

## White Paper

# Open Architectures Power Automotive Ecosystems and Redefined Customer Experiences

Sponsored by: Red Hat

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## IDC OPINION

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The automotive industry has experienced an overwhelming amount of disruption in the past several years, marked by a shift away from vehicle ownership and toward mobility service models, increasing competition and co-competition from the high-tech industry, and changing expectations for the customer experience. Automakers must transform to respond to these market dynamics; they require an operating environment that can build on ecosystem suppliers, technology providers, content partners, digital service providers, and customers. Those that can transform will create new value in the market and thrive through digital transformation, essentially applying technology for better business outcomes. The two hallmarks of a successful strategy for capturing value in the automotive industry in the coming years are:

- **Redefining customer experiences:** Supporting the rise of mobility services and connected vehicles, two industry trends that will redefine the relationship between consumers and cars
- **Empowering the automotive ecosystem:** Creating an open technology platform that facilitates collaboration and the community required for rapid change in the industry and software-defined vehicles

All of the changes in the product and the processes to redefine the customer experience and empower the automotive ecosystem depend on an openness that many companies have not been able to achieve. To complicate the matter, companies find themselves with multiple platforms to support the changes – an innovation platform, an operations platform, and a revenue platform. They're also adding more analytics, Internet of Things (IoT), and cloud on top of years of legacy IT investments. Companies must be able to quickly accelerate the value from all of their investments in platforms and new technologies, and they can do that only if systems and business processes are based on open and agile technology.

As the automotive industry continues to invest in digital transformation, we believe it should consider the advantages that have been achieved in the open source community, with open source architectures and infrastructure, including agility and flexibility.

## IN THIS WHITE PAPER

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This IDC Manufacturing Insights White Paper is sponsored by Red Hat and examines the need for an open technology approach that can support the digital transformation taking place in the automotive industry today.

This White Paper is based on briefings with Red Hat, IDC Manufacturing Insights research, and ongoing discussions with automotive ecosystem participants. The objective of this document is to educate automotive companies about how the rise of connected vehicles and mobility services requires a more open approach to architecture and IT investments overall to support an expanding ecosystem of participants and rapid innovation.

## SITUATION OVERVIEW

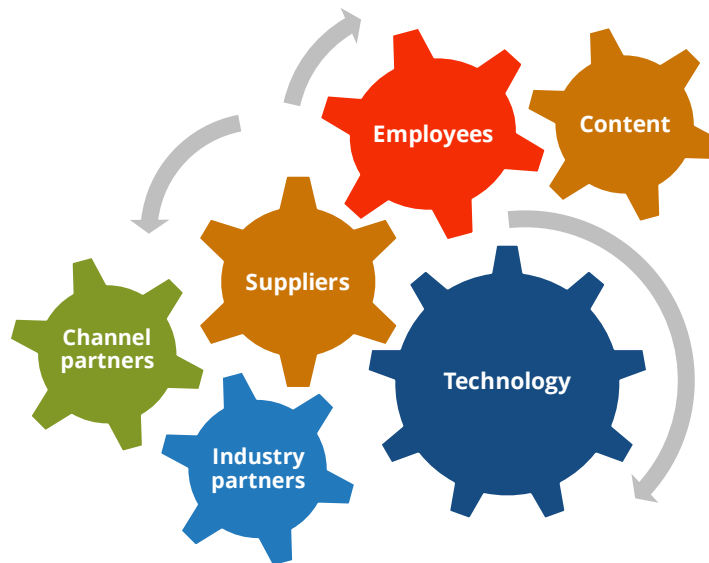
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Disruptive forces abound in today's automotive industry. Despite several years of record sales worldwide, the industry is bracing for a future that requires agility to respond to several significant market dynamics. First among them is the rise of mobility services, a term used to describe new methods for moving a passenger between two locations. The most common mobility services are ride hailing and ride sharing, made possible through mobile apps from companies such as Uber and Lyft. In addition, new car ownership models such as car sharing and vehicle subscription services reflect changing consumer preferences. Moreover, recent entrants into automotive manufacturing such as Tesla, Magna, and Local Motors are creating new competitive threats, as many of these companies are digital native, enabling a level of agility that is challenging for existing automotive OEMs to emulate.

While these are substantial issues to which the automotive industry must react, automotive OEMs must also continue to design and develop increasingly complex, connected – and eventually autonomous – vehicles. The average modern high-end car contains 100 million lines of software code and can generate up to 25GB of data per hour. Managing this in concert with the physical systems (electrical, transmission, fuel, etc.) requires a more agile approach to engineering and development. Automotive OEMs are working to align their various development efforts to meet shrinking product development cycles. This involves management of the complex, multiple ecosystems that span people, process, and technology in a unified platform approach. These ecosystems are internal (employees and technology systems) and external (partners, suppliers, and content) and must work in concert for OEMs to realize the full potential that the connected, and ultimately autonomous, vehicle provides for data monetization and customer experience optimization. Figure 1 depicts the various ecosystems that combine to create today's automotive landscape.

## FIGURE 1

### Connected Vehicle Ecosystems Are Multiple and Complex



Source: IDC Manufacturing Insights, 2018

The ecosystems can be defined as follows:

- **Employees:** This ecosystem includes engineers and non-engineers such as marketing, sales, product management, manufacturing, supply chain, and service.
- **Technology:** No longer focused on just the hardware-centric design and engineering of vehicles, this ecosystem is inclusive of products in service and cloud/applications for analysis/delivery of content (software, infotainment) within the vehicle.
- **Suppliers, channel partners, and industry partners:** These ecosystems include automotive suppliers, channel partners such as dealer networks, systems integrators and consultants, and academia. They also include manufacturers from other industries such as high tech and chemicals that collaborate with automotive companies developing systems and materials.
- **Content:** This ecosystem includes telco providers, insurers, third-party data services (weather, traffic, etc.), retailers, cities, and software developers.

Managing all of these ecosystems in a cohesive manner is an imperative for success in today's automotive industry.

## OPPORTUNITIES FOR AUTOMOTIVE MANUFACTURERS

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Auto manufacturers must redefine their value in the new automotive ecosystem, including producing new products and services in various combinations that deliver value to the customer. Among the top opportunities for automotive companies in the face of today's evolving landscape are the following:

- **Mobility services.** With the arrival of digital-native companies such as Uber and Lyft, the options for moving passengers between locations have shifted dramatically. Today, consumers can use a mobile app to order a car to pick them up at a precise location and choose whether to share the ride with other passengers for a reduced charge.
- **Fleet management.** While automotive OEMs are already familiar with managing a fleet of vehicles through relationships with car rental companies and commercial businesses, there are new opportunities for the OEM to provide fleets of vehicles for new ownership or subscription usage models or for gig economy drivers (Lyft, courier services, package delivery, etc.) that have been made possible by connectivity, mobile apps, and changing consumer preferences.
- **Vehicle-to-everything (V2X) platforms.** With the rise of Smart Cities, coordinating transportation within urban environments has become a focal point across metropolitan areas globally. Automotive companies have an opportunity for coordinating some of the capabilities and services that become available when connected vehicles can interact with various fixed and moving "things" throughout the city.

To avoid being left behind, automotive manufacturers need to create an ecosystem of value for the new services that will define how consumers interact with vehicles in the future.

In fact, IDC predicts the following:

By 2020, 25% of automotive OEMs will monetize their contributions to connected vehicle data marketplaces, relying on the broader ecosystem of participants to collaborate with and create new offerings and services.

IDC sees three platforms working together for automotive manufacturers to fully leverage the benefits of their growing ecosystem of internal and external development partners: one for product innovation, one for operations of the manufacturer itself, and one for capturing and capitalizing on the revenue opportunities the ecosystem creates. These three platforms are defined as follows:

- **Innovation platforms** include design, product life-cycle management (PLM), quality management, and integrations to manufacturing, supply chain, and service.
- **Operations platforms** include supply chain design, planning, execution, and manufacturing.
- **Revenue platforms** include analytics, application life-cycle management (ALM), content management, and marketing technology.

The three platforms must be elastic, open, and secure to foster the collaboration, innovation, and performance necessary in this new era of connected vehicles and mobility services. These platforms must be open and integrate with each other to achieve objectives such as rapid manufacturing, software optimization, service delivery, and customer experience.

For organizations in the automotive ecosystem, the emphasis should be on developing and implementing open platforms with integrated connections to enable the movement of data across and outside of silos. This will create a foundation for accelerating the development and delivery of new

vehicles and mobility services. OEMs depend on the ecosystem to develop all the hardware and software components required to deliver connected vehicles, especially as they increase their autonomous capabilities.

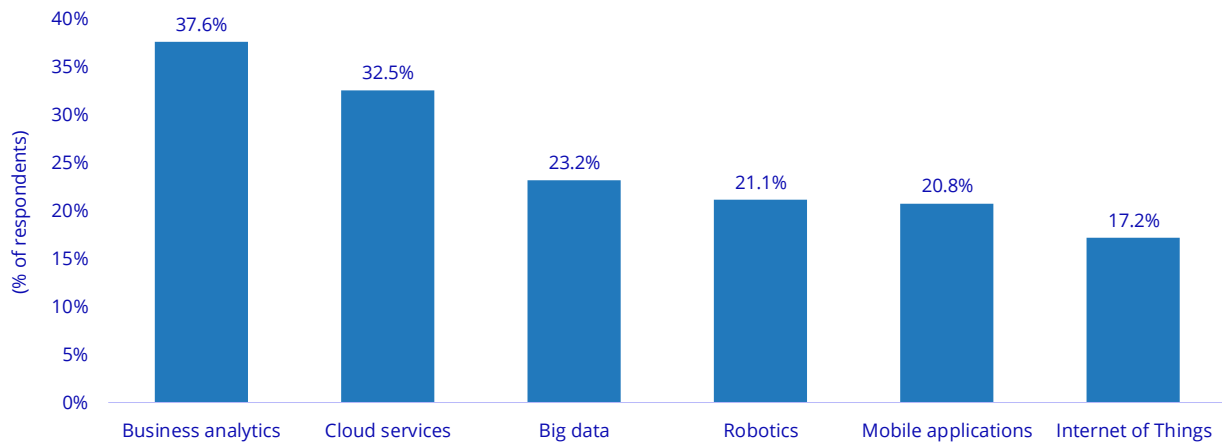
## THE ROLE OF NEW TECHNOLOGY IN THE AUTOMOTIVE ECOSYSTEM

Technology has long been an integral part of the automotive industry, but as the need for ecosystem interaction increases, manufacturers must turn to new technologies to support their efforts. IDC has seen the rise of the 3rd Platform as instrumental in supporting the modern automotive ecosystems with four pillars of technology: mobile, social, cloud, and big data and analytics. In addition, a number of innovation accelerators can be used to gain competitive differentiation in the market, including Internet of Things, augmented and virtual reality, robotics, artificial intelligence, 3D printing, and next-generation security. A recent IDC survey identified the technologies that automotive companies believe will have the greatest impact on their business in the coming years. Figure 2 shows the results.

**FIGURE 2**

### Technologies That Automotive Companies Believe Will Have the Greatest Impact on Business

Q. Which of the following do you believe will have the most impact on your business over the next five years?



n = 93

Note: Respondents are manufacturers across engineering-oriented segments. This figure shows the top 6 of 16 possible responses.

Source: IDC Customer Insights and Analysis Group's *Industry IT and Communications Survey, 2017*

It should come as no surprise that the top 2 technologies are business analytics and cloud services. To thrive, ecosystems need an infrastructure that can support myriad internal and external connections. Cloud is the best infrastructure for this purpose. Finding ways to mine the data that is shared across these ecosystems is the key to truly leveraging them. Big data and analytics can ingest and provide insight from data coming not only from systems and databases but also from connected products and people. We expect that analytics will expand to include artificial intelligence, especially to sense and respond to the dynamic driving or ride experience.

Another technology identified in the previously mentioned survey is Internet of Things. While connected cars are a prime example of using IoT in the automotive industry, automotive companies are using the technology in many other ways. According to IDC's 2017 *Global IoT Decision Maker Survey*, when manufacturers were asked where they plan to apply IoT data, the top 3 answers were as follows:

1. Generate new information and insight for revenue-generating services
2. Improve customer services processes using account, transactional, and historical activity data
3. Process automation

In using analytics for their IoT projects, automotive companies are already finding value, including productivity improvements (62% of respondents [multiple responses were allowed]), better customer intelligence (58%), increased revenues (49%), and decreased costs (46%). This example of the effect of one of the integral technologies exemplifies the measurable impact of building an agile platform for automotive ecosystems that leverages key innovative technologies.

We believe that the most effective use of technologies such as advanced analytics, IoT, and cloud will serve three key purposes:

- Embedding information and capabilities within the relevant system or form factor of use
- Making it easy to share information rapidly across internal and external value chains
- Providing decision support tools to make sense of an expanding amount of data

## ADDRESSING TECHNOLOGY CHALLENGES IN THE AUTOMOTIVE ECOSYSTEM

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Even as automotive companies are responding to the opportunities that exist within the rapidly shifting market landscape, they face a number of considerable challenges, including the following:

- **Competitors for mobility services are digital native.** They already have an IT infrastructure that is built for digital transformation, and therefore they are able to move more quickly in response to market dynamics.
- **Traditional IT systems are difficult to integrate and lack digital readiness capabilities.** Automotive companies will need to address this challenge and find ways to mitigate the impact of legacy and monolithic systems and break away from this technology debt.
- **The new reality of software and services development requires speed and new skills.** Many automotive companies lack the internal talent or resources to respond to the growing importance of software and services as integral aspects of products.
- **Existing processes and workflows may be rigid or long-standing and cannot easily adapt to changes in the market.**

Although some of the previously mentioned challenges can be addressed in the abstract (i.e., the digital-native competition), automotive companies face an urgency to create plans for addressing some of the other challenges in order to move ahead in the market. Their approach must include mechanisms that rely on open APIs that can connect with data and systems to foster communication, collaboration, and commerce, as well as the use of microservices to speed the adoption of new capabilities in their ecosystem platforms and the customer experience. Open standards and agile development are key IT and business considerations. Essentially, we are describing the outcomes from an open platform and open architecture approach, such as:

- Agile development capability for rapid app development
- Open standards for development and data management
- Common development languages and methodologies
- Readily available ecosystem of developers and suppliers

As the automotive industry continues to invest in digital transformation, we believe it should consider how open source approaches and technologies are part of the journey.

## ESSENTIAL GUIDANCE

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Considering the complexities inherent to connected vehicles and the rise of mobility services, we offer the following guidance for automotive manufacturers and their partners:

- Forge closer alliances with suppliers, content providers, complementary services, and customers to create an ecosystem that will deliver value to all participants.
- Establish the platforms for ecosystem optimization, including innovation, operations, and monetization.
- Create an open approach to accelerate innovation and learn from the best practices in the open source community.

The automotive industry is adapting to support new customer experiences through the rise of mobility services and connected vehicles, and empowering the ecosystem through new technology as well as new, more open approaches is essential. Openness and collaboration must increase between technology and business for digital transformation.

## About IDC

International Data Corporation (IDC) is the premier global provider of market intelligence, advisory services, and events for the information technology, telecommunications and consumer technology markets. IDC helps IT professionals, business executives, and the investment community make fact-based decisions on technology purchases and business strategy. More than 1,100 IDC analysts provide global, regional, and local expertise on technology and industry opportunities and trends in over 110 countries worldwide. For 50 years, IDC has provided strategic insights to help our clients achieve their key business objectives. IDC is a subsidiary of IDG, the world's leading technology media, research, and events company.

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