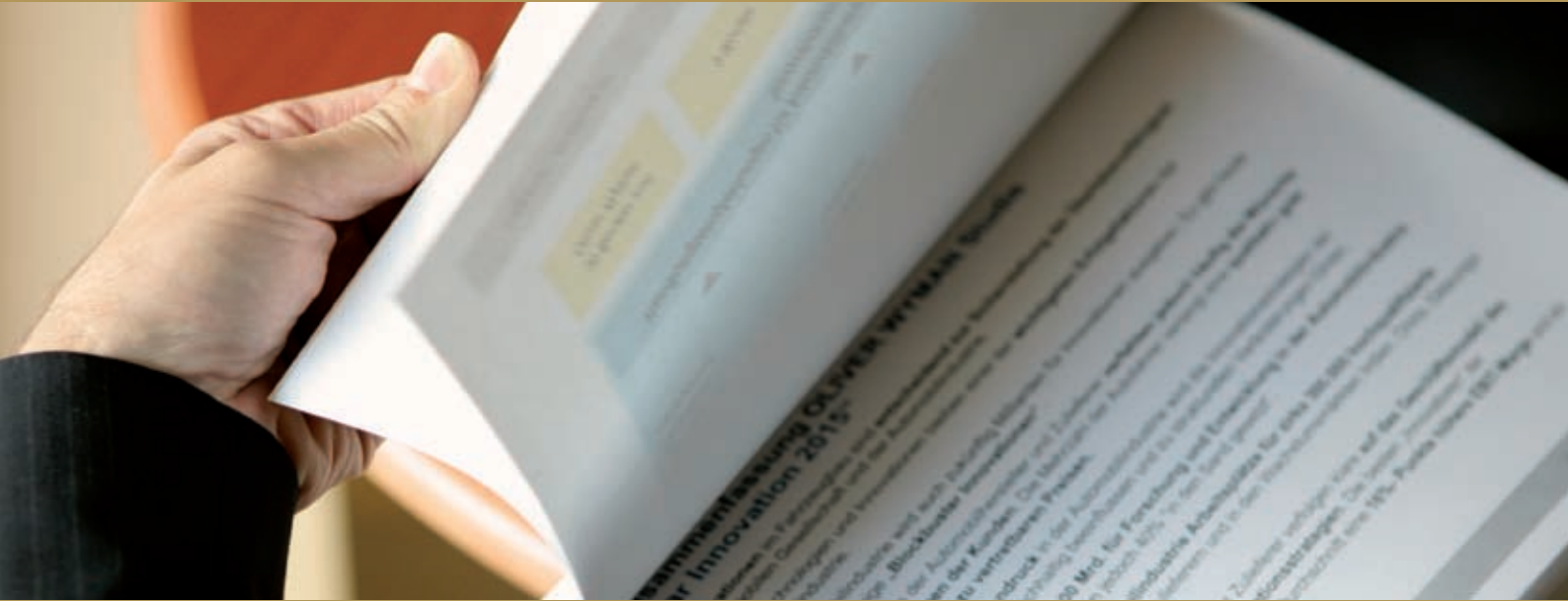


# Innovation Potentials



“Automotive companies must increasingly focus their innovation efforts on a very limited number of promising innovation projects.”

## Recognize technology chances and manage the risks

A closer look at R&D spending by both OEMs and suppliers shows that around 40 percent of all investments go into innovations that never make it into the car or are never produced in sufficient numbers due to a lack of market acceptance. Of the remaining 60 percent, 20 percent is for necessary serial development. Another 20 percent is for innovations that fulfill legal requirements but do not add to a product's distinctiveness. Usually, these innovations do not pay off either. That leaves only a small remainder of 20 percent that represents profitable innovation investment. And more and more technologies are fiercely fighting over this sweet spot.

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### Innovation portfolio

Oiver Wyman's "Car Innovation 2015" brought to light that only ten percent of all innovations have the potential to become a real blockbuster. OEMs and suppliers must scrutinize the innovation portfolio to identify the right ones.

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Only around ten percent of the automotive technologies under development at the moment have the potential to become blockbuster innovations. These technologies combine the two most relevant categories: The first category, market potential, consists of functional purpose, customer acceptance, regulation compliance and price level. The other category, a high degree of innovation, creates technological differentiation in the market, better intellectual property protection, high margins and a long harvest period.

However, blockbuster technologies come at a high risk. The bigger the innovation step, the higher the development risks. And market potential is a moving target. Take the fuel cell. It certainly is highly innovative compared with existing power-train concepts. But it has a very low market potential at the moment, given its still questionable road capability, uncertain price position and dependence on special fuels. However, this situation could change with time and turn the fuel cell into a true blockbuster.

Automotive companies must increasingly focus their innovation efforts on a very limited number of promising projects. In order not to place their bets blindly, they have to carefully assess the potential and risks of the technologies they want to explore and regularly reassess them.

Existing technologies, as well as technologies under development, always face the possibility of being pushed aside by alternative developments. In order to assess the technological and market potential of a given technology, its respective car module must be analyzed in terms of the key technologies being used, current trends and future innovations. The chances and risks of a given technology are also influenced by the different market structures, competitors and business models in each segment. Innovation cycles are constantly shortening while development costs are rising due to the higher complexity.

# “Car Innovation 2015” technology roadmap

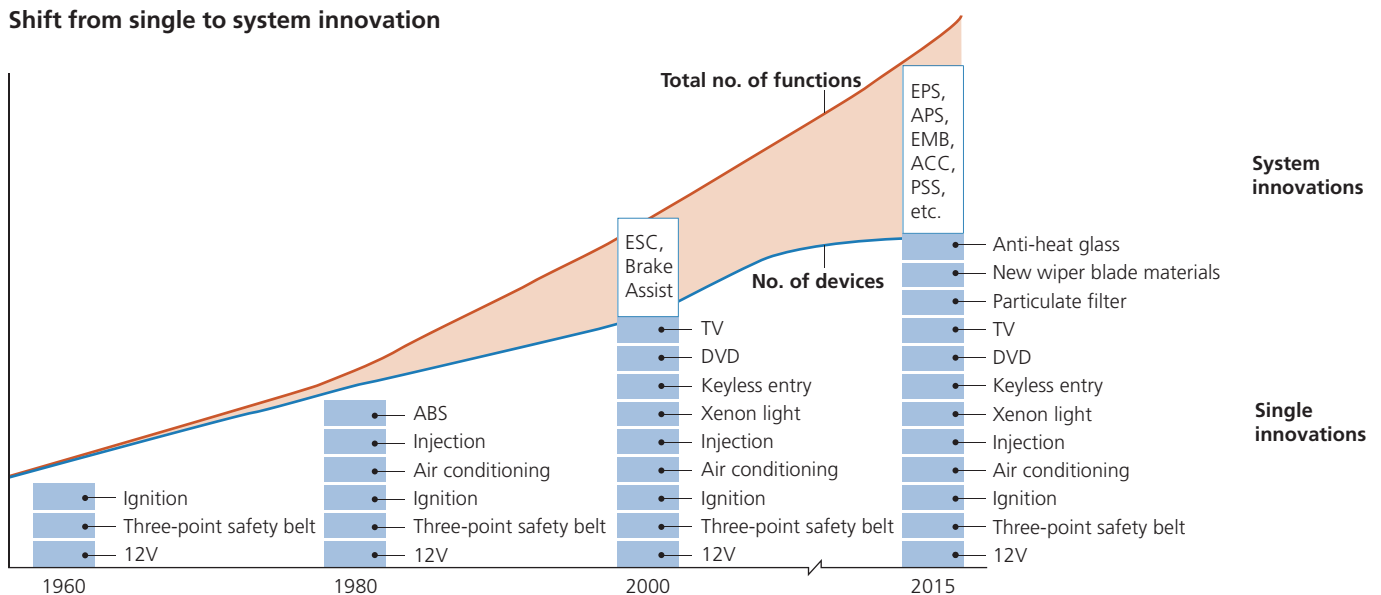
In “Car Innovation 2015,” Oliver Wyman has examined a representative sample of 315 automotive innovations in terms of their innovativeness and their market potential. This analysis suggests that little more than half of all current innovation projects in the automotive industry has a high likelihood of succeeding in the market. Besides producing a comprehensive industry innovation map and database, “Car Innovation 2015” has identified three technology trends through 2015:

Electrics and electronics will remain the most important enabler of automotive innovations through 2015 and beyond, and will grow by six percent annually. The sweet spots with a revenue growth of eight percent and more will be software, semiconductors, displays and power generation. Still, electronics will also face increasing cost-optimization pressures. Significant shifts will occur toward functional integration and carry-overs, and toward further standardization.

As more and more automotive functions become interlinked, a noticeable move from single innovations to system innovations is occurring. Whereas one device used to have one single function in the past, more and more devices will be used for two and more purposes in the future. One example of this evolution is the Mercedes-Benz PRE-SAFE system. It links existing systems like crash sensors and ESP with seat controls, seatbelts and the sunroof, adding safety functions to existing components.

The single most important innovation focus of the industry lies in emissions / fuel efficiency / weight, with new power-train concepts and architectures evolving. Through 2015, the production of power trains that use the traditional fuel of gasoline will decline 0.3 percent annually from 48.5 million units in 2005 to 46.5 million. Diesel engines will experience annual growth of 2.1 percent, from 12.6 million to 15.8 million, while alternative-fuel vehicles (biofuel, natural gas) will grow up to 3.8 million units per year through 2015. The strongest growth will be in hybrid power trains, with a compound annual growth of 21.4 percent, reaching 11 percent of all power-train concepts through 2015 (micro 70 percent, full 24 percent, mild six percent). Fuel-cell power trains will reach significantly less than one percent of production.

## Shift from single to system innovation



Please note: ABS = anti-lock braking system, ESC = electronic stability control, EPS = electronic power steering, APS = adaptive power steering, EMB = electro-mechanical braking, ACC = adaptive cruise control, PSS = predictive safety systems

## **Example:**

### **Chances of and threats to hybrid power trains**

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#### **Key enabler electronics**

The biggest technology challenge is still the ability to handle the complexity of electronics in the development process and in vehicle technology. Electrics and electronics remain the No. 1 enabler of automotive innovations.

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Hybrid power trains will experience an annual growth rate of more than 21 percent through 2015, making this one of the premier automotive growth markets. In 2015, 11 percent of all cars will be hybrid. But full hybrids will account for only 24 percent of this market, due to the high additional costs and weight. 70 percent of all hybrid cars will be so-called micro hybrids, which are limited to recovering braking energy for use during acceleration and a start-stop function. Market acceptance will be high for hybrids in urban areas around the world, and the technology can be communicated easily, especially for micro hybrids. Hybrid technology is very versatile and, therefore, very universal: It can be used with all sorts of combustion engines – gasoline, diesel, natural gas and alternative fuels. Additionally, the architecture and components for hybrid cars are very similar to those of fuel-cell vehicles and electric cars. Hence, hybrid developments will position companies well in the potentially vital fuel-cell market of the future.

## **Implementation:**

### **Choose and manage the right innovation projects**

As mentioned, around 40 percent of all innovation spending is predetermined by compulsory developments due to legislation and by necessary serial development. The fundamental R&D question for automotive companies is to choose the right technologies and to define the right targets for them in the right time frame.

The first step for R&D optimization is to evaluate the future market potential of all ongoing innovation projects, to define the threats they face from other technologies in the same area and to model price scenarios. If other technologies are needed as helping or enabling technologies, will they be available and what is their market potential? For example, a battery management system for fuel-cell and electric cars needs available technologies in place to have a market. Which regional markets will be likely to embrace the technology?

For example, the Asian market is much more interested in infotainment systems than the European market. The next step is to ensure a proper marketing and business strategy for each innovation project. Many innovations fail because they are not explained properly to dealers and end customers or because there is no adequate business design to make an attractive offer and to capture the value. The story of General Motors' OnStar shows how important the business model can be for the success of an innovation. The OnStar information system was first introduced in 1996 as a dealer-installed accessory that was an exclusive GM feature. GM managed to attract only 105,000 users and generate a turnover of USD 49 million within the first three years. In 1999, the business model was changed significantly:

The value proposition was enlarged, offering safety and security features as well as remote diagnostics, information, entertainment and other services. Instead of charging a sales price for the device, OnStar started a subscription business, opened the system to all car brands and factory-equipped all new GM models with its device. By 2002, the number of users had jumped to 2.2 million, generating turnover of USD one billion.