Connecting the consumer

Connected vehicles and Big Data
enable the digital drivestyle

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A more consumer-oriented world

The idea of a connected vehicle presents billions in opportunity and very real challenges for the automotive segment.

Enabling the digital drivestyle is a crucial transformational pathway— particularly for an OEM segment that confronts serious market, demographic, and regulatory issues. While in-vehicle blackboxes, navigation, and infotainment systems are increasingly standard features in many new cars, shifts in technology and consumer expectations are driving real change.

The near-ubiquitous consumer adoption of smartphones, social media, high-bandwidth cellular data plans, and rich media applications are redefining the idea of connectivity. Machine-to- machine (M2M) technologies and the advancement of second-generation, connected vehicle (2.0) capabilities are improving driver safety, enhancing the travel experience, and opening exciting new pathways for OEM sales and profits by extending the service portfolio.

Without a doubt, the focus is moving from vehicle technology to the consumer experience. It is part of a global, pan-industry trend that enhances the personal experience and supports individualism and uniqueness.

In this more consumer-oriented world, data will be the key to understanding, serving, and engaging the customer. To fully realize the potential of the connected vehicle, automotive manufacturers will need access to a robust, scalable information technology backbone and specialized IT capabilities. Today, however, few OEMs have the IT systems needed to support the connected consumer.

In this viewpoint paper, DXC Technology examines the role of analytics and data management in the automotive sector. The paper explores the clear benefits of connected vehicles—to consumers, automakers, and other stakeholders—and how OEMs can acquire the data-related expertise needed to design, support, and profit from digitally connected vehicles.

Benefits of the connected vehicle

Telematics have been an integral part of modern vehicles for decades, and connectivity is now an expectation for newer vehicles the world over. Certainly, the subscription model did not yield desired results, particularly in markets outside of the United States. Yet forward-looking automakers recognize the tremendous potential bottom-line value of a holistic, connected vehicle approach.

Savvy OEMs are evolving their service offerings and business models to better pursue and exploit the benefits of the connected, data-oriented vehicle of the future. The following represent key advantages of the connected vehicle across the travel value chain.

An improved travel experience

A data-capable, connected vehicle can dramatically improve the overall travel experience, thus improving consumer satisfaction and overall brand value.

Those improvements start with vehicle and on-road safety. Today's increasingly digital vehicles can monitor and display information about oil levels, tire pressure, seat belt use, and collision-prevention systems. Geographic positioning systems, proximity sensors, cameras, and other still-emerging technologies extend those protective capabilities to the surrounding environment, including weather, obstructions, infrastructure, and other vehicles.

Those systems can monitor the position, speed, and direction of the vehicle, and can provide information about traffic congestion, oncoming vehicles, and other variables. To minimize damage in the event of a collision, connected vehicles can leverage data to adjust braking and airbag deployment and pressures. Sensors and other technologies—situated in vehicles and in road infrastructure—can help identify and protect vulnerable road users, such as pedestrians and cyclists.

In the event of an accident, data and connected vehicle systems can forward alarms and detailed information—including location and vehicle type, the number of occupants and their level of consciousness, and risk of fire or explosion—to emergency response teams. Advanced technology also can be used to manage and prioritize traffic around an emergency location.

In non-safety related situations, data-oriented vehicles can help improve travel quality by optimizing navigation and traffic management. Today's increasingly advanced in-car mapping and navigation systems enable travelers to plan the best route, avoid congestion, and find and use gas stations, restaurants, and other amenities along the way.

As consumers increase their use of public transportation, car sharing, and other alternatives, data and connected vehicle technologies can help optimize the multimodal transportation environment. Those capabilities require seamless data availability and real-time analytic capabilities to enable consumers to evaluate transportation options, costs, and timing.

Extend the digital lifestyle

By emulating the now familiar digital lifestyle with seamless connectivity within the vehicle, these advances are creating a true digital drivestyle. In fact, observers agree that the key to consumer acceptance of the connected vehicle lies in creating a seamless user experience between the vehicle and other mobile devices.

To do that, OEMs must partner to enable easy transitions between devices and environment while maximizing the performance of applications across those environments. While in the vehicle, consumers should be able to stream, share, and update content from the home or office setting, and vice versa. Multiple passengers should be able to share Internet access within a single vehicle, and service availability should be consistent across the home, office, and vehicle environments.

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The life of the consumer continues to be increasingly connected - from the connected house to extended digital concierge services of different institutions (e.g. banking, insurance, healthcare providers, etc.). To support the connected consumer, the car must be an integrated device for that new lifestyle and be able to embed a wide range of external services.

M2M capabilities must immerse the driver in a digital ecosystem that provides access to traditional wireless devices, real-time information, entertainment media, and driver-assistance features. A fully integrated vehicle will enable users to access and manage music storage, for example, without reducing on-the-road safety.

Product improvements

Data and analytics will continue to drive enhancements in product-related design, production quality, and lifecycle management. A stronger customer feedback loop helps improve design quality and overall product appeal while also reducing consumer complaints and service issues.

By giving engineers access to field data, OEMs can improve product lifecycle management (PLM), streamline processes, and reduce material and manufacturing costs. Sophisticated analytics and data management are now being used to greatly improve after-sale services, including remote diagnostics, predictive maintenance, and shop logistics.

New revenue opportunities

Next-generation information and data management capabilities are opening important new revenue and profit opportunities for automakers. Those new revenues might begin with offers of premium options, such as high-end infotainment systems bundled with connected vehicle services.

In those markets where subscription-based models are viable, stakeholders across the value chain can share in subscription and service fees for now emerging connected services. Collaborative business models enable automakers to share in the revenue generated by in-car applications and services, pay-per-use services, and everything-as-a-service arrangements. Also cross-selling fees or flat-rate fees for integration of third party services are possible.

By using the connected vehicle as a platform for a digitally integrated business model, OEMs can share revenue from community services. Connected vehicle information also can be monetized by making field and customer data available to third parties in ways that are legally compliant and acceptable to the customer. In some cases, OEM services arms might also become mobility providers, offering flat-rate mobility services, or travel insurance for automobile, air, train, and other modes of travel.

Improved customer insights and engagement management, and the ability to enhance product and brand images, should help drive new vehicle sales. Improved data and analytics also can be used to encourage consumers to bring their vehicles to OEM-associated repair shops, driving after-sales revenue and profits.

Going forward, the connected vehicle will be an increasingly valuable treasure trove of data. Organizations that can capture, analyze, and monetize the data will benefit greatly.

Strategic OEM advantages

Given the quality, performance, and user experience improvements noted here, automotive manufacturers can obviously leverage Big Data to measurably improve brand image and loyalty. By using data to better understand the buying public, OEMs can accelerate time-to- market and enhance the quality of customer engagement management (CEM) across all market channels and selling touchpoints.

By better using unstructured data, social media networks, and other information, OEMs can more effectively listen to all sources of customer input. They can leverage analytics to better understand consumer preferences. Finally, automakers can then engage to optimize customer points of interaction across even the most complex sales environment.

Beyond the connected vehicle

To fully appreciate the changes now transforming the automotive sector, it may be helpful to explore the true reach and impact of the still-emerging connected vehicle. A future connected vehicle will be far more than just a car equipped with additional electronics. Starting with onboard navigational systems, the digital revolution is remaking modern vehicles to incorporate telecommunications and mobility, location-based offers and services, greater personalization, and a host of new and yet-to-be created applications.

A truly connected vehicle will feature:

- Vehicle-to-device links for wearables, mobile phones, smartphones, laptops, tablets, and other devices

- Vehicle-to-infrastructure links, including intelligent transport systems that will provide on-the-go information on traffic and weather, electric vehicle charging stations, and other assistance

- Vehicle-to-vehicle connectivity to exchange data on distance, speed, traffic conditions and other variables

- Vehicle-to-cloud links, opening an array of services, such as remote vehicle diagnostics, pay-as- you-drive insurance, touchless toll payments, congestion-based charging, and fuel payments

Leveraging these integrated links, the connected vehicle is expected to measurably improve on- the-road safety—alerting drivers to upcoming hazards and obstructions. Eventually, driverless technologies will enable vehicles to automatically detect and avoid collisions. Data-oriented monitoring and adjustments of vehicle performance can yield significant improvements in fuel efficiencies and emissions.

At the OEM level, improved data and communications will enable closed-loop feedback among consumers, service shops, designers, and production. Better metrics on vehicle performance and customer satisfaction will enable automakers to design and build better products. Enhanced diagnostics will continue to improve maintenance efficiencies.

At the same time, stronger connectivity will promote closer ties among consumers, dealers, and manufacturers—providing better service to customers and longer, more profitable relationships for automakers.

As noted, traditional database and analytic systems simply cannot deliver the details and insights needed to support the connected lifestyle. OEMs should understand the hurdles between them and the rewards of the digital vehicle.

The challenges are real

While the benefits of the connected vehicle are powerful and apparent—to consumers and to forward-looking automakers—the path toward the digital drivestyle does pose significant problems. Achieving a travel-oriented digital ecosystem capable of linking everything requires fresh thinking about business models, IT infrastructure, and how data is managed and used.

New business models already are reshaping the automotive sector. Shifting demographics show that younger consumers do not buy vehicles as often, as early, or as frequently as previous generations. Disruptive entrants—such as Uber, Zipcar, and Life360— are shaking the foundations of transportation. More stringent regulatory pressures on fuel economy and emission efficiencies pose difficult challenges to the automotive sector.

While the industry has worked to reduce the complexity of IT over recent years, the advent of connected vehicles has pushed things in the opposite direction. It calls for highly scalable, flexible systems, the integration of varied personal devices, and the management of complicated ecosystems of development and service partners.

In fact, when compared to first-generation telematics, the emergence of connected vehicle 2.0 requires a more holistic and complex approach to automotive IT architecture. As consumers demand greater in-car connectivity and functionality, the IT back end will be required to deliver real-time capabilities, far more computing and storage power, and better provisioning of a new generation of applications.

Going forward, automakers must have access to proven IT capabilities, including the ability to combine telecommunications, automotive, and consumer electronics technologies.

> Connectivity can be the key— and data is the most basic requirement in the emerging digital drivestyle.

One clear key will be the ability to manage and analyze data in the automotive context. To realize the full potential of the connected vehicle, automakers must address:

- The ongoing acceleration of data volume and velocity

- A continued rapid growth in data sources, formats, and complexity

- Serious governance, data privacy, and information security concerns

- Managing the context-oriented applications that will power the connected lifestyle

- A more personalized driver experience defined by social media, integrated mobility, and location-based capabilities

- Questions about who owns and controls consumer data

- How to derive value and profits in this dynamic marketplace

The connected vehicle presents challenges and opportunities. Automakers need a new approach to IT, one focused on advanced capabilities in data management and analytics.

The key: analytics and data management

Data may well be the distinguishing feature of tomorrow's automobiles. Current generation premium cars already produce a gigabyte of data per minute, compared to the gigabyte-persecond flow of data next-generation autonomous vehicles are expected to exchange with back-end systems.

In addition to those vehicle-sourced information flows, in the future the automotive information back-end systems will be required to handle customer and third-party data. The systems also will need to manage more diverse types of data—from infotainment content and advertising offers to radar output, mobile communications, and data from OEM systems, traffic infrastructure, and more.

Yet to realize the potential and maximum benefit of the connected vehicle, automakers must make Big Data a core competency. See Figure 1.

A workable approach must address all aspects of analytics and data management, from strategy and design to implementation, data security, and compliance. It should start with a Big Data architectural strategy that defines the functions and capabilities needed to align OEM IT capabilities with the requirements of the connected vehicle. Automakers must learn to capture, consolidate, manage, and protect key information, including structured, unstructured, and semistructured data.

Next, automotive firms need an integrated, data-oriented infrastructure platform. This strategic architecture will support the data consolidation, analysis, sharing, and searching in a diverse and high-volume information environment. Real-time, predictive, and prescriptive analytics are needed to transform data into insights and leverage insights to ensure more positive business outcomes.

Governance is the key and final element, ensuring the availability, security, and compliance of Big Data systems in an automotive context.

Figure 1. Big Data as a core competency is the key to realizing a wide range of business benefits from the connected vehicle.
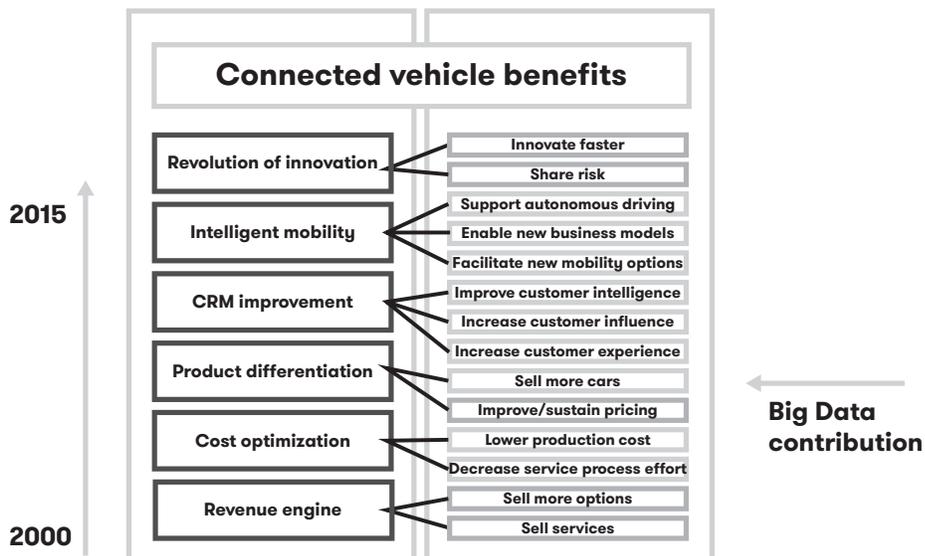
Why a partner makes sense

OEMs must adapt to the realities of the emerging digital drivestyle as the focus of the automotive sector shifts from traditional vehicle sales and services toward a more data-driven consumer experience. Data types and volumes will continue to expand, as will the demands on the IT infrastructure needed to support these innovations, and the future will be even more challenging.

Today, however, few automotive manufacturers have the IT, data management, analytics, and governance capabilities needed to fully realize the potential of connected vehicles. Fewer still want to build the internal infrastructure and skillsets needed to meet those next-generation IT requirements. That is why many forward-looking OEMs are partnering with allies that specialize in information management and analytics in the automotive sector.

DXC offers a comprehensive, data-oriented connected vehicle solution that combines innovation with a proven and mature IT infrastructure. The DXC approach can include upfront consulting, design, and implementation of a real-time data and analytics solution designed to improve vehicle quality, market differentiation, customer service, and supply chain visibility.

A real-world solution might include cloud-based provisioning and operation of the IT infrastructure needed to support connected vehicle services. Advanced software is used to manage users, devices, content, and services, including web portals, automotive application stores, e-mobility, and remote diagnostics.

Available back-end services can support billing, testing, concierge, and other advanced services. This approach also can provide management for content and service providers for news, weather, music, traffic, and navigation services.

DXC capabilities span the full range of connected vehicle 2.0 and M2M requirements, from network design and management, sensors and data acquisition, storage, analytics, and IT and business transformational capabilities.

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An example: Supporting active/passive safety

For the vehicle of the future, the connected vehicle, and the automotive industry, the information technology needed to support the car is potentially the single most important factor.

Consider just one example: data management requirements associated with testing and ensuring active and passive vehicle safety features. Tier 1 suppliers that provide OEMs with those active and passive safety features are required to capture, store, and analyze many types and massive volumes of data.

That information includes semi-structured and unstructured data, such as video streams, radar data, and information flowing from a range of in-vehicle and external sensors. A safety-related simulated test might yield 300 terabytes of video data. A full vehicle test program can generate from 3 to 5 petabytes of information.

To meet safety and compliance regulations, those massive volumes of test data must be archived and protected for as long as 10 years. Active and passive safety-testing programs are just one example of how OEMs and their Tier 1 partners must handle the volume, complexity, and velocity of data going forward. Those demands call for a robust and scalable Big Data management and analytics platform.

Big Data: New experiences, opportunities

The connected vehicle is far more than a feature-oriented trend in the automotive sector.

Faced with serious demographic and business challenges, OEMs are searching for competitive differentiators, stable revenue streams, and better ways to engage, serve, and satisfy tomorrow's more demanding and networked driver. The underlying goal will be to own the customer experience in an increasingly dynamic marketplace.

Connectivity can be the key—and data is the most basic requirement in the emerging digital drivestyle. To compete and succeed, automakers must seek more robust and scalable IT backbones, enhanced by travel-oriented information management and analytic capabilities. They will need innovative new business models, greater agility, and the ability to undertake tactical and strategic transformations.

By partnering with specialists that understand Big Data in the automotive context, manufacturers can fully realize the potential of connected transportation—improving safety, enhancing the travel experience, and opening new competitive and profit opportunities.

About DXC
DXC Technology (NYSE: DXC) is the world's leading independent, end-to-end IT services company, helping clients harness the power of innovation to thrive on change. Created by the merger of CSC and the Enterprise Services business of Hewlett Packard Enterprise, DXC Technology serves nearly 6,000 private and public sector clients across 70 countries. The company's technology independence, global talent and extensive partner alliance combine to deliver powerful next-generation IT services and solutions. DXC Technology is recognized among the best corporate citizens globally. For more information, visit www.dxc.technology.

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