Connected Car Study 2016
Report
Acknowledgements

We have spent the last few months speaking to many experts from the automotive industry. Being given this opportunity was particularly exciting, as the few connected car experts that are working in the industry are, as a rule, in great demand in their everyday work. We are proud to have so many high-profile executives of German car makers and their suppliers, representatives of young start-up ventures and the leading industry associations as well as leading managers from several US-American enterprises contributing to our study. We owe much of our work to their time and effort!
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Connectivity, with the internet and between cars, has become the most powerful trend in the automotive industry of our times. Built-in connectivity is not just a natural expectation for customers living in the age of the internet; it is increasingly becoming an indispensable technology for intelligent vehicles in the slow, but steady evolution of the driverless car.

One of the prime challenges for intelligent and user-friendly solutions lies in reconciling the different mindsets and work practices of the internet and software industry with those of the automotive industry. How can these two sides come together for a promising future? And how do car makers and their suppliers in particular have to change their structures and processes to allow a rewarding symbiosis?

This study shows that the industry is currently experiencing only the precursors of lasting changes and transformation. The increasingly dominant role of software in vehicles needs structural adjustments on the part of the automotive industry. Software, IT, and internet competences are becoming an indispensable resource for meaningful differentiation in the market. Traditional selling points, like built quality or quieter engines, are losing their cache in the markets.

Success under these new conditions means becoming faster and more agile in the development process and staying as true as possible to the customers and their actual needs. The question has to be: How are people actually using the product? The internet age has made the constant tracking of user data a core competence of all successful enterprises. Organizations need to become flat and open to accommodate experts from all areas. Organizational and management models from the IT and internet industry need to be emulated in order to respond more flexibly to the dynamic trends and the fast pace of technological change. A logical consequence is that the commercial and competence requirements will change for employees and executives alike. Innovation and change management will figure more greatly, as will more tolerance for errors. The traditionally top-down nature of leadership in the automotive industry is about to experience an exciting transformation.
Propositions

3.1 Revenues will shift from the point of sale into the lifecycle. Product development needs to be aware of user preferences.

3.2 Digitalization of the products and industry is accelerating innovations and increasing the pressure to adapt.

3.3 The growth and profitability of automotive suppliers essentially depends on their software and digitalization competences.

4.1 Organizations need to become flatter and more software-centric.

4.2 New leadership concepts like Radical Agility, Objective Key Results, and Tribal Organizations are becoming more important.

4.3 The product development process is becoming more agile and relies on a two-speed concept: Virtual products and surfaces are produced more frequently; safety-relevant features are innovated every three to five years.

5.1 In the competition for the best minds, recruiting excellence and employer branding are becoming indispensable.

5.2 Leadership cultures are opening up and becoming less disciplinary in nature.

5.3 Executives need to develop innovation and change management competences.
The automotive industry is undergoing one of its greatest transformations since the invention of the car more than 120 years ago. Within the next decade, driverless cars will be a commonplace reality. Even today, modern technology has equipped current models with the ability to master everyday situations like parking or keeping in lane autonomously.

These changes have multiplied the number of sensors and control units on board and magnified the role of software in making car traffic a safer and more pleasant experience. It seems a logical next step for the giants of the IT industry, like Apple and Google, to enter this market. New and powerful competitors are making themselves felt. New players like Tesla are showing how easily they can manage to take the old hurdles of vehicle integration or production by relying largely on the major suppliers. They are using the same principles that Apple had followed in its work with Foxconn. Large factories or extensive pools of manufacturing knowhow are becoming less and less relevant for differentiation in the car market.

The traditionally tough competition in the industry is made tougher again by these new players. Established business models and old structures, processes, leadership cultures, and competence requirements need to be questioned. This study tries to facilitate the necessary decisions by providing the essential background information.

Sources: *Kienbaum Connected Car Study 2015, ** recode.net/2015/05/27/apples-jeff-williams-the-car-is-the-ultimate-mobile-device, *** auto.de/magazin/zetsche-treibstoff-der-zukunft-ist-software
Where to go from here?

Even though a vast majority of the study participants recognize the market entry of Google and Apple as a major challenge, several automotive suppliers also see it as an opportunity for breaking free from the shackles of being tied to the large OEMs.

There is agreement about the fact that the role of connectivity or digital value creation will still increase significantly. Despite some differences in the expectations, the respondents generally assume that connectivity and software will amount to almost 30 percent of value creation in car sales by 2020.

One of the key questions is which other or additional sources of revenue can be tapped into as a result of these changes. The opinions differ: More than 70 of the surveyed experts assume that the sale of software will be the main driver of revenue in connectivity. 58 percent of the experts believe that the processing and sale of data will be an important revenue driver.
The Methods used in this Study

In order to understand the challenges and upcoming changes for the automotive industry, it is important to give the experts in the industry a voice to reveal their perspectives. At the same time, the expected needs for action need to be quantified and made tangible for decision makers. With this in mind, the study uses a hybrid design, combining methods of qualitative research with quantitative approaches.

In total, we have conducted more than 30 detailed interviews with decision makers in the industry since autumn 2015. In addition to representatives of car makers (OEMs) and their suppliers, we have spoken to personnel from younger software companies and industry associations as well as consulting houses.

All interviews began on an open basis and were later supported by online questionnaires, including both open-ended and closed questions. Additional interviews were conducted with experts to verify the results with an often surprising degree of consistency in the answers. These again confirmed the findings presented here. In addition to the interviews, recent studies on the topics in question and contributions from some of the leading conferences in the field were also reviewed.

### Background Information in Brief

- **Survey participants**: 31 experts
- **Survey**: Quantitative and qualitative
- **Survey length**: 45 to 75 minutes
- **Survey period**: September to December 2015
- **Country**: Germany

#### Gender

- 35%
- 48%
- 10%
- 7%
- 45%

#### Position

- Top management: 21%
- Middle management: 14%
- Employee: 48%
- Other: 20%

#### Company

- OEM: 14%
- Supplier: 45%
- New player: 20%
- Other: 21%
3 The Rise of the Connected Car and Its Implications
The interviews revealed considerable disagreement about the actual meaning of the term “connected car”. While some suppliers see connectivity as already beginning with sensor integration or the adoption of Ethernet standards, customers seem to focus on established functions like phone capabilities, satellite navigation, or music streaming via the internet. These features are increasingly being joined by other functions like remote diagnostics, over-the-air updates, driver assistance systems or semi-autonomous driving technology. The medium-term prospect of the rise of truly driverless cars is a topic of intensive discussions for premium OEMs and major suppliers in particular. Until that stage is reached, all relevant parties are strongly committed to semi-autonomous driving, which is already becoming a standard function in many new cars sold today.

The question has to be how important connectivity is or will be for the consumer. 86 percent of the participants state that customers will soon be – or are already – willing to pay a premium for connectivity capabilities. Three quarters of the sampled experts also believe that customers will not be interested in models without any connectivity features anymore. Certain niche markets will remain (with some car makers already selling selected models under the concept of “pure driving experience”), but they are generally considered negligible. In sum, the experts believe that the new features that are currently marks of distinction in the market will soon become classic hygiene factors.

There is also a general consensus that services like streaming subscriptions or traffic features will open up new and continuous cash flow sources. The relevance of car sharing is also increasing. Pay-as-you-use models are becoming popular even within cars. Revenue in the automotive industry is shifting from the point of purchase to a later point in the car’s lifetime. The focus is shifting from simple car sales to intelligent services that customers can access at the point of need.

### 3.1 Shifting Revenues

**Customers ARE willing to pay a premium for connectivity and related services.**

- Yes: 86%
- No: 14%

**Customers WILL categorically reject models without connectivity features.**

- Yes: 75%
- No: 25%

#### Status Quo

The cash flow is mostly generated via the sale of the product.

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**Example:**

Skoda selling Connection packages (Android Auto, CarPlay, and MirrorLink) at a €160 premium

#### Outlook

The cash flow is increasingly generated via services, in-app sales, or mobility services.

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**Example:**

BMW offers ConnectedDrive on a subscription basis after a free trial.
**Status Quo**

Customers recognize connectivity as added value and are consequently willing to pay a premium – Lacking connectivity is not a critical issue.

Connectivity can be a distinguishing feature.

**Outlook**

Connectivity is seen as a matter of course – Lacking connectivity is a critical issue.

Only niche products without connectivity
The Rise of the Connected Car and Its Implications

3.2 Focus on Customer Preferences

One of the most striking differences between the automotive industry and the internet sector is the difference in the nature and pace of the product development process. While car makers rely on traditional four to six-year product cycles, accelerated with facelifts or upgrades at the half-way point, the makers of software or IT products are used to working with cycles of a few weeks to a maximum of one year until the next release.

The automotive industry needs to step on the accelerator in order to get novel ideas and innovations faster to the customer. Already today, many customers prefer using apps on their smartphones instead of relying on out-dated car navigation systems. If a car is two or three years old, the navigation software can easily be five years or older and cannot keep up with the updates or even live data available on smartphones.

Apart from the pace of development, another major difference lies in the manner of tracking and responding to the users’ preferences and feedback. IT companies develop their new ideas often on the basis of a Minimum Viable Products (MVP), which only comes with the very basic features and is immediately ready for (usually online) testing. Depending on the utilization of the product by its users, only the functions that are actually being used are developed further. This makes it much easier and faster to satisfy the real customers’ needs and increase usage rates. This lean start-up approach is becoming increasingly relevant for connectivity features.

The traditional automotive industry has to ask itself how much it is prepared to focus on the customers’ actual preferences. Up to now, cars and their components are developed by experts with a unique talent for technology and automotive products. How customers respond to the product and which functions are actually being used is often of secondary concern. Modern cars already record substantial amounts of user data, made available via on-board diagnostics (OBD), and even though virtually every driver takes their car to a service station in the first few years of use, the data is not captured or used with anything like the systematic process that is common at internet companies.
In the start-up sector in particular, it is common practice to release “Minimum Viable Products” (MVP). A version of the product with the bare minimum functions is released to track actual usage and use the resulting data to develop the product further in line with the users’ preferences.

Lean Start-up Approach

In the start-up sector in particular, it is common practice to release “Minimum Viable Products” (MVP). A version of the product with the bare minimum functions is released to track actual usage and use the resulting data to develop the product further in line with the users’ preferences.

From Innovation to Customers – Automotive Industry

<table>
<thead>
<tr>
<th>Supplier</th>
<th>OEM</th>
<th>Customer</th>
<th>OEM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>OEM Presentation</td>
<td>Prototype Development</td>
<td>Release</td>
</tr>
<tr>
<td>Concept</td>
<td>6 months</td>
<td>1,5 years</td>
<td>2 - 2.5 years</td>
</tr>
<tr>
<td>Prototype</td>
<td>Internal Commitment</td>
<td>4 - 5 years</td>
<td>6</td>
</tr>
<tr>
<td>1 year</td>
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First delivery to the customer
3.3 Software and Digitalization Competences of Automotive Suppliers

The study paints a very clear picture that it will mostly be suppliers with substantial IT and software competence that can hope to outperform their market: A full 92 percent of the surveyed experts agree on this. The results are only minimally more mixed for suppliers without IT and software competences: Here, 71 percent of the interviewees assume that their products will soon become readily interchangeable commodities, and differentiation in commoditised areas is notoriously hard. Price alone becomes the deciding factor, and competition increases. This makes software and digital competences a decisive factor for the future growth and market presence of automotive suppliers. This trend is only reinforced by the sophisticated nature of the technology already built into many components and by the vast and fast spread of many features. Customers buying lower to mid-range cars nowadays expect the same build quality and high-tech components that were usually reserved to luxury range cars. There is little room left for further differentiation in established technologies like engines, chassis, or car body materials.

Suppliers traditionally have little touch points with the end user. In order to identify and pursue the right approaches, it can help them to demand access to the OEMs’ customer data, which will also be in the interest of the OEM and be an expression of the much-vaunted partnership between both sides.

An important feature in this respect will be platforms that suppliers or new internet ventures can use to sell services to the driver – without the involvement of the OEM – not unlike mobile app stores. Google and Apple are already committed to such strategies, which have proven their worth on Android and iTunes. Both companies have already made their first tentative steps into cars with Android Auto and Apple’s Car Play, establishing a first hold on the central cockpit display and its functions. Smaller car makers like Jaguar and Landrover can use this to offer their customers sophisticated premium connectivity platforms via such services. The strongly entrenched German automotive industry, with its five leading brands and landscape of major suppliers, has to respond in kind. A strategy of isolated solutions, like Nokia-Microsoft tried with Symbian smartphones, seems risky at least. The joint acquisition of Nokia here was a sensible first step that should be followed by many more.

Case Study: Brose Smart Opener

BMW has celebrated Brose’s smart opener (automated boot opener, sensor activated by foot) as the innovation with the greatest added value for customers.

This recognizes the creative IT thinking that went into a comparatively simple and cheap innovation.

<table>
<thead>
<tr>
<th>The products of suppliers without high IT/software competences are increasingly becoming replaceable commodities.</th>
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<tr>
<td>Yes 71% No 29%</td>
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<table>
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<tr>
<th>Suppliers with good/high IT or software competence will outperform the market</th>
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<tbody>
<tr>
<td>Yes 92% No 8%</td>
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</table>
4 Implications for the Organizations
The surveyed experts agree that corporate structures in product development need to become flatter and more dynamic. However, looking at their responses in more detail, the picture changes: All interviewees working at the new players are satisfied with their current organizational structures. In the traditional automotive sector, by contrast, a majority of respondents (61 percent) state that their product development units do not have flat or dynamic hierarchies.

German OEMs are often organized by traditional hierarchy or in matrix structures, arranged by car models or technology areas. The structure of the new players in the market adapts flexibly to the actual requirements in the given area. A clear link between the pace of innovation and hierarchy is evident: The flatter the hierarchy, the faster it can produce new products. Established OEMs still hold by development cycles of four to six years, while the start-up Faraday Future is committed to bring its first production model car to market in two years – a mere four years from the founding of the company. Tesla also expects its suppliers to achieve development cycles of a mere nine months.

It is therefore not surprising that most experts tend to agree that the structures in the automotive industry need to change substantially in response to the challenges of digitalization. The large established organizations with their intricate hierarchies in particular need to adjust. This can be done by launching spin-offs (see Infobox: Two-Speed Organizations, pp. 20-21) or by acquiring external capabilities.

Although most interviewees see the growing relevance of digital products, software development still plays a subordinate role in the German auto industry. Its position can resemble that of tier-2 suppliers: expected to deliver to specifications, but excluded from the creative development process. Experts can see change on the horizons: Software development and integration will (have to) establish itself as self-contained units in the automotive value chain. Exceptions prove the rule: The issue of security, for instance, seems set for vertical integration in order to avoid compromising the safety of the complete product.
Your company/The automotive industry is currently using flat and dynamic hierarchies in product development.
4.2 The Advent of Novel Leadership Concepts like Radical Agility, OKR, or Tribal Organizations

Many young enterprises use innovative organization and leadership instruments in a deliberate move away from traditional leadership theory. These include approaches like the tribal organization espoused by Spotify, Zalando’s radical agility concept, or the Objective Key Results (OKR) used by Google and others.

One principle shared by all these new instruments is their commitment to extensive flexibility in responsibilities and authorities. A frequent term used in this area is the “fluid organization”, with a structure and make-up to match the projects and conditions in the market. Employees are used in agile configurations of different topics and teams, with an even stricter distinction between functional and disciplinary leadership. Aside from urgency and competence, the preferences of employees are explicitly giving a hearing when tasks are allocated. This guarantees that employees work with more autonomy, boosting intrinsic motivation and job satisfaction.

Spotify organizes its people in tribes, chapters, and guilds, with community beating set structures. Spotify employees have the opportunity to network across the entire organization. Instead of standards being enforced from above, the solution that is used most effectively in projects will win. In the end, people are using de-facto standards that enjoy great acceptance in the workforce.

Zalando also achieves considerable flexibility and creative sharing with a flexible use of its employees. Instead of a set hierarchy, the organization uses the idea of radical agility, with any employee being supervised by up to three managers: the Product, People, and Delivery Lead.

The OKR concept, originally developed at Intel and long used by Google, emphasizes strategic focusing. Irrespective of the financial incentives offered by the grounding in traditional management by objectives, the OKR approach allows the necessary focus and prioritization on key issues – even if employees are working at separate offices or in separate teams.
4 Implications for the Organizations

Tribal Organization (Spotify)

Radical Agility (Zalando)

Objective Key Results (fictional example)

Source: Company homepages, internet
More and more agile units are being spun off

Response of the German automotive industry

- **Independent unit for digital services**
  - BMW
  - 150 new employees sourced from internet companies
  - Based in Shanghai, Chicago, and Silicon Valley

- **Subsidiary for innovative mobility services**
  - Daimler
  - Special recruitment days “Connected Car”
  - Takeover of the MyTaxi provider
  - Development of Car2go

- **Foundation of the VW Lab**
  - VW
  - Innovation fund of €20 million for projects outside the core business
  - Based in Munich, Beijing, and San Francisco

- **Bosch Start-Up GmbH**
  - BOSCH
  - Spin-off of a start-up incubator for new business models using Bosch technology

- **Foundation trive.me**
  - EDAG
  - Development of a proprietary app platform with individual car features
  - Small and effective team for fast innovation outside the corporate structure

Sources of Friction

- Strong resistance and limited acceptance in established organizations that have little interest in new “satellite” businesses
- Teams looked down on as “ideas management for cheap”
- Lab products have to match the zero-error standards of the established business
- Frictions: Projects and employees of the new units are more innovative and visible, while “old IT” employees are criticized as mere administrators
- Frequently regional and cultural distance between the spin-offs and the corporate centre

Comparing development processes in the software and automotive industry

<table>
<thead>
<tr>
<th>Software and Start-up Sector</th>
<th>2-Speed-Organization Automotive Industry</th>
<th>Automotive Industry</th>
</tr>
</thead>
<tbody>
<tr>
<td>Customer challenge</td>
<td>6 - 52 weeks</td>
<td>Concept</td>
</tr>
<tr>
<td>Prototype narrative</td>
<td></td>
<td>Product planning</td>
</tr>
<tr>
<td>Definition MVP*</td>
<td></td>
<td>Construction &amp; development</td>
</tr>
<tr>
<td>Release</td>
<td></td>
<td>Prototyping</td>
</tr>
<tr>
<td>Revision</td>
<td>6 years</td>
<td>Release</td>
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<tr>
<td>Data analysis</td>
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“We need to combine two cultures: Build the best car in the world, and launch apps immediately in beta releases and keep improving them with updates.” CEO, OEM

*MVP = Minimum viable product
A direct comparison of the product development cultures in the automotive industry and the IT sector reveals striking differences: Cars and other vehicles are generally developed along traditional "cascade" processes with set approval and clearance structures. The IT industry, by contrast, has united under the banner of agility. Fast product development with immediate feedback loops are the norm, not the exception. The increasing integration of software in automotive products needs these two worlds and rhythms to be aligned and calibrated.

All OEMs represented in this study, but also a first set of suppliers, have begun to respond to this challenge by spinning off dedicated units, tasked with developing ideas and software solutions in fast and agile processes. These operate under names like Digital Lab or Technology Office and tend to follow their digital business models far removed from the traditional head office. This distance exists not just in concepts and mind-sets; it is often also regional in nature. The VW Lab, for instance, is located in San Francisco and Beijing and in the homeland of BMW, Munich. BMW in turn has established offices right in Silicon Valley, in Shanghai, and in Chicago.

There is general agreement that these so-called 2-speed organizations are a sensible first step in the right direction. 73 percent of the surveyed experts expect more areas of their businesses to be turned into agile units. For the long term, they want to see dynamic and agile processes and faster development cycles playing a key role in automotive development itself.

Integrating the output of the agile units creates a first new challenge for their parent companies: The products and ideas will only be accepted and integrated if the mission of the new units is clearly defined and if their work is not considered an attack on established structures.

The success stories in the area go beyond simple communication and make sure that the staff in their established units are brought into regular contact with the start-ups – sometimes even in outright job rotation. In this manner, the recurring problem of mismatched quality expectations can be pre-empted: Many start-ups care primarily about the speed of output, while the eventual products need to fulfil certain quality standards that the automotive industry has grown accustomed to.

Conway’s Law

According to the computer scientist Melvin Conway, the structures of IT systems resemble the structures and channels of communication of the organizations that have developed them. The law states that complex organizations can only produce complex software products and systems. The same can, with some probability, be said about the manufacturing sector and its products. For the digitalization in the automotive industry, it seems necessary to develop simple and novel solutions, such as applications, by using simple and novel organizational structures.

Looking at modern IT systems, Conway’s Law seems to be in full effect. IT and software companies are working under the idea of "API first". This means that the interfaces between application modules are developed first and the underlying modules follow separately.
4.3 The Move toward Agile and Accelerated Development Processes

There is complete and unreserved agreement (100 percent) with the proposition that dynamic and agile processes are becoming important in automotive development to cope with accelerated development cycles. There are suggestions of automotive development splitting into individual components.

Certain components allow considerable creative input – such as software or clearly defined components with few interfaces and little impact on safety – that can be developed in fast-paced, agile, and fluid organizational forms. These include infotainment systems or simple interior fittings. On the other side, there are more safety-relevant features or components with more complex integration requirements. As the #Dieselgate scandal has shown, even components that are subject to strict regulation call for extensive tests and thorough oversight in the development process. More traditional parts, like engines, chassis, brakes, steering, seats, restraint systems, or exhausts, will continue to rely on established multi-year product development processes.

Dynamic and agile processes will become important in automotive development in response to faster development cycles.

**Suitable**
- Components with greater creative freedom, software or clearly defined components with specific interfaces

**Less suitable**
- Safety-relevant components or components with higher development and integration requirements

[Diagram showing suitable and less suitable components]
5 Implications for People
5.1 Recruiting Excellence and Employer Branding in the Competition for the Best Minds

A headline finding of the study is the apparent concern in the industry about its ability to attract qualified IT specialists in sufficient numbers. Already today, 61 percent of the participating companies lack software and IT specialists. The prospects are not well: 83 percent assume that it will become more difficult to find enough qualified personnel.

Comparing this with the results of other studies, it is clear: There is reason to be concerned. The IT industry association Bitkom speaks of a shortfall of approx. 43,000 IT specialists in Germany. Even today, the demand for IT specialists in the automotive industry is gaining ground on the demand for traditional engineers. In the mid-2020s, it will surpass that demand. The number of students and graduates in software or computer science is growing more slowly than the number in other engineering disciplines. It is only a matter of time before the shortfall will become an acute problem, especially when one considers that the automotive industry is appreciated much more among traditional engineers than among their IT peers: Automotive engineers are only needed in that industry, IT specialists are needed everywhere. The Trendence research institute has found out that around one third of all German IT graduates think about joining Google as a potential employer. The automotive OEMs and Bosch still manage to rank among the top-20 employers, but even the best performer in this ranking, BMW, trails far behind the industry leader with only 8.8 percent of mentions. Asked about the reasons for this situation, the experts pointed to the image and the product. At the same time, an interesting and stimulating work environment is also mentioned as a crucial factor.

Recruiting is a particularly problematic proposition for smaller, less well-known suppliers who are finding it harder and harder to recruit the right graduates and experts for their needs. This calls for recruiting excellence and targeted employer branding. In the "war for talent", only long-term strategies can hope to succeed, and big pay packages alone will not be enough to attract the best minds of the Generation Y.

What makes Google such an attractive employer?

"Attractive product" "Success; good guy image; lifestyle; youthfulness" "Highly innovative; apparently pleasant work environment" "Hip culture and successful business" "Different work atmosphere" "Image" "Employer brand" "Cool environment" "Very demanding" "I can make a mark; greater career opportunities"
5.2 Open and Less Disciplinary Leadership Cultures

As part 2.2 has shown, the transformations on the level of products also need a transformation in process and management models in the direction of modern open and agile approaches. Leadership cultures also need to change. 88 percent of the experts agree that a cultural change is required in the automotive industry. There is relatively obvious consensus that leadership has to become more lateral and less disciplinary in nature in order for true creativity to arise. The trend is towards "Larry Page leadership", which considers mistakes part of a learning process and cares more about recovering from, than preventing mistakes. The challenges arising from the changed mindset of the Generation Y(1) also contribute to the rising importance of intrinsic staff satisfaction.

Some reservations remain about these developments: Only about half of the surveyed experts believe that unfinished products will become the norm in the automotive industry, motivated in particular by safety concerns. The critical challenge will therefore be to keep the right balance between freedom, creativity, and tolerance for certain error margins and the required quality and safety standards. Mastering this challenge needs managers who are fully aware of the entire range of leadership instruments at their disposal.

For successful cooperation between software developers and the automotive industry, a cultural change is required in the industry.

In the IT/software sector, it is common practice to launch products that are not 100% finalized ("Fake it till you make it"). Do you believe that this mentality will take hold in automotive software development?

Larry Page/Start-Up Paradigm

<table>
<thead>
<tr>
<th>Error Culture</th>
<th>Errors as part of the learning process</th>
</tr>
</thead>
<tbody>
<tr>
<td>Openness</td>
<td>Open innovation and coopetition</td>
</tr>
<tr>
<td>Motivation</td>
<td>Task-oriented</td>
</tr>
<tr>
<td>Recruitment</td>
<td>By competence</td>
</tr>
<tr>
<td>Career ambitions</td>
<td>&quot;Conquer the world at 30, then leave.&quot;</td>
</tr>
</tbody>
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Ferdinand Piëch/Automotive Industry Paradigm

<table>
<thead>
<tr>
<th>Error Culture</th>
<th>Zero tolerance for errors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Openness</td>
<td>Not-invented-here syndrome</td>
</tr>
<tr>
<td>Motivation</td>
<td>Career-oriented</td>
</tr>
<tr>
<td>Recruitment</td>
<td>By knowledge and qualification</td>
</tr>
<tr>
<td>Career ambitions</td>
<td>&quot;Become a director by 55.&quot;</td>
</tr>
</tbody>
</table>

1) Additional perks and benefits for employees, like free lunches, leisure activities, laundry services, help with official correspondence etc.
5.3 Innovation and Change Management Competences as the New Hallmark of Good Leaders

Asked about the requirements that managers in the automotive industry have to live up to in the wake of digitalization, the experts named three aspects: Personality, competence, and leadership styles.

It is important for the leadership culture to be reflected in the personalities of the leaders. The study’s participants stressed how important it is to be more welcoming to new technologies and novel thinking. The “Not invented here” syndrome that many parts of the German car industry suffer from needs to be overcome, as it stops the uptake of solutions that come from outside sources. The future is one of open platforms and ecosystems and open-source models that live of openness and coopetition—the paradoxical combination of competition and cooperation. No single market actor will be able to develop all connectivity features independently, but the automotive industry remains an exclusive club with little access for executives from other sectors.

Modern, decentralized leadership models and structures make old top-down processes impossible. Middle managers in particular are called upon to develop a more entrepreneurial outlook: Greater autonomy means a greater range of factors to be considered when making decisions. When decisions are implemented, however, the focus falls on narrowly specific competences: The interviewees emphasize technical backgrounds or affinity to technology trends or they consider specific competences in agile methods, such as Scrum, as essential for success. Only managers who manage to make the leap from hierarchical and disciplinary leadership to cooperative leadership between equals in a culture of trust will master the challenges ahead.

Statements about the leadership competences required for an “agile culture”

<table>
<thead>
<tr>
<th>Personality</th>
<th>Competences</th>
<th>Leadership Styles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Openness: Faster innovation needs minds that are open for new ideas and technologies.</td>
<td>Trend scouting: Shorter product lifecycles makes the identification and analysis of trends increasingly relevant.</td>
<td>Leadership among equals: Cooperative leadership that values meaningful contributions over hierarchies promotes the necessary creativity.</td>
</tr>
<tr>
<td>Entrepreneurship: Greater autonomy needs holistic, entrepreneurial thinking.</td>
<td>Methodology: Awareness of and experience with agile methods like Scrum is essential.</td>
<td>Trust, not control: Agile organizations cannot work with complete controls; autonomous teams need to be managed with trust.</td>
</tr>
</tbody>
</table>

An agile culture needs open-minded leaders who can think like entrepreneurs, recognize new trends, apply agile methods, and lead others cooperatively.
Crucial top management qualities?*

1. Courage and daring (93%)
2. Inspiration and charisma (91%)
3. Openness and modesty (90%)
4. Vision and clear targets (90%)
5. Focus on people (85%)
6. Entrepreneurship (82%)
7. Leadership (71%)
8. Optimism in volatile times (70%)
9. Embodying the CEO role (66%)
10. Risk affinity and change mindset (60%)

Faster innovation cycles force managers to show more inspirational impact, open-mindedness, and a strong strategic focus.

Stable production or product expertise is being replaced by risk affinity and tolerance for volatility. At the same time, people-oriented and entrepreneurial thinking is gaining in importance.

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Source: Kienbaum Study “Digital Leadership & Innovation 2015”, * Figures in % of mentions, ** Russell Reynolds
Discussion: Do We Need New Academic Degrees?

The surveyed experts agree that the digitalization of cars is creating completely new requirements for young professionals. 68 percent of the samples believe that academic training will need to change in response to these new conditions. There is a particular need for new interdisciplinary engineering courses that combine aspects of electronics, information technology, and mechanical engineering. Many experts worry that statistics, data management, and machine learning are still given too little prominence in IT.

Interestingly, the opponents of such new degree courses espouse similar arguments. However, they suggest that the necessary knowhow is already available, but that old barriers between academic disciplines need to be broken down in order for more interdisciplinary minded graduates with a broader professional grounding to come into the job market.

We refer to the previous Kienbaum study on lacking strategic IT knowhow for the digital transformation ("Standortnachteil Deutschland: Fehlendes strategisches IT-Wissen von Führungskräften hindert die Digitale Transformation"), in which we revealed the emphasis on applied IT knowhow in current academic training.

What is missing here is again an element of multidisciplinarity. Compared to the situation in Germany, many US colleges combine IT and commercial expertise. The German tendency towards academic bunker mentalities, keeping IT and engineers well away from economic questions, is a considerable risk.
Will new types of occupations or academic qualifications be needed? If so, in which areas?

Apart from new degree courses, many experts wish for better fundamental training and lower barriers between different disciplines.

Most of the surveyed participants see a need for new interdisciplinary degrees:

- Integrating electronics, computer science, and mechanical engineering from a technical perspective
- Teaching of intermodal mobility concepts (IT, automotive, emotionality, and public offerings) from a commercial perspective
- Specialization in data management, data science, and machine learning from an IT perspective

**Knowhow taught in selected subjects** [in %]

<table>
<thead>
<tr>
<th>Subject</th>
<th>Information Technology (DE)</th>
<th>Information Technology (US)</th>
<th>Engineering (DE)</th>
<th>Engineering (US)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Applied IT knowhow for the digital transformation</td>
<td>100%</td>
<td>57.14%</td>
<td>12.5%</td>
<td>0%</td>
</tr>
<tr>
<td>Applied engineering knowhow for the digital transformation</td>
<td>0%</td>
<td>16.67%</td>
<td>12.5%</td>
<td>14.29%</td>
</tr>
<tr>
<td>Applied commercial knowhow for the digital transformation</td>
<td>0%</td>
<td>16.67%</td>
<td>12.5%</td>
<td>14.29%</td>
</tr>
<tr>
<td>Integration of IT in strategic management</td>
<td>10%</td>
<td>33.33%</td>
<td>14.29%</td>
<td>0%</td>
</tr>
</tbody>
</table>

* Source: Kienbaum Study "Standortnachteil Deutschland: Fehlendes strategisches IT-Wissen von Führungskräften hindert die Digitale Transformation"
What does our study tell us? We have seen how the concept of the Connected Car and the digitalization of mobility will have serious implications and lasting repercussions in the automotive industry. Now is the time to accept these challenges and to face the new situation with determination and commitment. Cautionary tales abound, like the crisis of Germany’s energy giants E.ON and RWE who considered themselves untouchable for so long that they missed the unmissable: the revolution in energy policy. Or consider Nokia and Sony, two other fallen heroes, who left it too late and did too little when their markets were being turned upside down.

The German automotive industry has already shown its ability to reinvent itself. Faced with massive competition from Japanese carmakers in the 1990s, the industry responded and systematically copied the manufacturing and quality management concepts of their more successful peers, especially Toyota. Now, the industry needs to look to the western hemisphere and see which ideas and methods for R&D or sales need to be taken from Silicon Valley.

The product ‘car’ is already changing and becoming closer in nature to electronics or software applications. The new pretenders to the throne are based in Silicon Valley, and they have the knowhow and the financial means to revolutionize the car market. Responding to that challenge means modernizing old organizational structures, processes, cultures of leadership, and the management of competences. The serendipitous timing of our study – coming hot on the heels of the VW diesel scandal – has certainly made the participants more acutely aware of questions of leadership. Everybody we spoke to agreed that the culture in the automotive industry needs to change. This suggests that major changes will take place in the industry, which will affect everything from the employee on the ground to leadership and processes or even entire business models. The challenge is there for all to see. Now is the time for a meaningful response.
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