The Future of Applications in the Automotive Industry
Three Strategies for Winning the Digital Battle
The automotive industry enjoys about $1 trillion in annual global revenues. Conditions have improved since the 2008 economic crisis. Increasing consumer confidence, moderate fuel prices, and greater credit availability are among the factors contributing to the industry's sales growth.

Automotive has always been a sector open to innovation. A recent report from the Center of Automotive Research notes that the industry spends about $100 billion each year on R&D, or about $1,200 per vehicle produced.¹

Today, however, more disruptive innovation is at hand, coming from Internet, software and Big Data companies outside the traditional automotive ecosystem. The explosive growth of digital technology and its pervasive use by consumers around the world in their daily lives is having a profound impact on OEMs and dealers as purchasing behaviors are changing significantly and there is a growing demand for connected vehicle services.

Purchasing behaviors have evolved at a rapid pace according to an Accenture global survey of 10,000 consumers in Brazil, China, France, Germany, India, Italy, Japan, and the U.S.² An overwhelming 93 percent of all surveyed drivers seeking to purchase a new vehicle are using some form of digital process to research their buying preferences. Nearly two-thirds (62 percent) are initiating the process online, including consulting social media, before entering a dealer showroom. And 42 percent of consumers say digital will radically disrupt the entire purchase process. They believe they will be able to buy, finance and have a car delivered completely via an online interaction, or believe that only the final paperwork will need to be completed in person. For example, BMW offers customers three direct sales channels to buy their innovative electronic BMWi cars including customer interaction centers, an online store and a mobile sales force.

With the increasing use of social media and mobile technology, consumers also are much more in touch with each other, brand owners and retailers. Such ubiquitous communications are making it necessary for OEMs and dealers to react faster to car-buying needs to remain competitive.

Drivers and passengers increasingly expect access to connected services in their vehicles. The connected vehicle space is a fast-growing market and a strategic priority for the automotive industry. What once was perceived as personal transportation is fast evolving into a new mobile device, merging with the digital world into an all-encompassing communications environment. The diagnostics data that connected vehicle systems generate can also provide OEMs with the insights they need to enhance services in areas such as CRM/marketing, quality, customer services, after sales and R&D.

FIGURE 1: Architecture to deliver an integrated consumer experience

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¹ Automotive Research Center
² Accenture
The future of applications

These changing technologies and consumer behaviors—as well as other factors such as industry consolidation and marketplace alliances—put pressure on the IT environment of OEMs, particularly in the area of applications. New business models will require dynamic integration between multiple components and partners in the auto/digital worlds. A proliferation of devices, operating systems and applications can be expected; every cycle will be shorter than the previous one. New development environments will need to be cross-platform, device independent, modular and highly flexible. Speed is essential to respond to rapidly changing business needs.

Supplier integration as well as software component integration via cloud services will become more important compared to on-premise services. In a world of connected vehicles there will be a shift from a traditional monolithic ERP IT to a more flexible, customer-centric architecture with the ERP system as a stable foundation.

At the same time, cost reductions and productivity increases will continue to be high on the priority list for CIOs—reduced implementation times and simpler integration components. New technologies and platforms such as SAP HANA, Salesforce.com, Microsoft Azure, IBM Bluemix and Cloud Foundry promise to deliver smaller and faster deployments based on a lighter architecture. IT will need to change accordingly. The future will also bring an evolution from software as a service towards a business process outsourcing approach to software services. That is, not only the software and operations of IT will be provided but also, for example, the update of a website with new content and initial customer interactions.

OEMs will need to rethink how they make use of the data collected in a connected world to create advanced products and services. Data from inside the car and through telemetry will be made available in product lifecycle management (PLM) systems to optimize products. Consumer information needs will be available in CRM systems to help companies understand consumer demands.

On one hand, OEMs need high stability and reliability in production and logistics, as well as high agility, flexibility and a desire for change to provide these new services. The ERP system will contain the central kernel—for example, SAP HANA as a base—and services placed around and on top of it to connect engineering with production and enable quicker development times.

On the other hand, OEMs are competing with customer-facing digital experiences from other consumer product companies. Auto companies need to provide an integrated customer experience and build this on top of their existing landscape. (See Figure 1.)

To win the digital battle, OEMs need to fundamentally rethink how applications should be built and deployed, as well as how to integrate existing systems and processes.

Liquid, intelligent and connected applications must also be underpinned by a modern architecture that has important new characteristics, including platform integration capabilities, security, monitoring and API lifecycle services. Investment in flexible, standardized, open integration services provides the ability to efficiently connect applications and information across the company. Orchestration and business process management services allow applications to be configured and continuously tuned to meet the needs of the business. And APIs provide the glue to enable reusable components to be accessed from within a company as well as by external customers and business partners.

Three strategies are especially important:

**LIQUID**
Developing applications that are more modular or component based and API driven, enabling quick composition of functional applications.

**INTELLIGENT**
Embedding software intelligence in applications to manage growing volume, velocity and complexity, and to maximize the business value of internal and external data—including that from the physical world.

**CONNECTED**
Creating applications capable of connecting with other applications both inside and outside the enterprise boundary of the OEM.
To compete with agility and speed, companies can no longer focus only on complex, lengthy and expensive coding of applications, or monolithic systems built from the ground up. What’s needed is a new way to build software—one that is faster, flexible and more liquid. No longer can applications be “built” as one distinct activity and “maintained” as another. Liquid applications will be assembled leveraging modular architectures, next-generation integration techniques and a cloud-first mindset. These elements, combined with engineering innovations such as Agile, Design Thinking and DevOps, mean that software can be continuously delivered and evolve as business needs change.

MODULAR ARCHITECTURES

Liquid applications require enterprises to create application architectures that are modular, featuring reusable components sourced internally or externally. One of the key components is emerging software platforms, including platforms as a service, which provide well-defined technical architectures along with standards, governance and reusable code. Platforms facilitate more rapid creation and assembly of liquid business solutions, as applications are increasingly assembled from prebuilt components.

For example, the BMW Group has created a flexible backend platform that is enabling its connected vehicle offering, ConnectedDrive. The platform provides the product management, customer management, ordering and contract management capabilities for ConnectedDrive within the BMW Group, which includes the BMW, MINI and Rolls Royce brands.

The new ConnectedDrive Store enables customers to purchase services and apps directly from BMW Group from within the vehicle or through a portal. Customers can choose the services and service duration according to their specific needs. Services are provisioned over-the-air into the vehicle in near real-time.

Using the new platform, the BMW Group is able to add new services for ConnectedDrive customers through the product catalogue and increase the range of services in the future. The ConnectedDrive Store allows the sale of new services to existing customers depending on vehicle capabilities. It also enables used car buyers to tailor their vehicles’ ConnectedDrive services to their needs.

CLOUD-FIRST STRATEGIES

To enable the shift from frozen legacy to liquid applications, companies need a cloud-first mindset. That kind of thinking requires that applications be engineered to operate and scale in the cloud, even if the initial deployment is on premise. Policy-based architectures will allow organizations to dynamically decide what parts of applications run in the cloud, and how. Automotive companies should establish a common component repository for their business, including cloud components and SaaS-based functionality. Along with that, they will need to adopt a culture of leveraging what exists over creating something new.

AGILE DEVELOPMENT

A key enabler of liquid applications is Agile, which represents a fundamental shift in software development. Rooted in iterative development and employing frequent inspection and adaptation procedures, Agile enables greater collaboration between the business and IT sides of an organization while simultaneously accelerating time-to-market performance.

Companies that adopt an Agile approach are typically also positioned to capture new opportunities. With frequent measurement, feedback and adjustment activities taking place throughout the development process, Agile enables teams to achieve greater project alignment with expectations.
To compete with agility and speed, companies can no longer focus only on complex, lengthy and expensive coding of applications, or monolithic systems built from the ground up. What's needed is a new way to build software—one that is faster, flexible and more liquid.
To manage growing volume, velocity and complexity, and to maximize the business value of internal and external data, companies need to embed software intelligence everywhere. Software intelligence is made possible by increased processing power, advances in data science, and innovations in natural language processing, machine learning and cognitive computing. Thanks to these advancements, software can be taught to automate decision making through rule-based algorithms, and evolve and innovate on its own through advanced learning techniques.

Intelligent applications offer three critical capabilities—intelligent automation, integrated analytics and self-governance.

By automating routine tasks, intelligent applications offload complexity and supplement human effort through technologies such as auto-correction and robotics. Intelligent automation improves productivity by doing more work in a fraction of the time with more accuracy.

Integrated analytics create systems that can analyze and comprehend independently, embedding intelligence in the processes themselves and radically improving both business and IT performance. Netflix, for example, is able to understand what customers are watching and when they are starting and stopping programs, and then use predictive analytics to optimize content recommendations based on usage.

Beyond that, intelligent applications can be taught to act as digital agents and to learn and govern themselves autonomously—revolutionizing customer service, IT management and business innovation. As software intelligence grows in sophistication, applications will learn to evolve and adapt, altering their behavior and extending their capabilities based on experience.

Analytics capabilities are one important aspect of overall IT intelligence. The rise of connected vehicle services will unleash an expanding flood of data that needs to be captured, stored, analyzed, and turned into intelligence to underpin services and revenues. Connected vehicle capabilities can be created and rolled out on a proprietary basis by individual OEMs for implementation in their own product range.

Tesla is an example of an automotive innovator driven by software and big data analytics. For example, telematics data gathered from a car can be used to improve fleet management, analyzing the entire fleet’s usage patterns. Data can also be used to detect crashes, identify need for maintenance checks, and improve overall performance.

Similarly, Google’s Android mobile platform can control a car’s dashboard, including the navigation system. The data collected from this platform can be combined with Google’s data analysis capabilities to provide a more personalized in-vehicle experience.
To manage growing volume, velocity and complexity, and to maximize the business value of internal and external data, companies need to embed software intelligence everywhere.
CONNECTED APPLICATIONS
Extending company boundaries through software

Connectivity in the age of the software-driven business is about more than application integration. It’s about creating new competitive frontiers using software. To grow revenue and defend their market position, businesses must open new dimensions of application connectivity—within the enterprise, with business partner and customer ecosystems, and with the rapidly growing Internet of Things.

Connected applications are required to dynamically interface with business partner and customer ecosystems in today’s highly networked, digital automotive environment. When properly designed and managed, an ecosystem multiplies the power of all the participants, leading to combinations of functionality—and revenue opportunities—that would previously have been difficult to achieve. (See Figure 2.)

For example, the Accenture Connected Vehicle Business Service provides onboard and connectivity solutions; telematics platform; and data integration and end-to-end services to automotive, heavy equipment companies, Tier 1 suppliers and new entrants to the Connected Vehicle ecosystem including telecommunications and insurance companies.

Similarly, Visa Inc., Pizza Hut and Accenture are working together to develop a proof-of-concept connected car to test mobile and online purchases on the go. The connected car will feature Visa Checkout, Visa’s online payment service, cellular connectivity, Bluetooth Low Energy (BLE), as well as Beacon technology deployed at Pizza Hut restaurants to alert staff when the customer has arrived and is ready to pick up the order.

How can companies create and manage new dimensions of application connectivity to grow revenue and defend their market position? Here are three components of a successful overall strategy.

• Develop and implement an ecosystem strategy: Enterprises need multiphase strategies to build and nurture an ecosystem. Start—and learn—with your internal developers and business functions, and then create a broader ecosystem that includes external entities such as business partners and customers. Revisit your business strategy before implementing the ecosystem strategy to determine which of your existing assets can be used to create a new, disruptive business and what new assets can be readily built. Companies also need to define the technical and architectural capabilities needed to implement and manage their successful new ecosystem.

• Prepare for resiliency: As applications become increasingly connected, companies need to design for resiliency and proactively manage security across the extended business ecosystem and the physical world. Companies, customers and other stakeholders will have to work together to mitigate the risks of connected applications.

• Integrate Information Technology (IT) and Operational Technology (OT): To grow revenue from new product-service hybrids, companies need a way to combine physical assets with software and third-party services. To date, IT—such as resource planning, customer relationship management and decision support systems—and OT, such as equipment monitoring and management and industrial process support systems, have been managed separately. Now, companies must weave together previously unavailable, or inaccessible, enterprise and machine-generated data—binding together IT and OT. Sensors, communications and other operational technologies will work together with IT to create new connected products and services.

FIGURE 2: Connected mobility ecosystem

<table>
<thead>
<tr>
<th>Car Manufactures</th>
<th>Navigation</th>
<th>POI/Location based Services</th>
<th>Social Media</th>
<th>X-Mode Travel/Assist</th>
</tr>
</thead>
<tbody>
<tr>
<td>Finance</td>
<td>Infotainment</td>
<td>Productivity</td>
<td>Insurance/Payment</td>
<td>V2X/ITS/FCD*</td>
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<tr>
<td>Vehicle Telematics</td>
<td>Service Providers</td>
<td>Car Apps</td>
<td>Car Rental/Share</td>
<td>Road Pricing/Tolling</td>
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<tr>
<td>OEM Car Care</td>
<td>Aftermarket Car Care</td>
<td>Online Business</td>
<td>Energy Producers</td>
<td>Find Parking</td>
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Conclusion
Embracing a new operating model for software development

Today's business world is increasingly high velocity and software driven. Sooner or later, these two realities will push every automotive company to rethink its potential and reinvent itself. We urge companies to begin that reinvention today, starting with a fundamentally new approach to the business of applications.

Be prepared to face a number of technical questions and decisions as you start that journey: standard software versus customized; closed versus open innovation; open versus proprietary platforms; service-oriented versus event-based architectures.

Beneath those considerations, however, is the fact that many automotive companies' existing operating model for software development is not fit for purpose in today's fast-paced business environment. Effectively driving business strategy through software will require a new business and IT operating model. The IT organization must be prepared to define and execute business strategy through software that is liquid, intelligent and connected. For its part, the business must strive to gain more technology savvy as it assumes a bigger role in building software.

Innovations must be driven jointly, tied to new strategic planning processes that span both business and technology. In this operating model, software becomes a revenue-generating product of the company. Business needs IT to ensure the company's software products are market relevant, and IT needs business to identify new markets where they can introduce these software products.

NOTES

1 http://cargroup.org/?module=News&event=View&newsID=73
THE FUTURE OF APPLICATIONS IN THE AUTOMOTIVE INDUSTRY: CONCLUSION
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