

REIMAGINING AUTOMOTIVE

Strategies Redefining Mobility Business Models,
Sales, Service And Experience



Introduction

The automotive industry is being reshaped by a number of forces. Technology advancement and Industry 4.0 has fundamentally changed the automobile from a feat of purely mechanical engineering into a connected machine that has as much in common with a consumer electronics device. This has ushered in a desire for new driving experiences and business models. Original equipment manufacturers (OEMs) have had to rethink the way they design and manufacture vehicles from the ground up, augmenting their capabilities across their organization from supply chain and production frontline to R&D and sales. Dealerships must adjust to new expectations around shopping and ownership, ensuring they can meet potential customers with personalized engagement on every channel. Underpinning all of this is the increasing value of data, intelligent automation and connectivity to deliver real-time insights that transform the way companies operate and innovate to enable the next generation of sustainable mobility.



Piers Fawkes
President, Founder
PSFK



ABOUT THIS REPORT

Reimagining Automotive is a report by business intelligence platform PSFK in partnership with global technology and service provider, Microsoft. We present the future state of the automotive industry through five forward-looking user journeys that highlight the advantage of digital transformation through the adoption of networked data, connected vehicles and operations, intelligent automation and a digitally-enabled supply chain. Insights learned can help manufacturers, OEMs and dealers understand how cloud-based solutions can transform their businesses in order to drive new levels of service throughout the entire value chain from customers to employees to partners.

psfk.com/report/reimagining-automotive

Foreword

Navigating a new era of mobility

We have never been at a more transformational time in the history of automotive. New technologies and advanced capabilities are translating to a big opportunity for automakers to deliver end-to-end connected customer experiences and new transportation-as-a-service business models. As the automotive and transportation sectors converge, McKinsey & Co. says the overall industry will grow from \$3.6T to \$7.2T. Traditional automotive business models are shrinking, making way for new mobility services.

In the midst of this transformation, a global pandemic has caused unprecedented business disruption, negatively affecting supply and demand, completely halting vehicle production, stalling vehicle sales, and forcing millions of staff to work remotely. On the road to recovery, automakers are navigating a new normal. What Microsoft calls tech intensity—building and mastering one’s own digital capabilities—is now even more critical.

This, in turn, has set the stage for automakers to become more agile and resilient as they continue to accelerate their digital transformation strategies faster than ever before, embracing new technologies and partnerships that are redefining the industry.

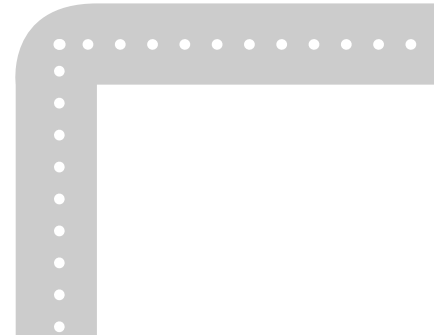
Connected, autonomous, shared, and electric (or C.A.S.E.) scenarios are propelling the industry forward at a rapid pace. These technologies have advanced significantly over the last decade. Looking to the next 10 years, we will only continue to see these capabilities converge even further.

The vehicle is becoming more and more software-defined, as automakers rebuild architectures to meet tomorrow’s new connected experiences and mobility services. The industry is adopting new business models built on a comprehensive connected digital infrastructure.

Smart mobility is connecting everything, easing the ability to travel from point A to point B with direct benefits to the environment, improved productivity, and greater resource efficiency on everyday services. Things like data monetization, in-car productivity, vehicle-sharing, ride-hailing, multi-modal transportation, and fleet management are just a few of the bold mobility strategies that are changing the automotive business model forever. We are seeing automated driving capabilities take off at scale as consumers become more comfortable with these technologies. And, over the next 10 years, one-third of the miles being driven will be shared miles.

The next decade will also define the creation of standardized platforms for these smart mobility services. These platforms will support commercial solutions, meet consumer demands at global scale and reinvent experiences. Mobility services will also be a major catalyst for the development of advanced IoT capabilities that make it possible to securely transmit data in complex environments across edge devices such as vehicles, phones, traffic lights or charging stations, and the cloud. We are already seeing the evolution between automotive retail and energy, as evidenced by smart charging trends.

To successfully innovate at this new scale and speed of business, automakers need a trusted partner. Microsoft is committed to supporting the industry through this transformation, helping automakers fast-track their own tech intensity. We take pride in empowering, not competing, with our customers. We ensure data is always under our customer’s control. And we focus on helping automakers and smart mobility service providers strengthen their own unique brand and customer experiences.



Foreword cont.

However, we must not forget that along with this innovation comes the responsibility for our industry to ensure sustainability and safety in everything we do. For Microsoft, we believe our most important contribution will come not from our own work alone but by helping automakers, OEMs and cities operate more efficiently.

To build cities that are more sustainable, safer, inclusive, and easier to get around requires a connected ecosystem that leverages the intelligent cloud, the intelligent edge and 5G networks to link people with smart vehicles, smart energy, smart buildings and smart cities.

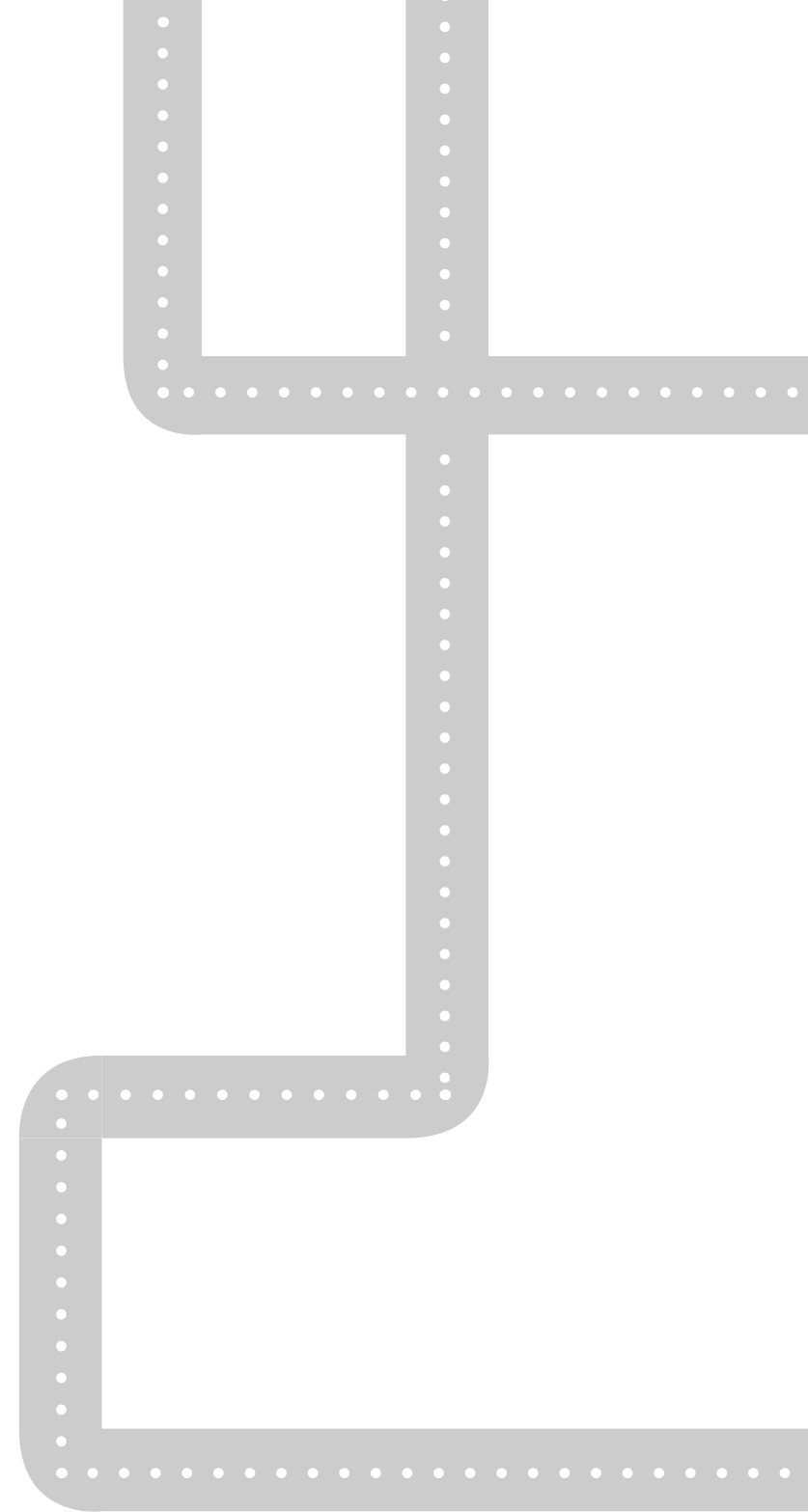
In addition, emerging solutions such as quantum computing hold the promise to have enormous impact in areas including supply chain, autonomous driving and mobility scenarios. One example of this is the work we are doing with Ford to drive a forward-looking quantum research project aimed at reducing traffic congestion. And to get products customers want to market faster, automakers can innovate using digital twins and big compute to enable more insight-based iterations on sustainable product, manufacturing and supply chain designs.

It is clear that the automotive industry is not only embracing the disruption at hand but pioneering new and exciting ways to drive the next level of mobility, sustainability and innovation in the decade to come.



Sanjay Ravi

General Manager, Automotive Industry
Microsoft



Digital Transformation Imperatives: Microsoft Expert Point-Of-View



John Reed
Director, Automotive Customer Experience Solutions,
Microsoft

We're seeing a mammoth change between the automotive business as it's been for the last 100 years, which is buy a car, service a car, sell it, get a new one, or occasionally, use transportation or trains, or airplanes. To a model where our projection is that probably at least a third or so of miles or kilometers driven by 2030 will be shared in some fashion. A significant shift, though not a complete shift away from an entirely private vehicle ownership model. The reason that that's relevant, is that what manufacturers, and dealers, and others are trying to sort out right now, is what does that mean to consumers? How does the business have to change? How do they keep customers in that current environment loyal to a dealership or loyal to a brand? How, at the same time, do these businesses begin to introduce new services that capture some of these growth areas in the future? How do those get integrated into those current business models?

What all these industry stakeholders - OEMs, dealerships, mobility services - are trying to do is create a unified customer journey, figure out how to hit the highest priorities they have in transforming their own experience, and then construct a roadmap of additional consumer capabilities in the technology platforms to enable those sorts of services.



Tara Prakriya
General Manager,
Microsoft

We're in the middle of that pivot where it isn't just about manufacturing a vehicle and calling it good. There is now an entire digital connectivity piece that needs to happen. We call our connected vehicle platform a digital chassis. Throughout the lifetime of a vehicle, there is now a connection that needs to be not just maintained but refreshed and integrated with all the surrounding systems. It's going from a vehicle manufacturing centric point of view to a consumer and transportation end to end and mobility point of view.

If you need consistency, and you want to lower cost, and you want to get to digital transformation, having a single connected vehicle platform across multiple different services is really what's required. Just from a differentiation point of view, this is then a platform on top of the platform. Our connected vehicle platform really rationalizes about 40 different Azure services across the Edge and the cloud in order to make sure that there's consistency, efficiency, and a very robust digital feedback loop across all services.

When we're talking about a platform that spans the Edge and the cloud, this is a fairly large digital transformation for our customers. They're used to having a division that really thinks about the electrical engineering and the in vehicle parts. Then they usually have a completely different division that's thinking about digital services. What we're proposing is that for the use cases of the future, it really needs to be a very integrated view, a single platform that connects the edge and the cloud, so an intelligent edge and an intelligent cloud view. Customers need to be ready for that transformation. Microsoft is ready and willing to help. That's why most of our customers are not just customers. They're really strategic partners because this transformation needs to be handled carefully and in very tight collaboration.



Digital Transformation Imperatives: Microsoft Expert Point-Of-View



Vijitha Chekuri

Director of Strategy & Development Autonomous & Connected Vehicles and Smart Mobility Solutions, Microsoft

Microsoft is providing all of the underpinnings, the underlying tools and technology needed on top of which OEMs can build their own autonomous development tools quickly and bring them to market. So think of us as providing the framework and infrastructure and the genetic tools that are not what you would call the proprietary models that OEMs would like to own and deliver on. What Microsoft is providing is the non-differentiated tools and tech that can make the development process for OEMs faster, more efficient and ultimately allow them to deliver their developments to market more easily.

At Microsoft, we're providing a platform that unifies these systems and helps to enable that continuous feedback loop for OEMs to create a continuously improving product experience for customers. We're also making sure that every product we create, we call them accelerators or solutions, is able to interact with each other in the most efficient way for OEMs. We're providing the skeleton of a framework for all these functions on which OEMs are able to customize and create their own branded solution, but we make sure that the underlying structures are unified and that they are communicating in tandem. So if you look at any of the product investments that are happening at Microsoft in support of these various trends, we are making sure that they align internally to help provide that unified structure for OEMs to utilize.

The way Microsoft views smart or connected mobility, from the car to providing solutions, it's all about data, so what we are doing is making sure we're enabling these collective database solutions either through first-party enhancers or through partners who are able to take all of Microsoft's technologies and build these data consortiums through which partners can transact with each other.



Jurgen Willis

Senior Director, Microsoft Azure Engineering

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Digital Transformation Imperatives: Microsoft Expert Point-Of-View



Darren Coil

Director of Business Strategy, Automotive,
Microsoft

Until recently, there has not been a good way to merge ERP data and warehouse data - the datasets are just too large. Data centers are too expensive to make it cost-effective to put all this stuff together in a single data lake, if you will. Microsoft is working with its customers to take all their business, people, customer and operational system data, put all of that data into the cloud and stitch it together in the cloud one time so that anyone can ask a question without having to spend countless hours of IT extracting reports and getting authorization, etc. They can answer business questions immediately and move on with their roles.

After a customer goes on a digital journey of getting everything connected and then visualizing their data lake versus individual systems, it really comes down to automating tasks that people do in a swivel chair fashion today. The already proven bottom line business benefit for intelligent automation is 15-20 percent improvement in net income, holding all the variables constant. We've seen factories increase their production with the same set of fixed assets that they have. We've seen companies improve their cash positions by reducing the inventory they carry. We've seen companies improve their quality, reducing warranty returns and claims. We've seen companies improve their quality in line, reducing scrap during production. It is straight bottom line net income improvements for companies.

Just as important as the technology adoption is the cultural change because if you don't change the culture at the same time you roll out new technology, the technology will just go idle quickly. We've observed this at several customers as well. It's a plant cultural change

that you have to do from the top down. It has to be role modeled by the leadership and you have to spend the time training for people to get comfortable with it. Alongside that, unlocking the employee potential is critical, helping them understand how they will still be valuable to the company as their role takes on more strategic, value-add aspects.



Digital Transformation Imperatives

1

Resilient Operations

Connecting the entirety of the enterprise with relevant data to drive continuous improvement through a digital feedback loop.

2

Differentiated Customer Experience

Capturing insights from across channels to gain a single view of customers and drive personalized experiences.

3

Emerging Mobility Services

Using location intelligence to develop new products and services for large fleets of commercial vehicles and urban mobility services.

4

Accelerate Vehicle Innovation

Modernizing the in-vehicle experience with location intelligence and virtual assistants; making vehicles future-proof with remote updates.

5

Increased Organization Productivity

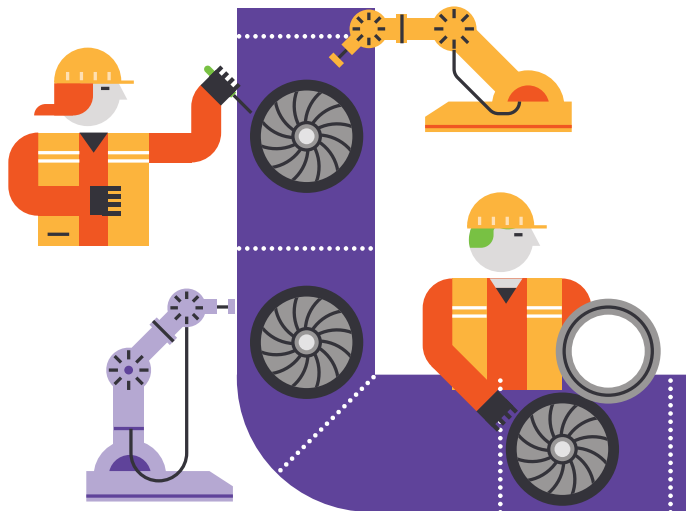
Combining real-world data with cloud-based simulations to safely develop, test, and deploy autonomous technology at scale



1. Resilient Operations

Connecting the entirety of the enterprise with relevant data to drive continuous improvement through a digital feedback loop.

Digital technologies are transforming the way cars are manufactured. The transformation starts on the factory floor, with connected equipment that can analyze and visualize operational information in real-time. Displayed through mobile devices and mixed-reality headsets, that information empowers workers with on-the-job insights and instructions. The relationship between factories and laborers has grown even stronger with smart contracts that keep employees happy and companies compliant. After vehicles are built, they are continuously monitored through digital twin simulations, feeding information back into the system to improve the product and make better forecasting decisions.



KEY ASPECTS

Connected Factory

leveraging agile operations and intelligent automation to improve productivity and efficiency

Connected Supply Chain

Bringing together partners at all links in the supply chain to maintain a real-time view of key resources and finished products

Intelligent Decision Making

Analyzing data from connected operations, markets and consumers to make more informed short- and long-term decisions

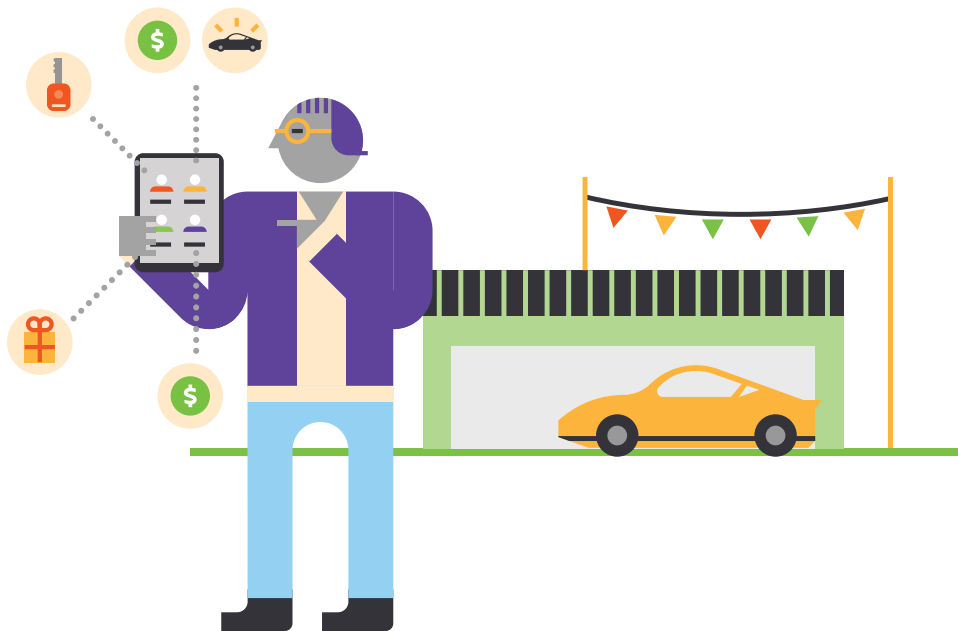
Intelligent Reality

Integrating mixed reality tools into operations to support streamlined workflows, access to information and improved collaboration

2. Differentiated Customer Experience

Capturing insights from across channels to gain a single view of customers and drive personalized experiences.

To keep pace with rapidly changing consumer expectations and elevate the automotive customer experience...companies need to capture insights from across various channels. Use customer data platforms to bring together data from all sources. Gain a single view of customers and discover insights that drive personalized experiences. Create omnichannel experiences. Move prospects through the journey more efficiently with predictive recommendations. Transform the way vehicles are marketed, sold, and maintained in a digital-first context.



KEY ASPECTS

Customer 360

Advanced platforms track and manage customer engagement across channels and touchpoints to create a universal profile and view

Digital Marketing

Managing consistent communications and tracking engagement across the multiple channels being used by customers

Customer Experience Management

Understanding where a customer is within their lifecycle to proactively engage them with the right message or service

Connected Field Service

Streamlining communications and deployment and automating workflows for service agents in the field

Dealer Management Systems

Bringing together disparate data sets to better serve prospective and existing customers and grow sales and service revenue

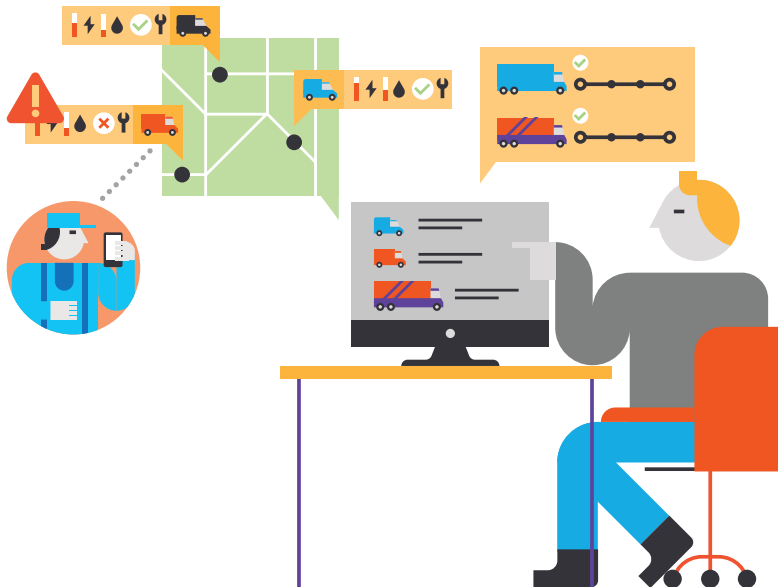
Predictive Maintenance

Monitoring real-time performance against historical models to anticipate and fix issues before they arise

3. Emerging Mobility Services

Using location intelligence to develop new products and services for large fleets of commercial vehicles and urban mobility services.

Location data is fueling a smarter transportation infrastructure. From long-haul trucking to urban micro-mobility, organizations now have spatial-awareness of all their assets at any given time. Providing real-time insights into congestion, delays and potential issues, location intelligence can be leveraged to more efficiently deliver people and products, while IoT-connected sensors and infrastructure continuously improve and refine the overall travel and transport experience.



KEY ASPECTS

Fare & Toll Management

Consolidated interfaces and frictionless payments streamline user experience, while creating new efficiencies for municipalities

Traffic & Transit Management

Real-time and historical driver and ridership information helps boost in-the-moment decisions, while planning for future needs

Fleet & Asset Management

Passive monitoring of connected vehicles helps proactively manage aspects like deployment, performance and maintenance

Parking Management

Connected infrastructure broadcasts space availability to reduce traffic and pollution

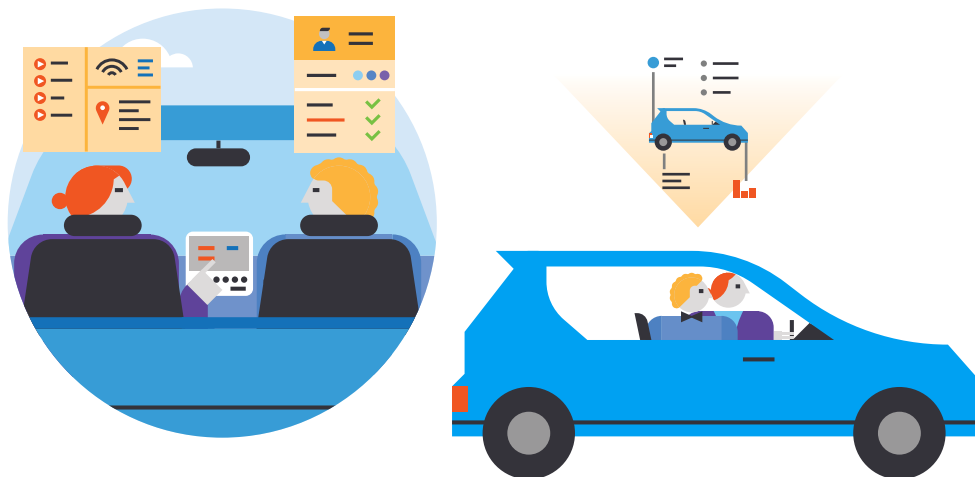
Data Marketplace

Information becomes an asset class that can be shared and exchanged to drive intelligent planning and innovation activities

4. Accelerate Vehicle Innovation

Modernizing the in-vehicle experience with location intelligence and virtual assistants; making vehicles future-proof with remote updates.

With the emergence of “software-defined” vehicles, OEMs can continuously add new features to a vehicle throughout its entire life cycle. This will radically transform the experience for drivers. Creating a seamless experience from the moment they enter, use, and leave their vehicles. By integrating virtual assistants, OEMs are not only personalizing the driver experience, but making it easier for third-party services to be integrated into vehicles, in turn creating ongoing revenue streams and future proofing vehicles with remote diagnostics and over-the-air updates.



KEY ASPECTS

Vehicle Services

Everything from entertainment and commerce to new vehicle features enabled through digital software

Connectivity

vehicles become connected hotspots capable of receiving/broadcasting key information and enabling new in-cabin experiences

Location-Based Services

Near-me context brings new levels of relevance to navigation and alerts

Speech Services

Handsfree interfaces deliver unprecedented levels of safety and control

In-Car Productivity

Maximizing time spent driving or commuting with entertainment, work and commerce capabilities

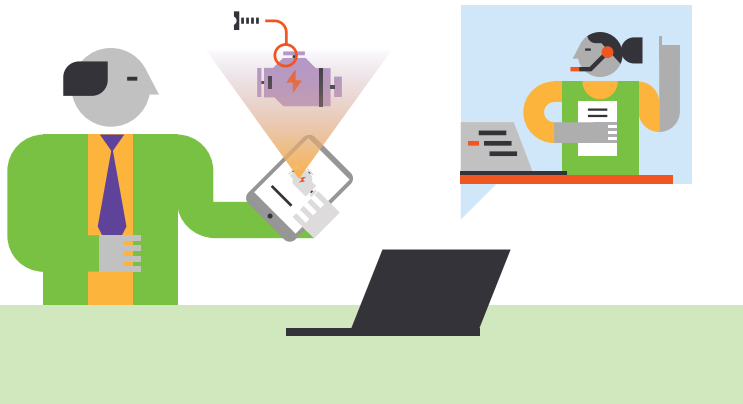
Over-The-Air

Software and service updates delivered seamlessly without having to visit a physical dealership or shop

5. Increased Organization Productivity

Creating a more connected and productive organization by empowering your whole business with team collaboration tools and the processing power of the cloud.

To keep pace with the shifts happening within the industry, OEMs, dealers and beyond need to ensure that their entire organization from the C-suite to the factory floor are seamlessly connected and empowered with the right tools. In an effort to enhance collaboration and maximize productivity, companies are digitally transforming the workplace with AI and intelligent automation to streamline workflows and offload repetitive tasks. They're integrating low and no-code solutions that enable anyone to build and deploy powerful apps and focusing on new training platforms to enhance employee skills. Enterprise-wide digital solutions and mixed reality interfaces are bringing together traditionally siloed teams by unifying devices, data, relationships, and processes.



KEY ASPECTS

Modern Workplace

Engage your workforce by replacing mundane, repetitive tasks with AI and intelligent automation, providing creative and strategic opportunities to connect teams in an impactful way via collaborative platforms

SAP on Azure

Outfit employees with the digital tools, from cobots to ML systems, to augment their existing skill set and amplify their productivity

High Performance Computing

Boost productivity and intelligent apps to guide businesses through best practices and compliance requirements

Low-Code Development

New platforms leverage drag-and-drop components and graphical user interfaces enable employees with little to no coding expertise to program applications to solve unmet needs

Quantum Computing

Build, test and deploy collaborative solutions rapidly

Marketplace Forces Impacting The Auto Industry

1. Mobility-as-a-Service

As ride-hailing and micro-mobility services take off, along with autonomous technology, deep changes are coming to the car business. Consumers are already signaling they don't need to own vehicles – they would rather just have access to transportation when they need it. Instead of selling an expensive vehicle that would mostly sit around unused, companies are starting to offer mobility-as-a-service. These companies are partnering with cities to make it easy for commuters to plan and pay for trips across multiple modes of transportation (both public and private) through a single access point.

2. In-Car Commerce

In-car commerce enables drivers to seamlessly find and pay for items while on the road. Traditional expenses, such as paying for fuel, parking, and tolls can be done from the dashboard. Drivers can pre-order food, coffee, or groceries, or even book a hotel room. Retailers can also offer location-based discounts to the driver when they pass by. In-car commerce opportunities are not limited to driving. Even while parked, connected cars can function as mobile access points for a variety of services. Packages can be delivered straight to trunks. Car washes, oil changes, and fuel can also be summoned to the car on-demand.

3. Empathetic/Responsive Interiors

While exterior sensors point out to understand road conditions, cameras, microphones, and biosensors in the car point toward drivers and passengers to detect things like alcohol, stress, confusion, distraction, or sleepiness. Those sensors are also able to pay attention to the interaction between people in the car and understand the context. While these sensors pick up on non-verbal cues, voice-based AI allows drivers to explicitly communicate their needs while keeping their hands on the wheel. The biggest reason for this tech shift is safety but content and commerce services can also become much more personalized.

4. Digital Twins

As its name suggests, a digital twin is a virtual replica of an object that can be continuously updated with data from its physical counterpart. Sensors can capture and continuously update a vehicle's digital twin throughout its lifetime, giving manufacturers a live window inside the product at all times. Digital twins can also be connected, sharing information with one another to simulate complex interactions. Soon, everything in the real world will have its full-size digital twin in the mirrorworld.

Marketplace Forces Impacting The Auto Industry

5) Over-The-Air (OTA) Updates

OTA updates help automakers keep their cars up to date without having to bring them into a dealership. Manufacturers can remotely fix bugs and update their infotainment systems. Owners can also purchase performance upgrades like extended range or autonomous modes. Instead of having new features “added”, they are now “unlocked”. This paradigm shift turns one-time purchases to ongoing revenue streams.

7) Unified Customer Profiles

Each customer interaction presents a chance for companies to learn more about their audience and to improve their customer’s end-to-end journey. To deliver on this, companies need to create customer profiles that can be accessed by any employee on any platform. Even when customers are passed across channels, this 360-degree view of a customer’s history enables employees at every level of an organization to treat the customer as a valued individual and ensure that they receive a consistent experience with a personal touch.

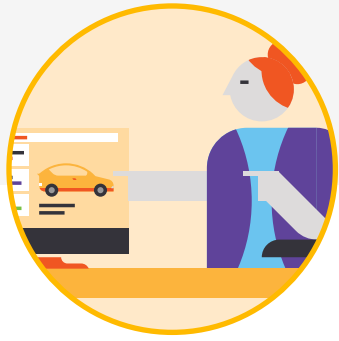
6) Networked Infrastructure

Fleets of vehicles create a tremendous amount of data. When aggregated, the ebb and flow of traffic creates a powerful real-time snapshot of a city’s inner workings. Access to mobility data fuels innovative new services and helps city planners make more informed decisions. The data also enables massive simulations, which have become critical for smart cities that want to orchestrate traffic and establish an autonomous transportation grid.

8) Frictionless Pre-Shopping

Consumers dislike the unnecessary complexity, excessive paperwork and overall length of time it takes to buy a car. Companies are automating processes, removing barriers, and introducing digital tools to facilitate a seamless move from online research to physical shopping. Today’s consumers are empowered to do most of the “pre-shopping” on their own. From a company’s perspective, it is about ensuring price consistency across channels and getting all the tedious work done in advance to enhance/speed up the in-person experience.

5 Digital Transformation Journeys Within The Auto Industry



Omnichannel Shopping

p 17

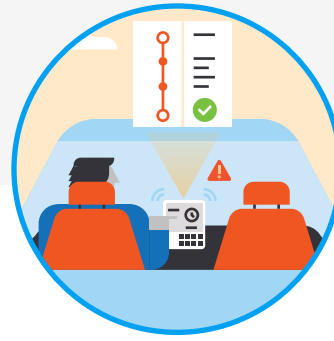
Powering a digitally enabled car buying experience that supports a fluid conversation between shoppers and dealerships



Connected Ownership

p 22

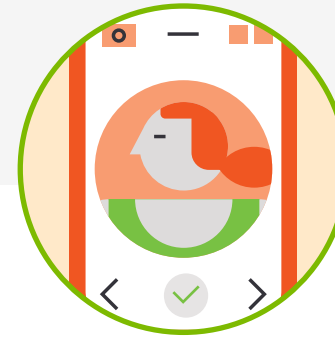
Providing proactive levels of customer service and turning one-time purchases into ongoing revenue streams



Connected Driving Experiences

p 27

Enhancing the in-car experience with connectivity, contextually relevant content, and on-the-go adaptability



Urban Mobility

p 32

Mobility companies are partnering with cities to provide affordable, equitable, and sustainable transportation to citizens



Fleet Management

p 37

Tracking mobility data to increase operational efficiency and continuously make adjustments



1. Omnichannel Shopping

Powering a digitally enabled car buying experience that supports a fluid conversation between shoppers and dealerships

Today's new vehicle shoppers are very informed by the time they show up to the dealership. They know exactly what they want and how much they want to pay. They don't want to waste time with negotiations, paperwork and unwanted upsells. They want to focus on the test drive and have an honest interaction with an informed salesperson. To live up to those expectations, dealerships are creating a unified view of their customers to seamlessly move them from online research to physical shopping. They are automating steps in the journey and removing roadblocks to empower customers to do more on their own. Advanced CRM systems track and analyze engagement history in order to deliver a concierge level of service; streamlining the purchase process and simplifying financing.

KEY THEMES:

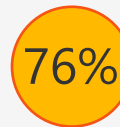
- Interactive Marketing
- Data-Driven Relationships
- Empowered Consumers
- Streamlined Sales

"Globally, automotive shoppers expect a digital experience that's consistent with the digital experiences they're having in other segments of retail, or in their interactions with other digital brands. As a consequence, car manufacturers and dealers, as well as mobility services providers, are trying to figure out how to create compelling experiences that also integrate their current businesses to create an omnichannel experience. The challenge with auto is that because the manufacturers don't own their stores and because there are a variety of different systems, and technologies, sources of data, along with different business needs between dealers and manufacturers, the business is highly fragmented."

John Reed

Director, Automotive Customer Experience Solutions, Microsoft

SUPPORTING DATA



67% of consumers believe personalization technology will improve the car-buying process. 76% of consumers expect auto dealers to know something about them before they walk onto the showroom floor.

Technology and Transformation of Retail Study, Cox Automotive's, 2019



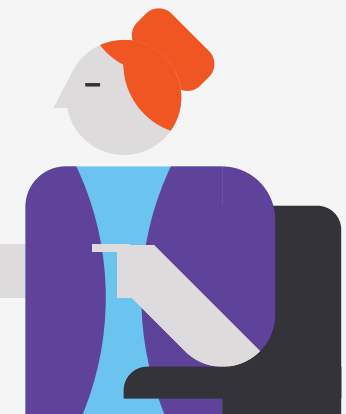
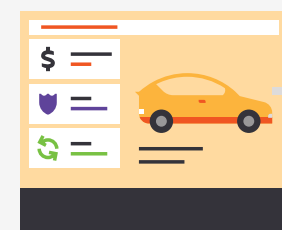
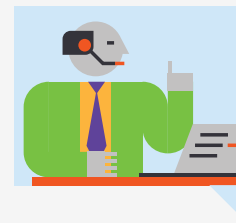
72% of Millennials and Gen Z consumers are likely to try visual search options. Virtual reality technologies will generate 1.8 trillion USD in revenue through retail and marketing in 2022.

Commerce Connected Playbook. PYMNTS, 2020



Only 9% of 100 senior retail executives surveyed are currently able to support technologies like artificial intelligence (AI), chatbots and augmented/virtual reality (AR/VR) to engage mobile shoppers, while 52% said they weren't prepared.

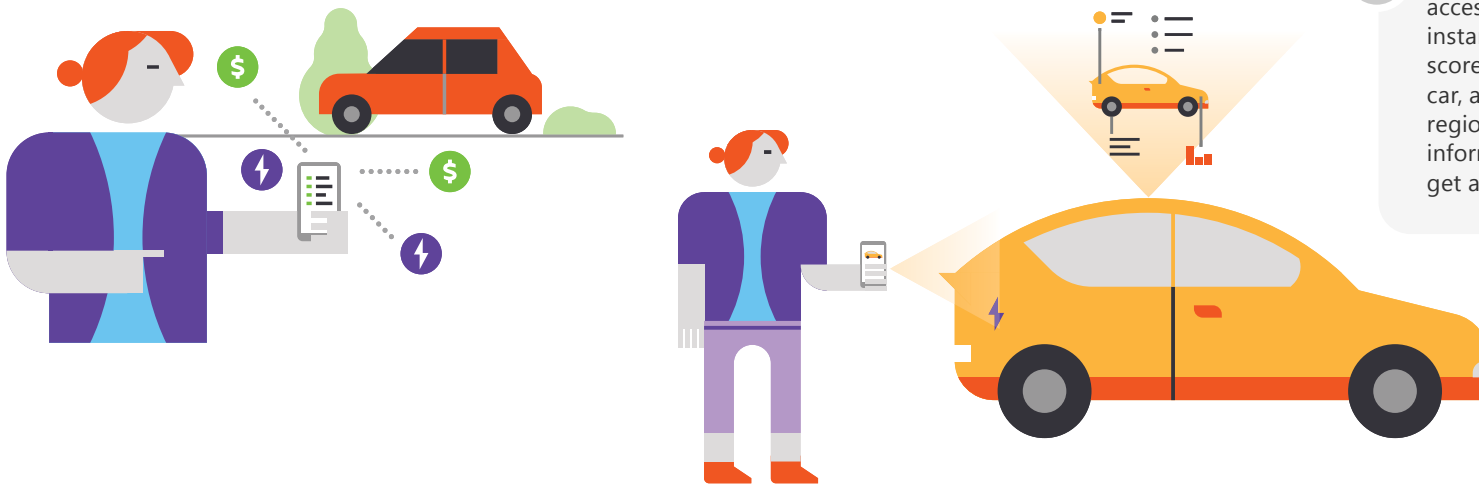
How New Tech is Creating Seamless Mobile Shopping Experiences. WBR Insights, 2020



SCENARIO:

Tom and Jordan work at two different dealerships for the same car manufacturer. They respond to Skyler, who wants to sell her family's old car and buy a new one. Using a sophisticated CRM platform, Tom and Jordan are able to support Skyler's entire customer journey; connecting marketing, sales and service with customer insights. They are able to capture consumer data and engage with Skyler at the very top of the funnel. The insights from those interactions are used to create a unified customer profile that can be shared across the enterprise. The CRM platform provides a direct line of communication with Skyler and enhances the showroom experience with assistive sales features.

- 1 Skyler lists her car for sale by taking a few pictures on her phone. Algorithms automatically sort them into categories and create an online listing, complete with an estimated list price. Because Skyler hopes to buy a new electric car, she also wants to know what the trade-in value is, so she allows the appraisal system to share her newly created listing with local dealers that sell EVs.
- 2 Later that day, Skyler sees an EV on the street that she really likes. She pulls out her phone and opens an AR app to learn more about it. Walking around the vehicle, the app pulls up information about the car's features (e.g. available colors, engine specs, and performance). Before leaving, Skyler saves a digital replica of the vehicle so that she can learn more about it later.



- 3 At home, she accesses the digital replica on her desktop computer. There, she is able to learn more about the vehicle--and its various trim packages. To get more information, she chats with a local dealer, Tom.

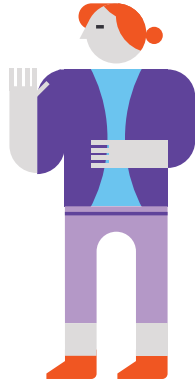
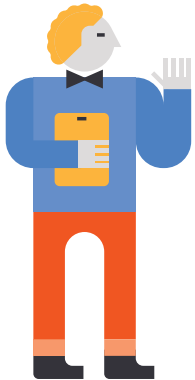
Based on her conversation with Tom, she makes a few modifications to the digital replica that she downloaded. After configuring it exactly how she wants it, Skyler can walk around a virtual model of her dream car. She can even place the virtual vehicle in her driveway to see how it looks; open its doors and turn on the lights.

- 4 Now that Skyler knows what she wants, she needs to figure how much it will all cost. She provides access to her financial information online and instantly receives a price that reflects her credit score, along with the trade-in value of her old car, and all current rebates and incentives for the region. Skyler also authorizes the system to access information about her previous driving behaviors to get a quote on their in-house insurance policy.

5

Based on their online interaction, Tom's AI-enabled CRM platform generates a customer profile for Skyler that he uses to follow up with tailored messaging. Tom is able to compare the virtual model Skyler created with current inventory at all dealerships in his network. He includes a link to the most comparable model that is on his lot and suggests a test drive. To increase convenience and reduce anxiety, Tom offers to bring the car to Skyler's home or office and provides a link for scheduling a time.

During the test drive, Skyler realizes that she wants a slightly different model and feature set, which is not something Tom has back at the lot.



7

Tom refers Skyler to Jordan's dealership across town. Jordan is able to access Skyler's customer profile, which includes all the specs for her newly updated "auto avatar". After checking his inventory, Jordan confirms that they have a vehicle with very similar specs available.

The CRM system provides Jordan with suggestions for the 'next best action' in closing the sale. Because they don't have exactly what Skyler wants, Jordan offers to unlock the premium infotainment system and extended mileage feature on the vehicle free of charge.

8

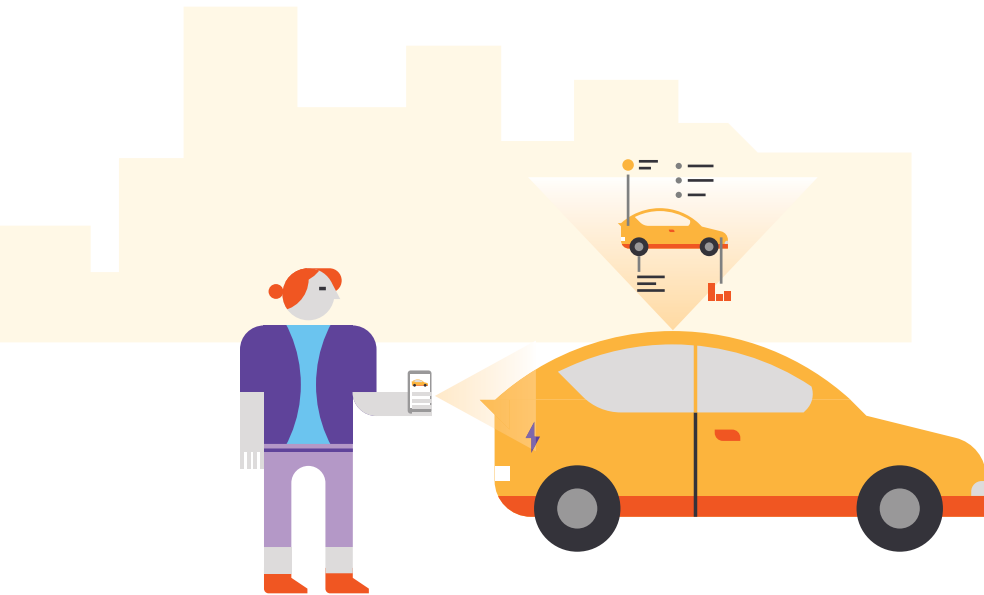
There is no negotiation or paperwork. With finance and insurance already pre-qualified, the price that Skyler initially saw online is exactly what she pays. The necessary forms can be quickly completed from a tablet without ever leaving the vehicle.

9

The connected infrastructure enabled a seamless hand off between dealerships, and between internal marketing, sales, and finance departments. Management can monitor those relationships through a dashboard displaying key information and reward each party for their contribution to the final sale.

DIGITAL TRANSFORMATION CHECKLIST

- Facilitate a seamless move from online research to a physical shopping experience
- Engage potential buyers during the research phase with targeted, tailored messaging
- Retain any data collected to help create a seamless experience at the dealership and beyond
- Create a unified view of the customer across the marketing ecosystem
- Increase price transparency across channels and accelerate the car-buying transaction
- Streamline insurance, financing and other paperwork with online pre-approvals and assistive tech
- Engage with customers on their own terms across physical and digital channels



Microsoft Case Study: *Porsche Holding*

To create a mobile-first workplace that allows for greater collaboration across each of its global divisions, Porsche Holding Salzburg, Europe's largest car distributor, partnered with Microsoft to deploy Microsoft 365 throughout its Volkswagen Group brands as well as the company's spare parts distribution, automobile financing services, and an in-house IT system development company called Porsche Informatik. Chosen not only for its interoperable business tools, but also for its state-of-the-art security features, Microsoft 365 allows Porsche Holding to securely open communications across each position within the company, connecting all of its employees in real-time and in turn helping its frontline sales teams to provide exceptional customer service both online and in person.

Today, dealerships' main contact with customers is shifting from salespeople within a showroom, to direct contact via online communications. Recognizing the tech-driven industry disruptors that are rapidly changing how people purchase, drive and service their vehicles, Porsche Holdings realized its global workforce needed better mobile and cloud-connected business productivity tools. Through Microsoft Teams, a central hub for meetings, chat, and content sharing, Porsche Holding's employees are now able to better meet customers' expectations for flexible, cloud-based online services. Today, warehouse managers carrying their smartphones can use Microsoft Teams, OneDrive, and Outlook to communicate with the logistics center in Salzburg, and service consultants in a dealership can use smartphones to stay connected to corporate news via email or access HR documents on a Microsoft SharePoint site. Since introducing these capabilities for its workforce, use of mobile apps has increased by 50 percent across Porsche Holding. With enhanced security for anytime, anywhere work environments, Porsche Holding employees are free to collaborate virtually when and where it suits them—without worrying shared data and transactions are secure.

[Learn more](#)

How Microsoft Powers Next-Gen Omnichannel Shopping

Synced CRM:

In order to deliver on the personalization and recognition that customers expect, companies must invest in synchronizing customer profiles and developing robust customer analytics tools, which can be accessed by employees on any platform and at any stage in the customer journey. Even when customers are passed between agents and across different channels, this 360-degree view of each customer's history enables employees at every level of an organization to treat the customer as a valued individual and ensure that they receive a consistent experience with a personal touch.

- **Dynamics 365 Automotive Accelerator** enables customer insights, digital marketing, customer engagement, and OEM-to-dealer integration for automotive OEMs, distributors, and dealers.

Dynamics 365 Customer Insights brings data from all sources

- together to gain a single view of customers and discover insights that drive personalized experiences.

Dynamic Outreach:

For today's consumers, the discovery process is more likely to take place within the context of a social media feed or a third-party website than a brand's homepage or store, which has forced brands to rethink how they engage with consumers at the top of the funnel. Automotive brands are creating interactive marketing content that reaches potential buyers where they are online, allowing them to learn more about vehicles in a fun, engaging way.

- **Adobe Experience Cloud** provides a complex view of customers, delivers personalized experiences and optimizes engagement.

Dynamics 365 Marketing increases customer demand for your

- products and services, creates seamless customer experiences, and improves marketing results.

Always-on Support:

Customers are increasingly comfortable browsing, purchasing, and even troubleshooting on their own before turning to brands for support. Rather than getting in the way of customer independence, companies can improve the experience by automating steps in the journey, removing roadblocks, or developing easy-to-use supports that streamline the process and empower customers to achieve more on their own. Customers expect brands and businesses to always be available at the right time and in the right place to deliver consistent, convenient and personalized experiences.

- **Techsoft** delivers a best-in-class customer experience by providing a complete 360-degree customer and vehicle view.
- **Annata for 365** drives a great omnichannel customer journey, engaging customers with a personal, relevant, seamless, and differentiated experience.

2. Connected Ownership

Providing proactive levels of customer service and turning one-time purchases into ongoing revenue streams

Today's cars are as much an internet-enabled consumer electronic device as they are an engineered machine. They operate on a centralized computer connected to the cloud capturing and reporting sophisticated streams of data. Onboard sensors allow dealers/manufacturers to monitor vehicles in real-time, collecting information on the vehicle's performance, transferring it to the cloud and evaluating any risks of potential malfunctions of hardware or software systems. If a problem is detected, over-the-air updates can often fix the issue on the fly. The two-way connectivity also allows customers to purchase performance upgrades, turning one-time purchases into ongoing revenue streams.

KEY THEMES:

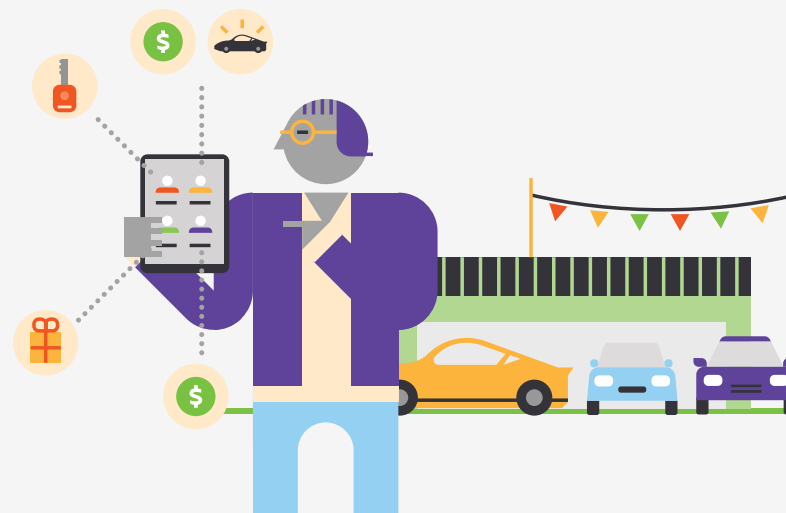
- Digital Twins
- Unified Customer Profiles
- Remote Updates
- Post-Purchase Sales

The big opportunity for OEMs is to become a trusted partner to consumers by offering a continuous set of services across their mobility and transportation journeys throughout the day and throughout all the different systems that they have to interact with. The digital chassis makes that possible, not just when the car is manufactured but throughout the lifetime and throughout the full relationship with that consumer. Connectivity is not just being able to connect to the cloud. It is the connection between the brand and the consumer being more than a single transaction. I certainly don't want to underestimate the benefits of cost and efficiency, but this offers even greater value.

Tara Prakriya
General Manager, Microsoft

SUPPORTING DATA

- 72%** 72% of dealers say automation and AI technology will help empower employees and improve consumer satisfaction without reducing staff.
Technology and Transformation of Retail Study, Cox Automotive's, 2019
- 49%** 49% of executives and 42% of consumers believe OEMs to be the big winners in the battle for the direct customer relationship.
Global Automotive Executive Survey, KPMG, 2019
- 62%** 62% of customers expect companies to adapt based on their actions or behaviors. The same study found that only 47% of customers believe they are receiving this level of personalization today.
The New Rules Of Customer Engagement: Key Trends from Global Research, Salesforce, 2019



SCENARIO:

Jamal is a customer service rep at a car dealership. He is in charge of all post-sale services. Over the course of a single day, he deals with a variety of customer interactions, from onboarding and maintenance to sales and loyalty. Jamal uses a dealership management system to monitor all the vehicles on the lot, as well as all the sold, leased, and subscribed vehicles. The system provides an interface for viewing each vehicle's digital twin and communicating with individual owners. The platform maintains a 360-view of customers that help anticipate maintenance needs and provide proactive levels of customer service.

1

Part of Jamal's job is to get owners onboarded and educated on the operation of their new vehicles. This includes an in-person orientation about using the digital features of the vehicle and its associated mobile app. During the onboarding process, Jamal is also responsible for helping customers register their vehicle's "digital twin," which simply requires them to scan the vehicle's VIN# with the camera function in the app. By having a digital replica in place, both the owner and dealer can monitor the vehicle's health and quickly diagnose any problems as they occur.

2

Within the dealership's management platform, Jamal can access a service dashboard that tracks historical and real-time usage data to anticipate when vehicles need routine maintenance like oil changes or tire rotations. Jamal employs an AI assistant to monitor the list and automatically send notifications to customers when their vehicle is due, suggesting times based on previous appointments. Depending on the service, owners can pay extra to have a mobile technician complete the work at their home or office. The scheduling tool syncs with the service and maintenance department to ensure that they have the right parts and supplies on hand and are staffed accordingly.



3

Jamal gets a notification informing him that one of their leased vehicles has been red-flagged. The on-board sensors have noticed a potentially dangerous irregularity. Jamal immediately notifies the driver via email, text message, and a dashboard display. The driver sees the messages and responds by pressing a button on the infotainment screen and is instantly connected to Jamal via voice. Jamal tells the driver to pull over somewhere safe to await roadside assistance. Jamal can simultaneously work with his service team to dispatch a nearby field technician to minimize the wait.

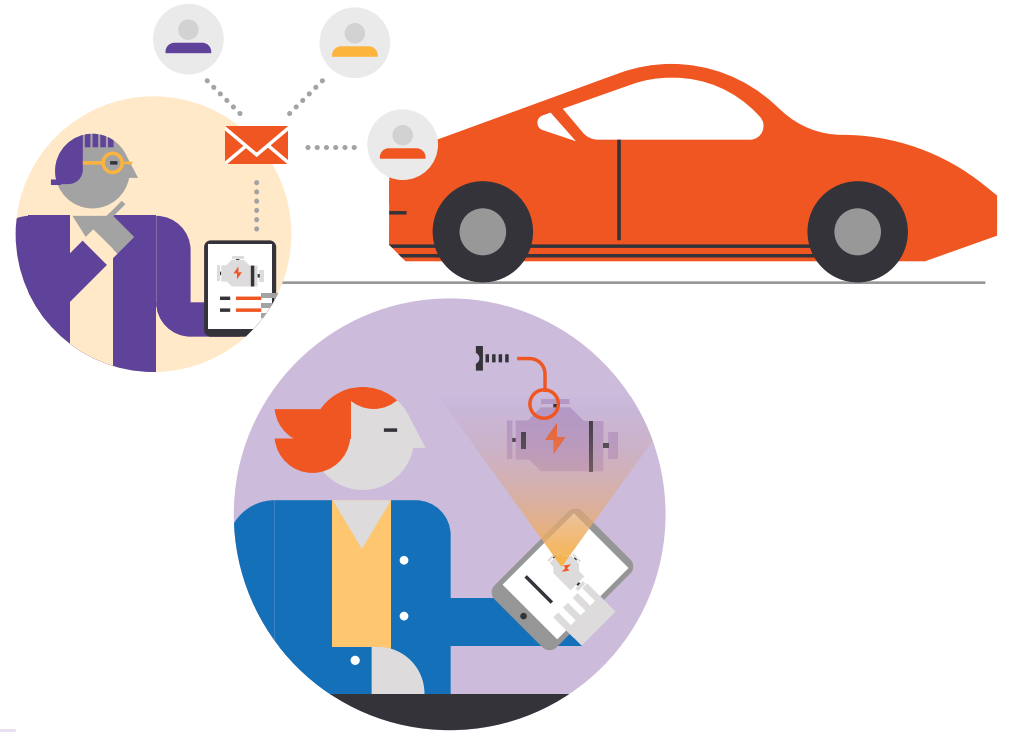
4

Local data across dealer and driver networks is automatically aggregated and sent to the manufacturer for analysis. The OEM is able to track a bigger issue within a particular model's braking system and gets to work on a software patch that can be distributed nationally. As this update is being disseminated, Jamal also sends a personal message to his customers, instructing them to get in touch if they have any questions.



5

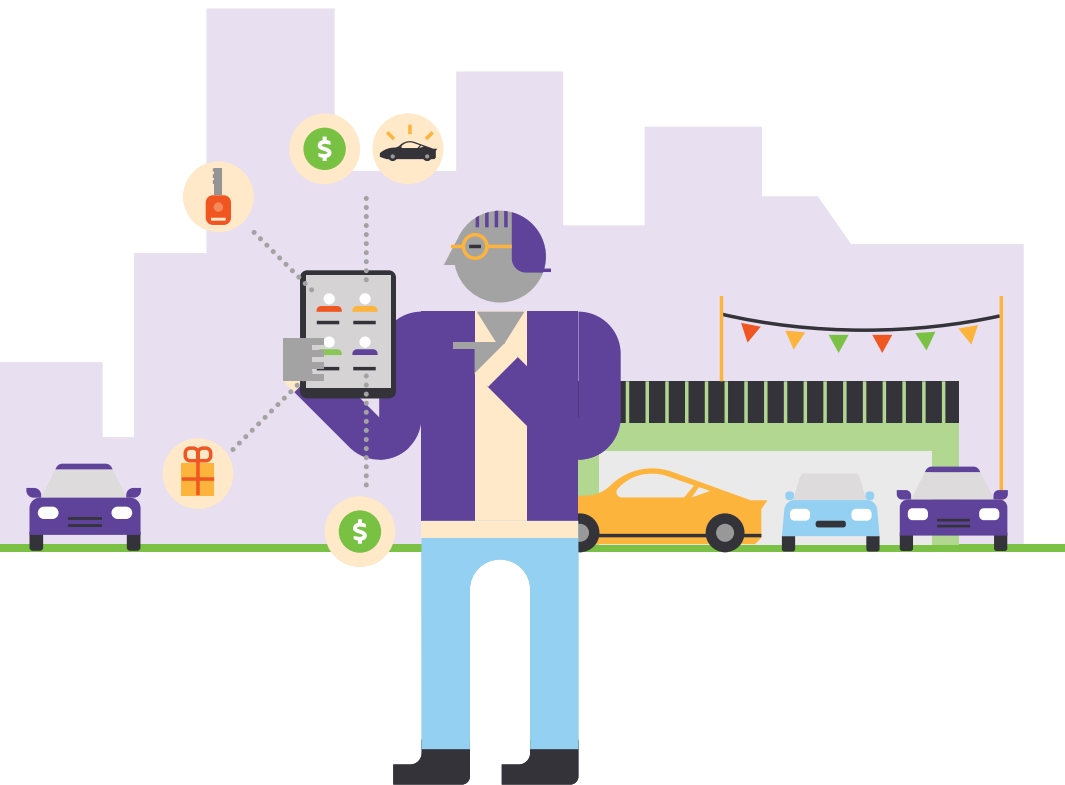
Jamal responds to an email sent from an owner asking about the best way to install an aftermarket accessory. He is able to send them a link to a step-by-step tutorial that overlays relevant information onto the vehicle using AR functionality through the OEM app. At home, the owner can use the mobile app to get a step-by-step immersive demonstration. Jamal encourages the owner to create his own AR Tutorial and contribute it to a rapidly growing and vibrant community of other owners interested in doing their own maintenance and/or modifications.



6

To foster long-term relationships, Jamal is able to reward loyal customers for positive behaviors, such as safe driving or active participation within the driver community. Jamal can reach out to individual drivers and share perks like discounts on service, digital bundles to upgrade vehicle features or access to different models for weekend getaways.

Using an audience segmentation tool in his CRM platform, Jamal can also identify owners that might be open to an upsell. The system can generate a personalized bundle of content, apps, and services from both the OEM and the broader marketplace based on individual driver profiles to create a unique value ecosystem for both owners and partners.



DIGITAL TRANSFORMATION CHECKLIST

- Anticipate customer needs and deliver personalized service and solutions
- Reduce interruptions caused by potential issues before they arise
- Drive customer engagement throughout the product life cycle
- Transform into a software-driven company that can directly connect with its customers
- Turn one-time purchases into ongoing revenue streams and drive revenue with upsell and cross-sell opportunities
- Reward consumers for positive behaviors, such as safe driving, on-time payments or for sharing information about their driving behavior and other personal data, fostering a mutually beneficial exchange

Microsoft Case Study: *Brimborg*

Multi brand automotive company Brimborg partnered with independent software vendor Annata and Microsoft to drive innovation across its rental business model, and become one of the best customer rated businesses in Iceland. Through the Microsoft Dynamics 365 platform, Annata has been able to create a solution for Brimborg that improves their customer satisfaction rates and helps to leverage customer data for an improved experience. Rather than separate employees selling spare parts to separate receptionists at different workshops, customers are now able to access these services from one place, streamlining Brimborgs business operations channels. Additionally, the Microsoft Dynamic 365 solution is aiding Brimborg to better understand its business through access to immediate sales figures and real-time rental contracts, in turn using that data to inform their marketing campaigns. Through Dynamic 365, Brimborg employees are able to instantly access real-time rental options and customer preferences in order to deliver a rental vehicle in less than 4 minutes, help customers to make a return within 30 seconds and then turn that vehicle around again within 12 minutes. By providing this level of intuitive service, Brimborg is able to ensure customers continuously receive the 'made for me' retail moments they crave.

[Learn more](#)



How Microsoft Powers Next-Gen Connected Ownership

Customer Experience:

When it comes to customer experience, organizations excel when they not only address buyer concerns but also invest in building meaningful relationships. By combining customer service best practices with data-driven digital solutions, companies can ensure that each interaction is relevant, personal, and effective.

- **Annata for 365** drives a great omni-channel customer journey, engaging customers with a personal, relevant, seamless, and differentiated experience.
- **Dynamics 365 Customer Insights** brings data from all sources together to gain a single view of customers and discover insights that drive personalized experiences.
- **Dynamics 365 Marketing** increases customer demand for your products and services, creates seamless customer experiences, and improves marketing results.
- **Adobe Experience Cloud** provides a complex view of customers, delivers personalized experiences and optimizes engagement.

Incentivized Ownership

(Anticipatory Maintenance // OTA):

As cars become more connected, there are growing opportunities for car brands to capture valuable data and leverage it to improve their operations. As internet-enabled technologies are able to understand the broader context around a product's use, the next evolution of assistance will shift from reactive to proactive. Over-the-air updates help make cars future-proof and lead to faster deployment time frames for updates, as well as more cost-efficient operations.

- **Microsoft Connected Vehicle Platform (MCVP)** accelerates the delivery of connected vehicle solutions and mobility experiences.

Streamlined Maintenance:

Keeping cars operational. Helping owners schedule appointments that fit their schedule, rapidly dispatching assistance when it is needed, and providing mixed reality tools to ensure the job is done correctly.

- **Dynamics 365 Automotive Accelerator** empowers customers and users to schedule appointments and services facilitated through proactive communications.
- **Dynamics 365 Field Service:** Deliver exceptional customer experiences to dispatch the right resource at the right time to the right place—with all the tools to succeed the first time.
- **Dynamics 365:** Empower employees and optimize operations with mixed reality applications (Remote Assist, Guides, Product Visualizations).

Feedback Cycles:

As carmakers collect information about the performance and use of each vehicle, engineers can aggregate the data to create updates that will improve the performance of that specific range of cars, a very real example of real-time innovation.

- **Prevedere Demand Forecasting:** Make better forecasting decisions using real-time insights into your industry, markets, and product demand. Quickly develop real-time demand models.
- **ToolsGroup Multi-Echelon Inventory Optimization:** Increase customer service levels and lower costs when you apply intelligent analytics to your existing sales data.

3. Connected Driving Experiences

Enhancing the in-car experience with connectivity, contextually relevant content, and on-the-go adaptability

Technology is transforming the in-car experience. Drivers have always valued safety, comfort and performance but with connected vehicles, they now also demand contextually relevant experiences, content and commerce. By taking personal preferences, location and situation into consideration, connected cars can respond to drivers' in-the-moment needs, delivering relevant recommendations and enabling on-the-go adaptability. With the inclusion of emotional and biometric sensors, these ancillary services can become even more personalized--proactively responding to the changing needs of drivers.

KEY THEMES:

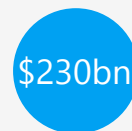
- Personalization
- In-Car Commerce
- Navigation and Route Planning
- Driver Monitoring and Safety

"As autonomous capabilities become more advanced, and as vehicles become more self operating, first in specific domains and environments where the driver does not need to be paying attention, for example, on highways, or in traffic jams, or in geofenced areas, all of a sudden, how they interact with the vehicle can look very different. You start thinking of the user experience within the vehicle, things like entertainment options, productivity options, and everything else."

Jurgen Willis

Senior Director, Microsoft Azure Engineering

SUPPORTING DATA



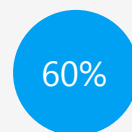
The average 51 minutes that 135 million U.S. workers spend in their cars during their daily commutes represents a \$230 billion in-car connected commerce opportunity through mobile smartphone or dashboard-based internet connections.

Digital Drive Report, PYMNTS, 2019



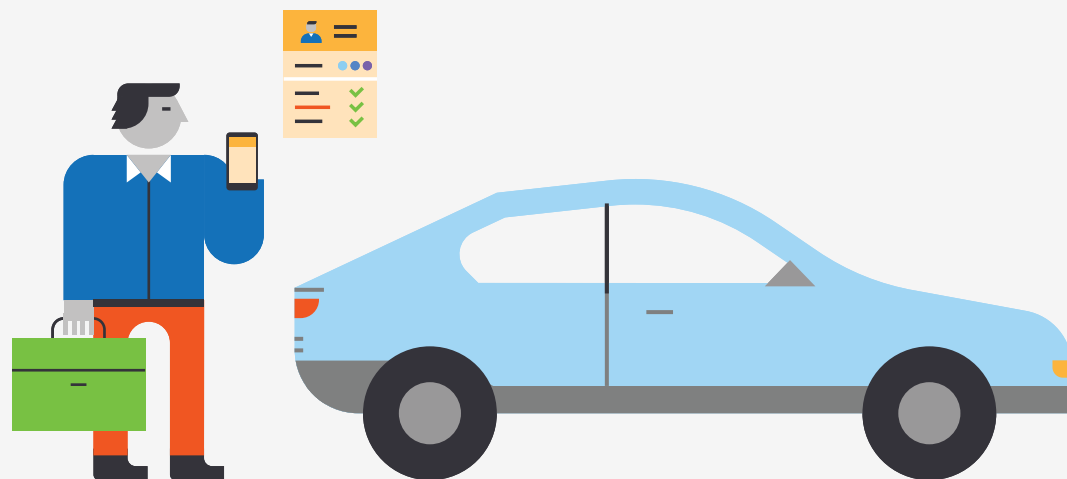
\$17 billion in routine and leisure consumer spending is estimated to be generated by integrated, in-vehicle marketplace applications by 2025.

In-Car Marketplace - Use Cases and Transactions, Research & Markets, 2020



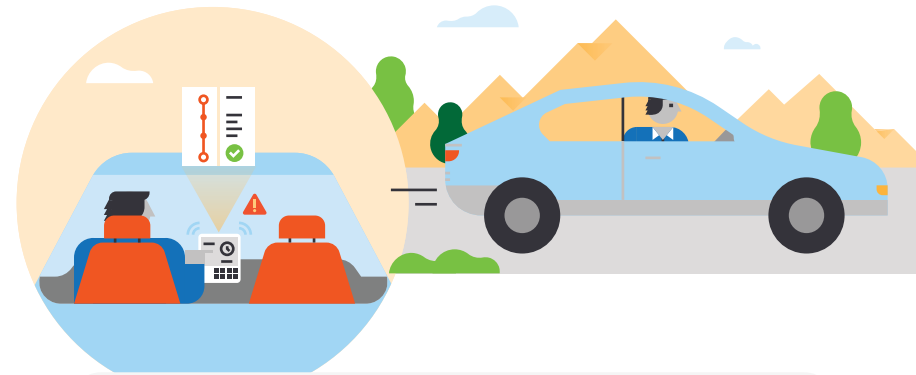
60% of consumers in China would pay more for a vehicle that could communicate with other vehicles and road infrastructure to improve their safety.

2020 Global Automotive Consumer Study, Deloitte, 2019



SCENARIO:

On short notice, Joaquin flies across the country for a busy day of sales meetings with customers. He needs to visit half-a dozen businesses but is unfamiliar with the area. The vehicle that he accesses through an OEM subscription syncs with his phone to create a tailored cabin experience and develop an itinerary that plans out all aspects of his trip. Even as Joaquin's schedule changes throughout the day, the vehicle can dynamically respond. Throughout his journey, voice-based AI serves as the connective tissue for a wide variety of services and capabilities, from enabling in-car payments to easing daily stress.



1 Joaquin owns a vehicle as part of an OEM subscription service, which enables him to access available cars wherever he's traveling. He manages his subscription from the OEM's mobile app. After he lands, the app is able to guide him from the airport terminal to the lot where the vehicle he is borrowing is parked. As he approaches, the vehicle's lights flash and proximity sensors unlock the doors and trunk.

After the engine turns on, his phone is automatically synced to the vehicle OS, which accesses his personal preferences to configure the infotainment display, seat position and mirror adjustments. A virtual assistant asks if he wants to integrate his meeting schedule with the vehicle's navigation system. He says yes and the car creates a custom route and itinerary.

2 On the way to his first destination, he asks the virtual assistant where he can pick up breakfast. The assistant promptly replies with a list of five nearby restaurants, and an offer to provide more information about any of them. That same list is displayed in graphic form on the infotainment display. He selects his favorite fast-casual restaurant. And because he already has a connected profile, his previous orders are stored and easy to re-order. He opts for his standard order, which will be paid for and ready to pick-up by the time he arrives.

3 On the way to his second meeting, he gets a text message. Something has come up and the person won't be available until a bit later. The virtual assistant is able to understand the context of the message. With Joaquin's approval, the virtual assistant gets the navigation system to create a new itinerary and automatically updates Joaquin's calendar (sending notifications to everyone with updated arrival times).

4 Given the extra time now available, the assistant suggests a more scenic route based on previous trips that Joaquin has taken, allowing him to take in some of the sites. He agrees to the updated route and the assistant is able to act as a tour guide, providing details about points of interest along the way.



5

While in a meeting, Joaquin receives a message that his lost luggage has been retrieved and is ready to be delivered. Through his OEM app, he can share the location of his vehicle and grant the delivery driver temporary access to the vehicle's trunk without having to interrupt his conversation.



6

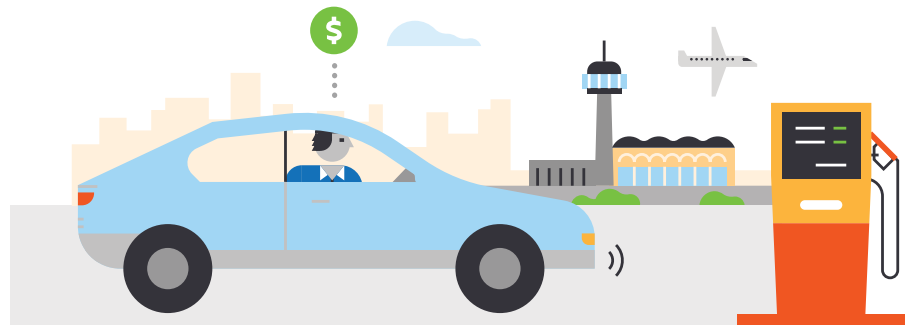
On the way to his last appointment, early evening traffic conditions start to get worse and Joaquin begins to feel the effects of his early morning flight. A suite of sensors in the vehicle's cabin pick up on his emotional and physical state, detecting increased levels of stress and irritability. Interior conditions like lighting and temperature automatically adjust to accommodate and the assistant suggests a series of actions from taking a break at suggested nearby parks, rest stops or coffee shops to playing a personalized playlist. He opts for a guided breathing exercise led by the assistant, which helps calm him down and get him ready for his meeting.

7

By the time Joaquin leaves his final meeting, it is already dark. He's tired from the long day and still has some important paperwork to complete so he can secure the new sales orders from his meetings. He opts to use the autonomous driving function within the vehicle so he can work while on the way to the airport. Recognizing the time, the assistant also recommends that Joaquin take the opportunity to call his family on the way before the kids head to bed.

8

As Joaquin nears the airport, the vehicle selects the closest gas station with the best fuel prices to top off the tank before he returns it. As it pulls to the pump, it is able to initiate pre-pay so that he can save time and make it to his flight home in plenty of time.



DIGITAL TRANSFORMATION CHECKLIST

- Deliver an automotive operating system that is accessible in-vehicle and on a mobile device
- Personalize the vehicle experience with intelligent syncing and seamless connectivity
- Integrate real-time location intelligence
- Keep drivers' eyes on the road and hands on the wheel with voice-based interfaces
- Improve driver comfort and safety with real-time monitoring and responsiveness
- Think about how on-demand services can deliver 'on-the-go' convenience

Microsoft Case Study: *Mercedes-Benz*

By migrating its development team from a hardware-based solution to Microsoft's cloud-native services on Azure, the Connected Cars Platform team at Mercedes-Benz Research & Development is no longer constrained by a system that only allows for yearly software updates. Now, Mercedes-Benz connected car app developers are shipping new solutions to market in as little as three months, modernizing the way in-car software is updated and allowing for innovation to match the pace of business. With a cloud-based containerized platform, the team can develop individual apps and then deliver them in a secure and compact way over the air, using the programming language of their choice. Additionally, the containerized platform allows developers to run automated tests in simulated vehicles within the cloud, accelerating the pace at which solutions are refined and approved, and reducing lead time and delays. With a cloud-first approach to R&D, the Mercedes-Benz Connected Car Platform team was also able to access an operations dashboard using Azure Monitor, providing full scope of operations in real-time, from development to testing and production.

[Learn more](#)



How Microsoft Powers Next-Gen Connected Driving

Partner Led Approach:

Any car is the result of hundreds of partnerships formed by the vehicle manufacturer. Microsoft makes it easy for these partners to create their services (such as telematics or mobile command and control) without worrying about complicated back-end. Because Microsoft has 'simplified the plumbing', partners are free to focus on the scenario (ie building the mobile app and thinking about the user experience) not the connectivity, data transfer, or security issues.

- **Microsoft Connected Vehicle Platform (MCVP)** accelerates the delivery of connected vehicle solutions and mobility experiences.

Location Intelligence:

While on the road, today's drivers demand real-time, contextually relevant information. They expect their applications and navigational systems to understand them, respond to their immediate needs, and stay one step ahead with built-in location intelligence.

- **Azure Maps:** Add maps, search, and routing capabilities to your apps with geospatial services APIs; Integrate real-time location intelligence; Create rich data visualizations on top of maps with heatmaps, multiple map layers, and image layers.

Voice-Based AI:

With voice-based assistants, consumers can talk to and be understood by their products. This digital presence can follow users throughout their day, moving seamlessly across devices to remove points of friction. An automated experience where needs are recognized early on and personalized based on context.

- **Virtual Assistant Solution Accelerator** provides customers with a personalized, intelligent connected vehicle experience on a variety of devices using insights from cloud-based data.

4. Urban Mobility

Mobility companies are partnering with cities to provide affordable, equitable, and sustainable transportation to citizens

Auto manufacturers are beginning to think in terms of providing mobility solutions rather than selling individual vehicles. As a result, they're looking beyond the automobile to offer access to a range of shared transportation options, from cars to scooters to public transportation, to ensure that consumers can seamlessly switch between multiple modes of transport to meet their in-moment needs. Three factors are accelerating this shift: 1) Consumers, especially in urban areas, want to limit the risk/cost associated with car ownership, while ensuring they still have the best possible experience. 2) City centers are becoming less welcoming to privately owned cars in an attempt to reduce congestion and pollution. 3) Mobile and constant connectivity have created a new paradigm for how people navigate through daily life.

KEY THEMES:

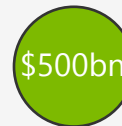
- Urbanization
- Shared Mobility
- Sustainability
- Smart Cities
- Autonomous Development

"When we consider how connected and autonomous vehicles extend to smart mobility and smart cities or connected infrastructures, Microsoft has had a lead in providing smart cities solutions worldwide. Connected vehicles are one part of it, but when you look at the smart mobility solutions it's really a number of industries coming together to provide ease of access to services that citizens need, and consumer journeys are not just confined to the automobile they're confined to consumers' personal mobility. It's your home, your devices, your CT services, your retail services accepted. As each of these come together within the context of smart mobility, we're seeing the blurring of the boundaries between industries and them all coming together to enable safe and efficient personal mobility."

Vijitha Chekuri

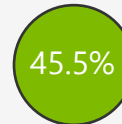
Director of Strategy & Development Autonomous & Connected Vehicles and Smart Mobility Solutions, Microsoft

SUPPORTING DATA



The shared micromobility market in China, Europe and the United States could reach \$300 to \$500 billion by 2030.

Micromobility's 15,000-mile checkup, McKinsey, 2019



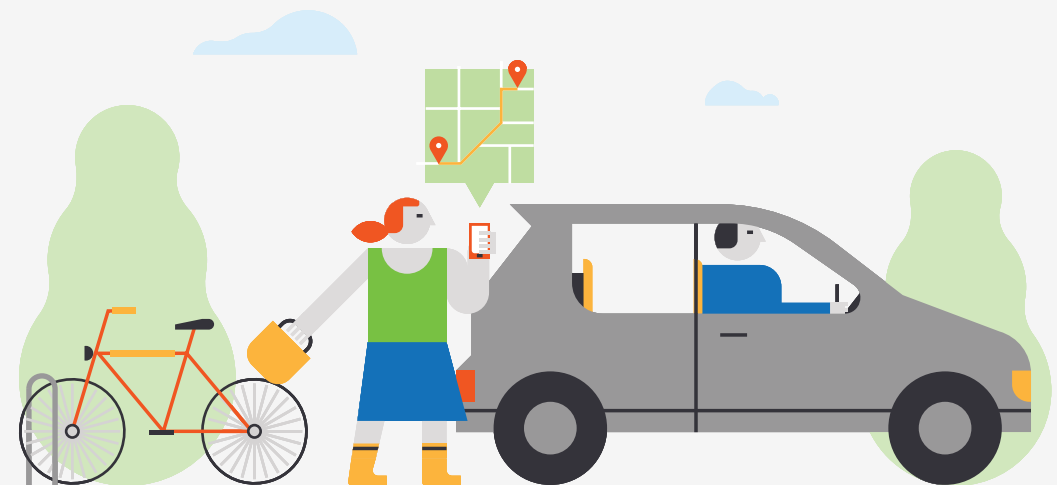
45.5% of Gen Z are comfortable with shared ride experiences in an autonomous vehicle, while 31% of American consumers report regular use of rideshare services as an alternative to using their own vehicle.

Global Automotive Executive Survey, KPMG, 2019



The Ride Sharing Market is projected to grow at a CAGR of 19.87% from 2018 to 2025, to reach a market size of USD 218.0 billion by 2025 from USD 61.3 billion in 2018.

Ride Sharing Market - Global Forecast to 2025, Markets & Markets, 2019



SCENARIO:

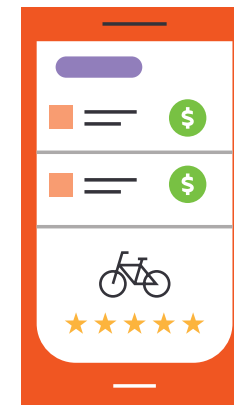
Jenny lives and works in a rapidly growing city. She doesn't own a vehicle but that doesn't impact her ability to get around conveniently and cost-effectively. While she considered getting an all-inclusive subscription from an OEM, she decided the monthly fee was too high and it still didn't solve her lack of reliable parking options. Instead, she opts for a city-sponsored mobility-as-a-service (MaaS) program that lets her plan and pay for trips across public transportation, bikes, scooters, carshares, taxis, and traditional car rentals – all without switching between apps. The city is living up to a new mandate to provide more equitable transportation solutions. Using blockchain as the backbone, the system lets her contribute her mobility data to the city. She can pick and choose what data she wants to share and who can use it. The data helps identify traffic volume, usage patterns, and popular ridership corridors so the city can reconfigure their streets and plan for a fully autonomous future. By sharing her data, Jenny is automatically enrolled in a sustainable rewards program.

1

While riding the subway, Jenny sees an advertisement for a Mobility-as-a-Service (MaaS) subscription being offered by her city. Jenny scans a code on the ad with her phone's camera that instructs her to download a mobile app. Once inside the app, she begins the sign-up process. She can choose between three tiers of service: a pay-as-you-go option; a \$50 monthly subscription offering unlimited public transport and reduced rates for taxi/carshare; and a \$500 monthly package that adds unlimited taxi/car share access. She selects the all-inclusive package.

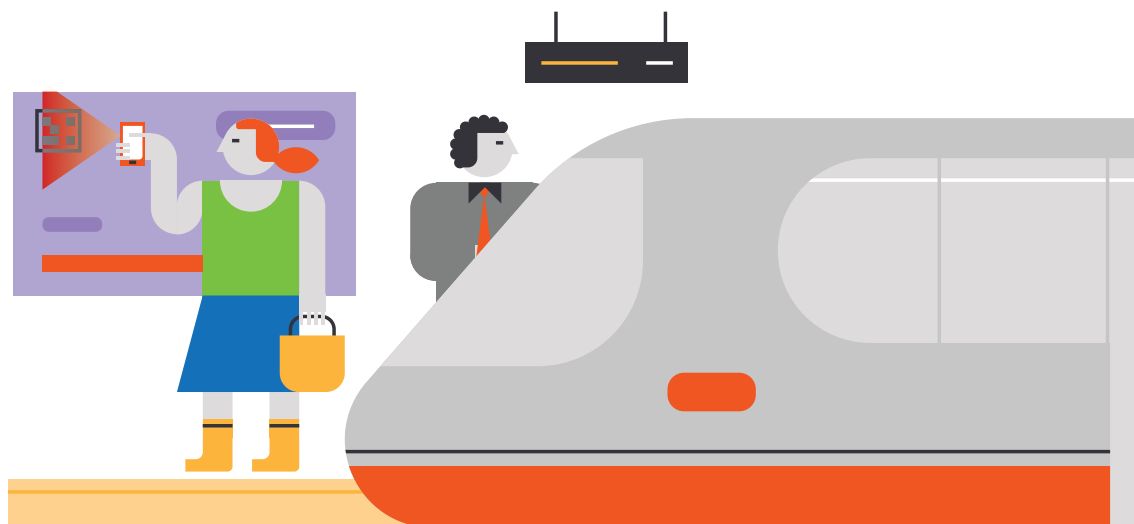
2

During the registration process, she has the option to share her anonymized mobility data with the city to help them make better decisions about how to allocate public resources. Each member can decide exactly how much of their data is uploaded to the platform and how it should be used. For example, a person may decide that location-tracking data about parks they visit can be used by the city council but not private companies. Individuals' data-sharing preferences are securely stored on the blockchain. Jenny can also opt-in to receive targeted, location-based surveys to capture qualitative data and is able to vote on a broad range of local issues.



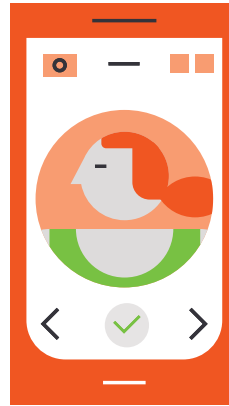
3

As a premium subscriber, and because she agreed to let the system track her movements, Jenny is eligible to earn sustainability points. Points are issued for utilizing sustainable modes of transportation. The more sustainable, the bigger the reward--so when she takes Uber she earns 2x miles. When she rides a bike, she receives 5x. If she rents a car, she can earn points for staying off highways during commute time. The points can be redeemed with brands across a variety of categories or be donated to local and national non-profit organizations.



4

To complete the registration, Jenny needs to submit biometric authentication using her face or voice. This will allow her to access bikes and scooters, even when she doesn't have her phone. It also provides verification and safety when accessing pooled rides and car shares.



5

Jenny's preferences follow her from vehicle to vehicle. When renting a car, Jenny's mirror, seating and infotainment settings are automatically adjusted. The app gives her the ability to choose who she travels with in car shares and helps her connect with others based on common interests. She can also establish whether or not she wants to chat or take a silent ride.

6

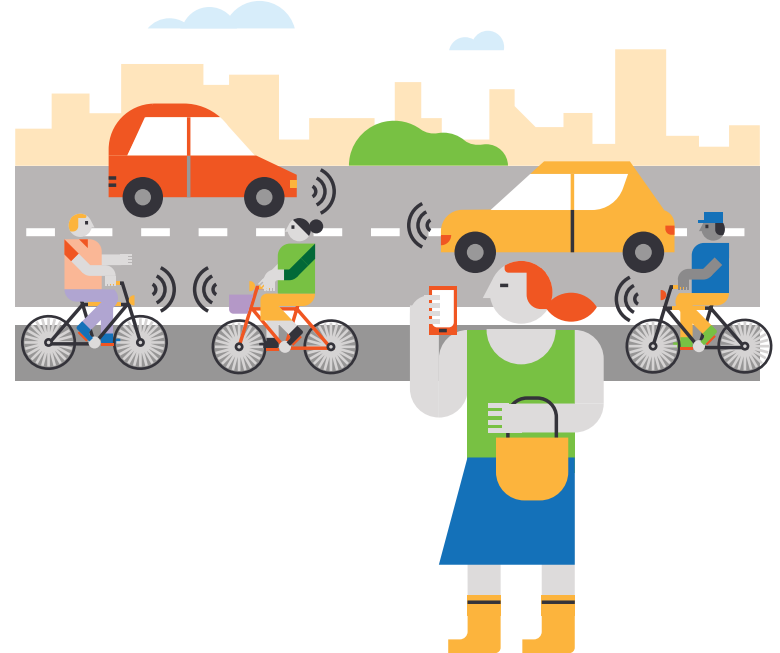
The app provides real-time location intelligence on public transit services, including stops, route information, and travel time estimations. Jenny is able to select her destination and desired time of arrival to receive tailored suggestions for optimal modes of transportation and other relevant information.

As a premium subscriber, she also gets access to trending locations. A heat map showing what bars/restaurants/clubs/events are experiencing a lot of traffic. The MaaS service has also installed displays around town that provide similar streams of real-time information, displaying curated details for that specific location.



7

In conjunction with the MaaS program, the city has analyzed member usage data to rezone a number of busy transit corridors to accommodate autonomous and semi-autonomous vehicles. Across the network, vehicles communicate with their surroundings and each other to ease congestion. Autonomous bikes and scooters are able to redistribute themselves to other stations based on need.



DIGITAL TRANSFORMATION CHECKLIST

- Help automakers transition into “mobility companies”
- Make it easy for commuters to plan and pay for trips across multiple modes of transportation (both public and private) through a single access point
- Reduce congestion and pollution and power sustainable choices
- Make the streets safer and more welcoming to pedestrians
- Establish public/private partnerships; support open-source systems
- Be transparent about the data that is being collected and how it will be used, and ensure that consumers are able to opt-out

Microsoft Case Study: *Moovit*

In order to create more inclusive cities and accessible transit realities, urban mobility app Moovit partnered with Microsoft to provide its transit data to developers who use Azure Maps, and a set of mobility-as-a-service solutions to cities, governments and organizations. Optimized for screen readers, Moovit is an essential part of customers with disabilities daily commutes, and currently serves more than 400 million users in 2,700 cities across 90 countries, and in 45 languages. Designed in partnership with a developer who is blind, as well as 550,000 local contributors, Moovit is optimized for audio experiences, low vision, and wheelchair accessibility within each of its available cities. Moovit’s data partnership with Microsoft and Azure Maps will help developers continue to build and scale similarly inclusive public transit experiences through better informed A-to-B trip planning, transit line information like scheduled and real-time transit arrivals, list of stops and route guides, as well as detailed and step-by-step itineraries, service alerts and transit maps for multiple modes of transportation, all optimized for accessibility.

[Learn more](#)



How Microsoft Powers Next-Gen Urban Mobility

Multimodal Transport Solutions:

Meet the mobility needs of people and businesses with an integrated planning approach that encompasses all modes of transit in and around cities.

- **Moovit MaaS** provides a complete software solution for governments, cities and municipalities that wish to offer MaaS to their citizens.

Access Over Ownership:

For many consumers the flexibility of multi-modal transportation outweighs the burdens of ownership. This has big impacts for OEMs and dealers looking to cater to customer needs with non-traditional solutions like subscription.

- **Dynamics 365 Automotive Accelerator** enables customer insights, digital marketing, customer engagement, and OEM-to-dealer integration for automotive OEMs, distributors, and dealers.
- **Dynamics 365 Customer Insights** brings data from all sources together to gain a single view of customers and discover insights that drive personalized experiences.

Sustainable Cities:

In an effort to curb congestion and pollution in urban environments, many cities are exploring more public and shared transport solutions and limiting the number of private vehicle traffic in certain zones.

- **Azure Maps** brings maps, search, and routing capabilities to your apps with geospatial services APIs that integrate seamlessly with other Azure tools and services.

Data Exhaust:

Most cities don't have enough information about their operations to make timely and informed decisions. However, new technologies are changing the way data is collected, making it less expensive, easier to collect, and more reliable. The digitization of society and expansion of sensor networks has produced a wealth of data that city planners can tap into, giving them a high-resolution, real-time view of their cities.

- **Azure IoT** brings greater efficiency and reliability to your value chain with world-class IoT and location intelligence services. Improve quality of service, increase safety, and reduce cost by finding smarter ways to get people and products where they need to be.
- Manage smart transportation infrastructure, assess road conditions and ease congestion with real-time and historic traffic intelligence.

5. Fleet Management

Tracking mobility data to increase operational efficiency and continuously make adjustments

For companies that employ fleets of vehicles, optimizing the management of mobile assets can have a significant impact on the bottom line. While companies once relied on historical reporting to measure efficiency, today's organizations must be able to act in real-time, continuously analyzing information to refine operations in the moment and anticipate future change. This is achieved by tracking vehicles, drivers and external factors to create a feedback loop of information and communicating key insights to relevant parties.

KEY THEMES:

- Efficiency and Sustainability
- Real-Time Monitoring
- Compliance
- New Business Models/ Revenue Streams
- Last-mile Deliveries

"The technologies across connected, autonomous, shared mobility and electric solutions are very much interwoven. If you take autonomous vehicles for example, most of the development happens in test fleets so all of the fleet management solutions that are necessary for maintaining these test vehicles are developed through the connected vehicle pipeline. So when you consider how you keep track of them, how you provision them, and how you deploy services to them or the most updated quote models or map developments back to them, the connected vehicle is definitely a key part in making all of these autonomous feature functions possible."

Vijitha Chekuri

Director of Strategy & Development Autonomous & Connected Vehicles and Smart Mobility Solutions, Microsoft

SUPPORTING DATA

86%

86% of fleets now use telematics, up significantly from just 48% two years ago and 82% in 2018. 55% of fleets reported reduced fuel costs from telematics software--a huge win considering that fuel is the largest expense for 32% of fleets. 42% have seen fewer safety incidents since using fleet tracking software to monitor driver behavior.

3rd Annual Telematics Benchmark Report: U.S. Edition, Teletrac Navman, 2019

\$31.5bn

The global fleet management market size is expected to grow from USD 15.9 billion in 2018 to USD 31.5 billion by 2023, at a Compound Annual Growth Rate of 14.7% during the forecast period.

Fleet Management Market by Solution, Service, Deployment Type, Fleet Type, and Region - Global Forecast to 2023, Research & Markets 2019

45%

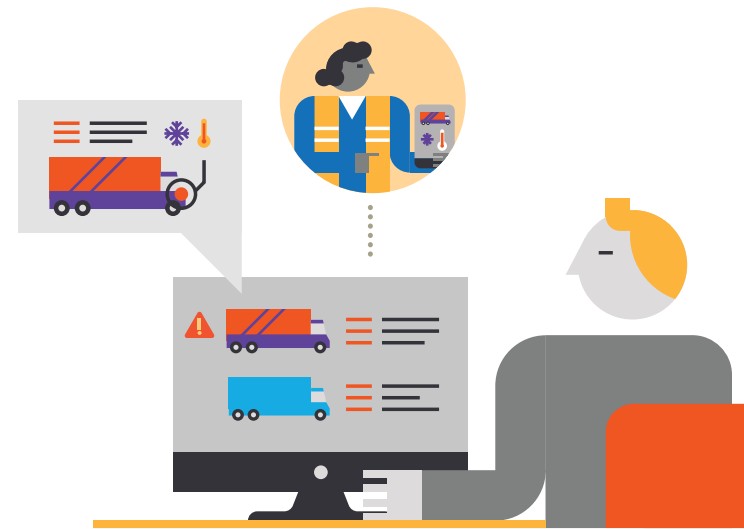
45% of fleets that used GPS tracking software achieved a positive return on investment in 11 months or less, which was up 18.5% from 2018. Companies using these platforms also reported an increase in customer service (50%), productivity (53%), routing (45%), maintenance (49%).

Fleet Tracking Trends Report, Verizon Connect, 2019



SCENARIO:

Finn is a fleet manager at a global logistics company. He is responsible for managing thousands of cars, trucks, and delivery vans. His primary objectives are to increase operational efficiency, improve safety, ensure compliance and contribute to sustainability goals. Finn relies on fleet management software that uses geospatial mapping to visualize the location and status of each vehicle. Finn can understand performance trends and usage patterns at a macro level to identify unmet needs. Finn has also been tasked with innovation and monetization strategies. He is currently piloting a vehicle-to-grid (V2G) solution as well as a last-mile delivery system that combines human drivers with small pods of sidewalk delivery bots.



3

Finn receives an alert related to a cargo truck. When he zooms in, he can identify the vehicle, its route, the driver and the estimated arrival time. Finn clicks on the vehicle to get a closer look at telemetry from the various onboard IoT sensors and discovers that the alert was triggered by the cooling-unit sensor due to increased levels of humidity, requiring the driver to be rerouted to the nearest depot. Finn issues a ticket to alert the depot's maintenance crew of the problem and schedules a replacement truck and driver.

1

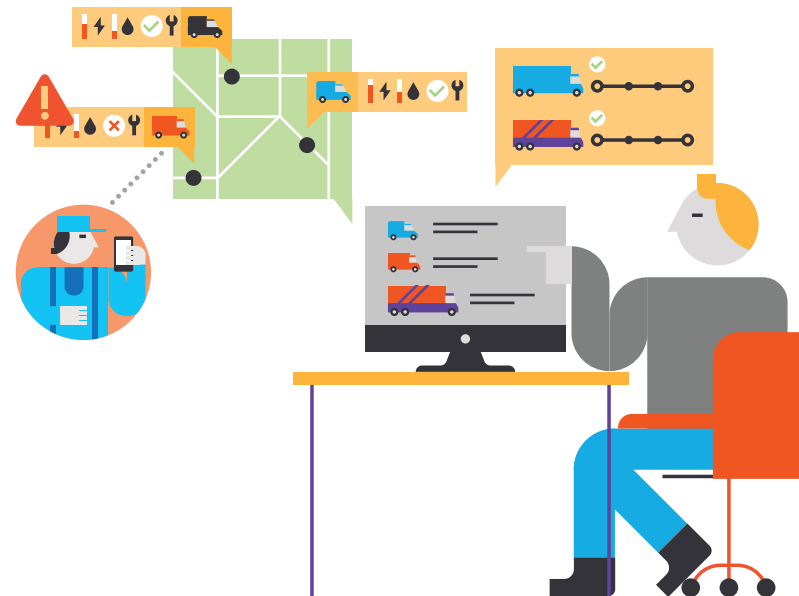
Every vehicle in the fleet is equipped with a suite of sensors. Data from the vehicles and drivers, along with environmental factors, all feed into a centralized platform for analysis. Finn starts his day by checking fuel consumption; yesterday's average MPG was over anticipated levels.

He is able to see exactly how much gas is in each vehicle and make correlations about driver efficiency by monitoring things like speed, acceleration and braking. One driver stands out. His driving patterns are fine but his miles per gallon average is low. Finn checks the vehicle diagnostics and realizes a mechanical issue is likely the problem. Finn sends the driver a message instructing him to drop his truck at the company shop and also schedules a loaner for the next day.

2

Finn is able to run large-scale simulations to give each driver the ideal route, based on the day's weather forecast and traffic patterns. These routes are tailored for each type of vehicle and the cargo they are carrying (i.e. refrigerated, dry, or hazardous).

Several years ago, the company added cameras to their fleet. Those cameras use computer vision to identify objects on the curb, such as fire hydrants, parking signs, bus shelters, and wheelchair cuts. All those details are now pinned to digital maps and made accessible to drivers. Now, drivers get real-time, hyper-local notifications to let them know exactly where they can unload cargo or if they are idling too long in a passenger drop-off zone -- all this helps to cut down on citations from the city.

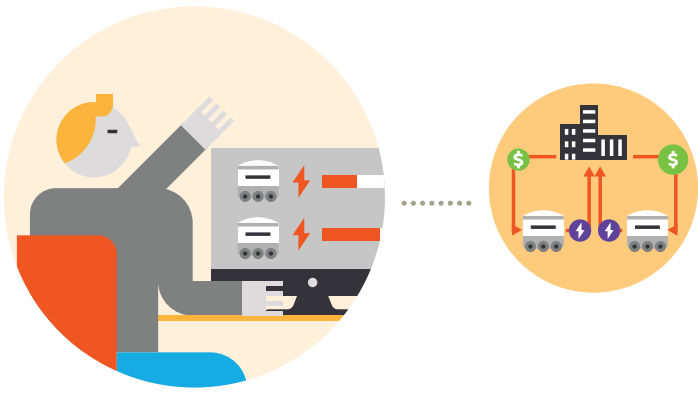


4 Drivers wear smart headbands that monitor their biometric data for fatigue. They also sleep with wearables that analyze the quality and quantity of sleep to project when they will feel tired. Real-time measurements are displayed on a dash-mounted device with alarms and notifications; it is also fed into the fleet management system where Finn can monitor driver conditions. The system also integrates with electronic logging devices to ensure drivers don't drive more than the legally allotted hours in a day and that they take required breaks.

Finn uses the fleet management software to adjust schedules, approve timesheets and send paychecks. He also keeps track of drivers' licensing and drug testing.



5 Deploying Pods of Sidewalk Delivery Bots: Access to this vast foundation of curb information has laid the groundwork for a new last-mile delivery solution that Finn is piloting. Instead of driving to each location, double parking, and walking a single package to a doorstep, specially outfitted delivery trucks are now routed to a central location where they deploy a fleet of sidewalk bots to deliver packages. While one fleet is making deliveries, the truck can drive to another location and drop off a secondary fleet. This way, the truck (which is driven by a human) is always in motion and never blocking traffic. The bots operate autonomously but are still monitored by humans should unforeseen situations occur.



6 Before heading out for the day, Finn takes a look at the numbers on his most recent initiative. After converting the entire fleet to electric (and adding solar panels to some of the larger vehicles), the company is able to put power back into the grid during times of high demand. A virtual trading platform uses the blockchain and smart meters to let the company get paid by the city/utility. The power stored in the vehicles can also be drawn during emergencies. During a crisis, the vehicles can form a microgrid to power response centers.

This ability — known as vehicle to grid, or V2G — can be used to help ease the load on the grid.

DIGITAL TRANSFORMATION CHECKLIST

- Draw insights from mobility data; overcome information overload
- Increase the reliability and longevity of vehicles
- Be more fuel-efficient; reduce cost of ownership
- Shorter drive times; increase accuracy of arrival times
- Optimize last-mile deliveries; reduce congestion and pollution
- Minimize idle time; make sure all assets are fully utilized
- Find specific fleet information quickly; integrate fleet data into existing software systems
- Manage a geographically-dispersed team
- Help drivers be more aware of fatigue risk; adjust schedules accordingly

Microsoft Case Study: *Daimler*

To help fleet managers increase vehicle reliability and reduce operational costs, commercial vehicle manufacturer Daimler Trucks North America leveraged Azure, Microsoft's cloud computing service, to build Detroit Connect, a data capture and analysis program for cloud-connected vehicles. Designed to assist fleet managers in making more informed decisions, Detroit Connect helps Daimler to better understand not only how vehicles are performing and how much of their time is productive road time, but also help customers improve fuel efficiency. By automating that data and the analysis process, Daimler helps customers to better understand why vehicles are trending down in their fuel economy performance, whether it is driver behavior or a machine learning issue or just the vehicle's load, and then direct the customer to more rapidly respond to emerging issues within a fleet.

To further maximize efficiencies for its customers, Daimler's Connectivity team launched remote tools within the Detroit Connect platform, including Virtual Technician, Remote Updates and Analytics. With Virtual Technician, fleet managers are able to assess real-time solutions when an engine experiences disruptions, while Remote Updates helps fleet managers to act on those solutions directly from headquarters, keeping drivers from having to stop and update their engine performance manually. Moving that idea further, Analytics, a feature that generates on-demand, automated fuel efficiency analysis and safety event reporting, interacts with sensors on the vehicle, including coolant temperature, oil temperature and pressure, air temperature coming into the engine and the exhaust temperature coming out. Once the data is in Azure, Detroit Connect Analytics dashboards help customers analyze and visualize key insights about performance, safety, and fuel consumption across a fleet. As a result, they can more quickly address the issue and ultimately spend less time crunching data and more time optimizing vehicle performance.

[Learn more](#)



How Microsoft Powers Next-Gen Fleet Management

Actionable Insights:

Logistics operators need to capture data, organize it, and find exploitable connections between their long-term corporate strategy and their daily business operations.

- **Azure IoT** manages, tracks and monitors connected vehicles, freight, or other assets in real time. Integrated maps keep people, goods, and fleets moving.

Hyperlocal Intelligence:

Delivery vehicles compete for increasingly contested curb space; they need a lot more information about their immediate surroundings.

- **Azure Maps** brings maps, search, and routing capabilities to your apps with geospatial services APIs that integrate seamlessly with other Azure tools and services.

Macro Management:

Companies with large fleets of vehicles generate tremendous amounts of data and need to manage information overload to reduce operational costs.

- Dealer Management Systems: **Annata 365** an all-in-one cloud-based Management Solution for Automotive, Equipment, Rental & Fleet Industries. **NAXT** is designed for Heavy Equipment Dealers who sell, rent, or maintain machinery and equipment.

Autonomous Development:

Self-driving vehicles are coming fast, but we must hit the brakes. There is a lot more to figure out. Simulation platforms to safely develop, test, and deploy autonomous technology at scale with solutions that allow developers to virtually test their algorithms against complex scenarios which may be encountered in the real world.

- **Cognata** is a simulation platform for testing self-driving vehicles. **Intempora** combines real-world data with cloud-based simulations. **Applied Intuition** allows companies to virtually test algorithms against simulated scenarios that may be encountered in the real world.

Development Ecosystem:

To achieve a fully-autonomous and more sustainable future, we must create conditions that enable innovations to come from anywhere. Organizations must create relationships that encourage open-sourced technologies and knowledge sharing.

- **Microsoft for Startups** (autonomous driving) gives promising companies access to resources and expertise to accelerate their mobility ideas.

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