World Economic Forum
Digital Transformation Initiative:
In collaboration with Accenture

Reinventing the wheel: digital transformation in the automotive industry

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Reinventing the wheel: digital transformation in the automotive industry

Digitalization has the potential to both recast how we use transportation and generate significant value for industry and society.

The smartphone, internet and wireless and cellular communication are giving us an unending supply of conveniences and services. We expect the car to bring us the same. Now it’s happening.

Connected and empowered consumers see the vehicle not as a product to buy; rather, transportation for them is a mobility experience that might take them to their destination in a single vehicle or via multiple forms of transport.

Assisted driving and self-driving technology means cars can park themselves and cruise hands-free on highways. We are approaching a time when there may no longer be ‘drivers’. We will all be travellers using various forms of transportation as part of a seamless connected continuum, coasting on roads that could be congestion-free.

$0.7 trillion
Value at stake for automotive industry players from digital transformation to 2025

$3.1 trillion
Potential value of societal benefits from the digital transformation of the automotive industry to 2025

Source: World Economic Forum / Accenture analysis

We have identified three themes that will be central to the digital transformation of the automotive industry over the next decade:

1. Connected traveller
2. Autonomous vehicles
3. Digitizing the enterprise / ecosystem

The Digital Transformation Initiative

The Digital Transformation Initiative (DTI) is a project launched by the World Economic Forum in 2015 as part of the Future of the Internet Global Challenge Initiative. It is an ongoing initiative that serves as the focal point for new opportunities and themes arising from the latest developments and trends from the digitalization of business and society. It supports the Forum’s broader activity around the theme of the Fourth Industrial Revolution.
Digital trends in the automotive industry

Several global trends are combining to herald an era of unprecedented innovation in the automotive industry.

1. Urbanization

City populations are booming. For the first time, more than half of the world’s population live in urban areas. Currently standing at 3.7 billion, this number is predicted to swell to 66% by 2050 – with 90% of urban growth set to take place in the developing world. Urban consumers put a far greater premium on mobility. A recent study found that 64% of all travel made is within urban environments and that the total amount of urban kilometres travelled is expected to triple by 2050.

Forecast urban mobility demand 2010-2050 (trillions passenger-kilometres (pkm) p.a. %)

<table>
<thead>
<tr>
<th>Year</th>
<th>2010</th>
<th>2030</th>
<th>2050</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demand</td>
<td>25.8</td>
<td>43.2</td>
<td>67.1</td>
</tr>
<tr>
<td>Growth</td>
<td>+68%</td>
<td>+55%</td>
<td>+68%</td>
</tr>
</tbody>
</table>

Many municipalities around the world are increasingly regulating how their citizens move through dense urban landscapes via congestion pricing and access restrictions. This has significant implications for the automotive industry, and for consumers who move through these environments on a regular basis.

2. Shifting global population dynamics

The global population is growing, ageing and evolving. From 7 billion today, the number of people on the planet is set to hit 11 billion by 2100. Between 2000 and 2050, the proportion of the world’s population over 60 years old will double from about 11% to 22%. Roughly 2 billion of the world’s young people are digital natives, and by 2030, an estimated 3 billion people are expected to enter the middle class, mostly in emerging markets.

3. Rapid expansion in global connectivity

Most dramatically, the world economy is transforming into a digital economy with a proliferation of cloud computing, big data and analytics, mobility and broadband connectivity, e-commerce, social media and the use of smart sensors, and the Internet of Things. With 7.2 billion gadgets and more mobile phones than people, the world has never been this connected.

28.1 billion

The number of connected devices around the world by 2020


The traditional markets of North America, Europe and Japan will remain important, but understanding and capturing the value of emerging markets will be a prime differentiator.

In collaboration with Accenture
Future horizons: digital themes and initiatives

Calculating the value of digital transformation in the automotive industry.

Drawing on the ecosystem and technology trends outlined above, we have identified three digital themes that will underpin the digitalization of the automotive industry over the next decade.

Within each theme, we have identified digital initiatives that can be pursued by automotive players, highlighting case studies that illustrate the relevance of these initiatives to the industry.

These digital themes and initiatives provide a framework for us to calculate the potential value that digital transformation in the automotive industry could deliver over the next decade – both for the industry itself and wider society.

Delivering value through digital transformation for the automotive industry and society

How we calculated the value of digital transformation

Our value-at-stake methodology aims to assess the impact of digital transformation initiatives on industry, customers, society and the environment. It provides likely value estimates of global industry operating profits that are at stake from 2016 to 2025, and the contribution that digital transformation can make to customers, society and environment in that time frame.

Value at stake for industry comprises two elements. First, the potential impact on an industry’s operating profits that will be generated from digital initiatives (value addition). Secondly, operating profits that will shift between different industry players (value migration). Value-at-stake for society measures the value impact of digital transformation for customers, society and the environment.

For a full explanation of our value-at-stake methodology, visit digital.weforum.org

Note: (1) We have followed a logarithmic scale for the value for Industry and Society, with Industry value represented by cumulative operating profit from 2016-2025; (2) Total Societal Value at Stake includes impact on the consumers, society and environment; (3) Bubble Size indicates the combined business and societal annual impact in 2025; Source: World Economic Forum, Accenture Analysis
1. Connected traveller

Initiatives to ‘connect’ the traveller will revolutionize people’s experience of transportation.

The vehicle is becoming a digital hub for real-time two-way wireless data transfer. We are moving towards total connectivity between vehicles, traffic and municipal services through sensor-embedded roads and infrastructure; and between entertainment and navigation services connected with any of the myriad mobile devices embedded in the vehicle or in the hands of the traveller. By 2020, more than 90% of cars sold will be connected.

Connected traveller: digital initiatives

• Infotainment

Automotive infotainment technology has advanced quickly as original equipment manufacturers (OEMs) move towards open-source software and mobile-friendly platforms. Infotainment is evolving into a location- and condition-based service where products and services come to passengers based on where they are, who they are with, what their preferences are. Location-based services can give customers end-to-end intelligent route planning across all modes of transportation, both automotive and non-automotive.

• Usage-based insurance

Telematics allow major insurers to customize policies based on individual driving behaviours. Using on-board wireless sensors that transmit driving information, insurers can offer robust incentives for good drivers. Eventually, vehicle insurance may be upended by the connected ecosystem: by the time autonomous cars reach critical mass, current accident rates are likely to plummet as standards of driving improve.

• Multimodal integration

An integrated multimodal network would lower costs for everyone while greatly expanding access to transportation. Multimodal connected transportation seamlessly links all forms of road, rail and ferry travel with walking and cycling. Full-scale multimodal integration, which has already been proved viable by small-scale pilot programmes, would create significant social and environmental benefits, such as reduced pollution and congestion, and more liveable urban areas.

Unlocking value from the connected traveller

<table>
<thead>
<tr>
<th></th>
<th>Value at stake ($ billion, 2016-2025)</th>
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<tbody>
<tr>
<td>Multimodal integration</td>
<td>1249</td>
</tr>
<tr>
<td>Usage-based insurance</td>
<td>381</td>
</tr>
<tr>
<td>Infotainment</td>
<td>109</td>
</tr>
</tbody>
</table>

Source: World Economic Forum / Accenture analysis

Case study: Jaguar Land Rover (Infotainment)

Jaguar Land Rover has introduced self-learning intelligent cars to its range of vehicles. The system learns driver and passenger behaviours, needs and preferences. Integrating with users’ mobile phones, it can change comfort controls and entertainment choices, and offer calendar reminders and navigation guidance. For instance, the car can link up with the driver’s fitness wristband to detect a gym visit, and pre-cool the air inside the car as the owner heads back to the parked car.

2. Autonomous vehicles

Driverless cars will reinvent personal transportation and transform the automotive industry.

The wide-scale adoption of autonomous vehicles (AVs) will lead to unprecedented economic, social and environmental change. Independence and freedom of personal travel will be available to almost everyone, while the expected reduction of road congestion would bring wide-ranging work and personal benefits. The gains from a drop in vehicle accidents and deaths are obvious.

The route to critical mass adoption of AVs is not clear. Acceptance may occur after years of incremental introductions of discrete autonomous functions, or more quickly, through the direct development of the radical new technology of autonomous driving. The major players in the market are pursuing one or both of these approaches. Technology giant Google has jumped right into producing a completely autonomous vehicle with no steering wheel. Hands-free autonomous cars are now being tested on public roads in Europe, Japan and the United States. Many OEMs are investing in both improving assisted driving capabilities and simultaneously exploring fully self-driving technologies.

Case study: Volvo (Self driving)

Volvo announced its Drive Me project in early 2015. In partnership with the Swedish government, 100 production-ready autonomous cars will be in the garages of customers by the end of 2016. The cars will be allowed to drive on 30 miles of roads in the city of Gothenburg in what would be the first public test of a self-driving vehicle.


Autonomous vehicles: digital initiatives

- Assisted driving
  
  New driver-assist functions herald an era in which the public are driven around by fully automated cars.

  Many of the assisted driving features that now exist in premium-branded cars will become more affordable and more common in mass-produced vehicles. For governments, the priority may be to coherently regulate the incremental improvements in assisted driving technologies before writing the rules for autonomous vehicles.

- Self driving
  
  Several technology firms are working on creating vehicles capable of navigating themselves through mixed traffic conditions on all roads and highways.

  Pioneered by the likes of Google, self-driving vehicles are a reality in proof-of-concept testing around the world. Legislative, infrastructural and technological barriers will slow the rate of adoption, which will also be determined by consumer confidence and expectations.

Unlocking value from autonomous driving

![Graph showing value at stake ($ billion, 2016-2025) for Industry and Society.](source: World Economic Forum / Accenture analysis)
3. Digitizing the enterprise / ecosystem

Digitalization is set to enhance efficiency, reduce costs and spark innovation throughout the automotive industry.

Digitalization has the potential to drive substantial improvements in the industry’s value chain. As original equipment manufacturers (OEMs) expand from business-to-business through their dealerships to a business-to-consumer model, there will be new ways to engage with customers, partner with suppliers and interact with data. The increasingly connected vehicle will alter business strategies from selling a product to providing a customer experience-centric value proposition.

Digitizing the enterprise / ecosystem: digital initiatives

Connected supply chain
This initiative promises to reduce costs through a better managed end-to-end process.
Digital will lower costs and accelerate supply chain transparency through continued partner system integration. Data gathering and analytics will reduce the number of defects and speed up component design, manufacture and delivery. Much of this integration will be facilitated through the cloud.

Digital manufacturing
Robotics, artificial intelligence and the Internet of Things have all become part of a new industrial revolution.
Smart factories have technologies that enable virtualization of design and testing to achieve faster time-to-market, and lower physical prototyping and testing costs. Predictive asset maintenance will also more accurately anticipate and pinpoint machine and part failures.

Unlocking value from digitizing the enterprise / ecosystem

Source: World Economic Forum / Accenture analysis

Case study: Tesla (Connected service and maintenance)
Instead of switches, knobs and gauges, most car functions and performance metrics in a Tesla Model S come through a single 17-inch touchscreen. For the driver, this digital interface reduces complexity and adds flexibility. Periodic over-the-air software updates allow some of the vehicle’s original mechanical design features, including the look and feel of the touchscreen, to be upgraded to continuously meet consumer expectations.

Source: http://www.teslamotors.com/models
3. Digitizing the enterprise / ecosystem (continued)

Digitizing the enterprise / ecosystem: digital initiatives (continued)

Disrupted retail

OEMs, dealers and customers are dynamically redefining how they interact with each other. Consumers increasingly expect a seamless experience across both digital and physical touchpoints. Customers are using the manufacturer’s digital options (such as website or online reviews) to educate themselves, comparison-shop and virtually test-drive and build their dream cars.

Connected service and maintenance

Vehicles and even individual components can proactively signal when they need maintenance or replacement. Increasingly sophisticated in-vehicle diagnostic systems, smart components and ubiquitous connectivity enable continuous data analysis, which creates new opportunities for preventive maintenance. This dramatically reduces critical, unanticipated failures and reduces the frequency and severity of recalls.

Transformed digital aftermarket

Existing aftermarket players will shift sales and services to meet burgeoning demand for upgrades that keep car owners connected. The average age of cars in the European Union is 8.6 years. In the United States, it’s 11.4 years. To better facilitate software and hardware upgrades, manufacturers and suppliers will be expected to make their systems forward compatible.

Automotive data marketplace

A digital-driven data economy could have a transformative impact on the data-intensive automotive industry. Industry participants need a secure and robust data market where they can come together to trade data. This will allow organizations to be more targeted and efficient in their data collection processes, both to support their own business objectives, and to transact in the data marketplace.

Connected infrastructure

Telecommunications companies are seeing opportunities in machine-to-machine communication in vehicles. Sensors, transponders and RFID readers on roads, traffic lights, bridges and parking lots will enable continuously moving digital information to increase safety and improve traffic flow. An integrated infrastructure-based network would also be a boon to infotainment functionality for the connected traveller.
How can the automotive industry keep up with digital transformation?

As digitalization takes hold, automotive players will need to act quickly to keep up with – and stay ahead of – digital transformation.

We have identified a set of ‘no-regret’, short-term digital capabilities and strategies that organizations and enterprises in the automotive industry can adopt immediately to remain relevant in the digital age. No single set of recommendations will be equally applicable to all organizations across the value chain. However, our analysis points to several fundamental capabilities that are crucial to survival in the emerging digital world. We have grouped our no-regret capabilities accordingly.

### Structure and skills

- **Create digital talent to support digital skill requirements**
  Full digital integration requires a new and comprehensive skills strategy for talent.

- **Make talent portfolios into flexible pools of internal and external skilled resources**
  Employ non-traditional hiring practices. Leverage partnerships to bring in qualified talent and build trust with legacy employees who can see their value will be enhanced by skills training.

- **Enhance the organization to support digital customer engagement, digital products and data services**
  Using new digital capabilities, rethink the operating model, organizational structure and key processes to break down silos and make the organization more agile.

### Partnerships and ecosystems

- **Foster ecosystem collaboration**
  Enterprises across the value chain are working together in new and intriguing ways. Municipal codes and national regulations are common industry hurdles that can be seen as opportunities for collaboration.

- **Municipalities can help leverage public-private partnerships**
  For mutual benefit, strategic thinking and planning can help enterprises find new ways to collaborate.

- **Identify new partners outside the ecosystem to drive breakthrough innovation**
  New business models will emerge from sharing data and insights to drive service and product innovation with partners from other industries.

### Customer engagement and experience

- **Enhance omnichannel customer engagement**
  Create a unified customer experience strategy. When digital channels to the consumer are open and transparent, the car buyer more easily develops a bond with the brand.

- **Meet the automotive ‘prosumer’**
  Create a trusted environment to gather customer feedback. This information can be used to continuously improve products and services.

For our full recommendations, please read our in-depth report on digital transformation in the automotive industry, available at digital.weforum.org.
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References
For a full list of sources and references, please refer to our in-depth report on the automotive industry, available at digital.weforum.org.

To find out more about the DTI project, visit reports.weforum.org/digital-transformation