label producers without end- customer access. They focus either on high-volume, low-cost production of hardware or specialize as a niche player that offers key technology hardware modules. Revenue is generated through a volume-based model. To ensure profitability, manufacturing capacity operators strive for operational excellence and efficiency in production processes to continuously reduce operational and fixed cost.

EXHIBIT 2: EVOLUTION OF COMPETITIVE DYNAMICS BETWEEN DIGITAL AND TRADITIONAL PLAYERS



Source: Oliver Wyman analysis

Given the need to optimize production processes, resources are mainly allocated to manufacturing and assembly. While keeping some basic design capabilities to capture additional value from engineering of components that are not core to asset-light integrators, they build up a strong competency in system integration to ensure they have ability to weave in pre-designed third-party elements as well as their own components into the end product.

When targeting the volume segment, these operators secure their market position by being able to offer the lowest prices for vehicle manufacturing given their high efficiency in production and key processes. In contrast, when being positioned as a capacity operator for premium automakers, the market player would provide high-quality, tailored products for each partner through customized processes and product manufacturing.

On the basis of current competencies, automakers willing to move into this model need to cut spending on all those initiatives that do not support the overall objective of realizing operational excellence in manufacturing and assembly, especially attempts to capture or further strengthen the customer interface beyond the traditional dealer model. They need to optimize their footprint and invest heavily in highly flexible and efficient production systems. Developing best-in-class capabilities in production launch is key for achieving adequate returns. In an extreme scenario, Asian volume manufacturers could evolve in this way by utilizing their global footprints and low-cost competencies.

Today, dynamic and extremely agile new players are entering the automotive market with superior digital capabilities and enough cash to make things happen. Automakers cannot match the newcomers on digital expertise, which leaves them vulnerable along the entire value chain.

Because of the way automakers typically conduct their research and development it takes them years to adapt their products and services to digital trends. The newcomers can innovate more rapidly. A key area where this happens is in the traditional retail model. Automakers currently have limited customer interaction before and after the purchase and there is little done to collect and analyze data from multiple unconnected sources. Automakers are left with a profound lack of information about who their customers are, how they behave, and what their needs are.

Collecting and utilizing data from their customers is part of the leading digital players' corporate DNA. They are expected to keep that advantage. However, given the huge yet largely untapped potential to collect valuable data such as road condition and traffic situation from cars, automakers can gain from their position as "gatekeeper" for mobility-related data. To capitalize here, automakers will need to enhance their ability to launch and operate these services. One way to do this would be through partnerships with other automakers, which could allow them to gain scale faster than the digital players.

In the current environment, the business models "connected life-solutions provider" and "intermediate orchestrator" seem to be far away choices for automakers. The more likely paths would be asset-light integrator, customer-centric manufacturer, or manufacturing capacity operator, depending on the automaker's current position and strategic direction. Getting there will require decisive actions as well as endurance because the payback will take at least a decade. That is difficult for auto companies to grasp, especially since the industry thrives on immediate profit improvement and high asset utilization.

TODAY, DYNAMIC AND EXTREMELY AGILE NEW PLAYERS ARE ENTERING THE AUTOMOTIVE MARKET WITH SUPERIOR DIGITAL CAPABILITIES AND ENOUGH CASH TO MAKE THINGS HAPPEN.

HOW TO DIGITALIZE THE COMPANY

While the degree and direction might vary depending on the targeted business model, automakers will need to work in five strategic areas if they want to stay competitive in the future. Over time, while the industry develops towards its target state they can de-emphasize individual areas that are less relevant for their business model. Only a customer-centric, data-driven manufacturer will need to stretch to excel in all areas:

- Customer experience: With digital players having established a seamless customer interaction over multiple channels in other markets, customers will expect the same when it comes to mobility. Establishing a seamless customer experience enables an auto company to secure the retention of traditional and new customers within the ecosystem. Interacting with the customer along the whole journey allows the company to continuously collect and analyze data from multiple sources, which in turn provides the opportunity to identify and skim off additional sources of revenue.

- Intelligent product: Driven by, among other things, increasing urbanization and a higher willingness to share rather than own, the car is becoming a commodity that will provide differentiation potential for automakers in the future. Therefore, vehicle manufacturers need to build a product that fits in the digital world. The car will be autonomously driven, highly connected, embedded in a larger ecosystem, and flexible enough to serve an exploding number of use cases of a global population. That being said, software development and innovative services will rise in importance when it comes to value-add and brand value while value generated through traditional mechanical engineering and manufacturing will decrease. In response, automakers need to rapidly adjust their product value chains, capabilities and partnerships while they try to simultaneously seek to maximize the profits that can still be generated from their legacy businesses before they disappear.

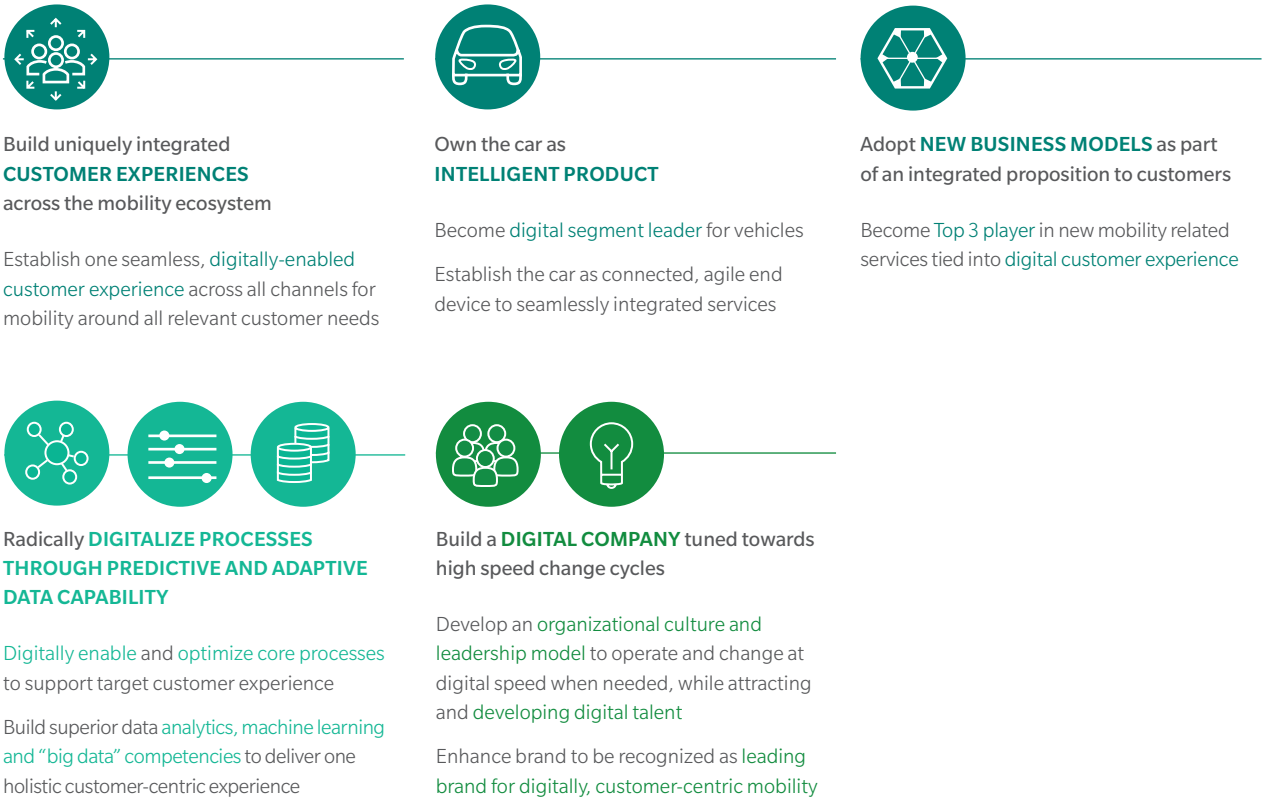
- New business models: The overarching objective is to create an ecosystem of services around the current vehicle offering and identify services that show maximum profit potential and strategic control. These solutions have to fully address customer problems and tap the complete range of profit opportunities in the new value system, including mobility services, communication, infotainment, and more. To achieve that, automakers need to establish an environment that encourages new ideas; define a framework for tailoring the services to regions, markets and cities; and make sure the services fit the company's brand and current strategy. Key success factors include establishing an agile organizational structure around the defined services, being open to creating new partnerships, and finding new ways to allocate funds.

- Digital processes & technology: While it might not be evident in other areas of their business, automakers began adapting to the new digital era years ago when they started their digital factory initiatives. Machine-to-machine connectivity is already a given. An enormous amount of data is being collected along the extended manufacturing value chain without the need to add any IT infrastructure. The new challenge, however, is to apply advanced analytics to optimize manufacturing performance, predict product quality or increase product safety. Systems that use machine learning will identify anomalies that the current systems would miss. That means today's end-of-line quality inspection will be replaced by a real-time virtual quality inspection, resulting in a significantly higher accuracy and faster detection rate. Vehicle assembly plants will shift from traditional process automation to an optimized man-machine collaboration model where humans will operate smaller task-specific machines to boost production efficiency and flexibility to the next level.

- Digital company: Developing into a customer-centric manufacturer also requires a transformation of the company's capabilities. While certain expertise needs to be built up quickly, launching hundreds of new initiatives is neither possible nor recommended. To become a so-called "Digital OEM" automakers should start by focusing on key digital capabilities that drive digitalization. For example, they should refine branding, initiate cultural change, acquire and retain digital talent. Brand identity needs to be refined to reflect the auto firm's digital target picture. This includes developing an ecosystem that retains the company's DNA but is applicable across new touch points. Getting the digital culture right and finding the best digital talent can make or break a company's bid to make a successful digital transformation. Therefore, automakers should equip all managers with sound digital understanding and increase digital awareness, knowledge and acceptance throughout the company. Besides that, capability initiatives that enable digitalization, such as establishing a two speed IT, ensuring companywide security of information and developing a new approach to financing, need to be set-up.

Digital players think big, but start small. They rapidly launch prototypes to quickly learn and adapt their solutions because they want to achieve hyper scale as quickly as possible. So far, auto companies often are too caught in their processes, which means they will need to make sweeping, fundamental changes. To maintain their leadership position, traditional automotive companies need to transform their business models and enterprises in a three-step approach:

EXHIBIT 3: DIGITALIZATION FOR AUTOMOTIVE OEMS



Source: Oliver Wyman analysis

1. Define a clear target and get everyone to follow along.

2. Implement an effective steering mechanism that ensures the delivery of the targeted impact and contributes to achieving the defined target picture.

3. Ensure rapid execution by identifying and aligning the most impactful "digital initiatives" that kick-off the transformation at its core and quickly setting up digital nuclei to move towards the targets.

Developing a shared view of the digital target picture and the road ahead is at the core of the digital transformation. An initial review of existing digital initiatives with regards to objectives, ambition level, timing and resources can result in the creation of a concrete digital transformation agenda that defines required initiatives for each action area, closing the gap to the target.

Given that digital has been one of the "hot topics" in the automotive industry for several years, companies have various initiatives, but few are aligned enough to provide the desired results. What is often missing is a steering, support and "challenge" mechanism to efficiently orchestrate and effectively execute the digital transformation, which is critical to ensuring that budgets devoted to digital initiatives contribute in a positive way. Furthermore, to balance the available resources without losing focus, the governance effort for each initiative should follow clear principles.

Finally, a first wave of initiatives, identified as the "most impactful" for the digitalization of the company, need to be executed rapidly to kick off this core transformation of the business. Depending on the strengths and weaknesses of the automaker, these initiatives need to contribute to strategic action areas to ensure the most urgent topics are addressed while also generating measureable progress towards the company's short- and medium-term digitalization goals.

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