Opportunities for Action in the Automotive Industry

How Electronics Will Revolutionize Innovation in Autos

THE BOSTON CONSULTING GROUP
How Electronics Will Revolutionize Innovation in Autos

The Age of Electronics has hit the auto industry full force. This does not mean simply that automakers must rethink how they market and sell cars over the Internet. They must also rethink how and where they introduce innovations and how they manage their relationships with suppliers to provide those innovations. By fundamentally altering the auto industry’s rules of innovation, electronics are rewriting the rules of competition.

Manufacturers already rely heavily on electronics to differentiate their models. A large and growing proportion of innovations in automotive entertainment, communication, and navigation depends on electronics. The same is true of the core functions that determine performance and comfort. As a result, the influence of electronics on the premium that a model or brand commands—which is already considerable—will become much greater over the next decade.

The rise of electronics signals a sea change for automakers and their suppliers. Why? Because electronics industries have their own distinctive model for introducing and profiting from innovations. It remains unclear to what extent the auto industry’s model will evolve toward that of electronics industries. But one thing is already certain: the auto industry will be transformed.

Introducing Innovations

In the auto industry’s existing model, manufacturers introduce innovations at the top of their product
lines—in premium brands and top-of-the-line vehicles—and then gradually take them down the pyramid to mass-market vehicles. Fuel injection, antilock brakes, dynamic suspension systems, and car phones all spent their childhood as expensive options in luxury vehicles. This approach has allowed car manufacturers to recover the cost of developing innovations from customers willing to pay top dollar for them. And it has given automakers a powerful means of enhancing the value of their premium brands while they learn how to manufacture the innovations in larger volumes.

In contrast, innovators in many electronics markets immediately strive for the greatest possible volumes. They price in advance of their experience curves to build market share and achieve scale as quickly as possible. Consequently, they tend to offer all their innovations immediately to volume producers without any grace periods for premium brands. If that pattern took root in the auto industry, luxury brands would lose an important means of differentiating their models, which would severely undermine their ability to command a premium over mass-market brands.

**The Pace of Innovation**

Automakers generally make continual, incremental improvements in most of the components of a model during six- to eight-year cycles. They introduce breakthrough technology only occasionally. The industry’s economic model—which includes pricing, resale values, leasing margins, and the timing of new-product introductions—depends on that lengthy cycle.

The cycle of innovation and the economics could not be more different in electronics industries. Product generations rarely last more than 18 months. Per-
formance often more than doubles from generation to generation. Companies introduce incremental improvements monthly, if not weekly. They often provide new releases or updates to customers as a profit-generating service. And an innovation’s influence on price drops precipitously within only a few months of its introduction.

If that pace becomes the norm in the auto industry, the results will be profound. New features—including navigation systems, steer by wire, “smart” safety and anticollision systems, and integrated drive train, suspension, braking, and steering systems—will continue to emerge and improve at an accelerating rate. As a result, the features and cost of a new model will be dramatically better than those of any car that has been on the market for more than a couple of years. Sales volumes, price realization, and resale values of the outdated cars may drop so significantly that selling and leasing them will no longer be profitable.

Controlling Innovation

In the auto industry, manufacturers have largely controlled the innovation process. In many electronics industries—most notably, personal computers—suppliers are the prime forces. Consider the possible outcome if the electronics model prevails.

If manufacturers lose control of innovation, they risk losing control of the final product. Even before electronics became such an important issue, automakers had already increased that risk by relentlessly pursuing outsourcing. Outsourcing essential skills can deprive a company of the knowledge and insights it needs in order to innovate. To build strong brands, companies cannot outsource their core competencies—and today those include electronics R&D.
Suppliers could grab the lion’s share of the profits. Ultimately, the auto industry could look like the PC industry: manufacturers could find themselves in a stalemate business, squeezed between strong suppliers and strong retailers.

Rethinking Strategy

The overwhelming importance of electronics means that automakers and suppliers must revisit their technical and process-based competencies and strategies. They must challenge every aspect of their approach to innovation, including how they fund and organize their R&D efforts.

To begin thinking about which technical competencies and processes it needs in order to cope with the pace of innovation, an automaker or big supplier should construct a matrix. One axis should display the layers of a typical electronics industry, and the other the major functions of a vehicle. (See the matrix “Choosing R&D Priorities: Rank the Boxes.”)

For each box of the matrix, the company should think about the four stages of R&D:

1. Ideation: brainstorming about possible innovations and which to pursue
2. Concept development: turning the idea into a prototype or simulation
3. Commercial development: transforming the prototype into a mass-producible part or system
4. Life-cycle development: continually improving the part or system during its life
The company should then examine each stage and decide which it should perform itself, which it should tackle in a partnership or joint venture, which it should outsource to a trusted supplier, and which it should treat as a commodity and put up for bid. A company’s answers to those questions will depend on its strategy and position. But all companies had better factor in the huge economies of scale that many kinds of electronics require.

A critical issue, of course, is how quickly electronics-based technologies will supplant traditional technologies. Will a supplier of, say, an endangered hydraulic system be able to find new markets that can replace the auto industry? How might it make the transition to electronics? In other words, traditional suppliers must worry about survival. For its part, an automaker has to ponder which of its suppliers will be able to

![Choosing R&D Priorities: Rank the Boxes](image)
make the transition and which new partners it should cultivate.

Automakers in particular have to think broadly about how electronics could change their business systems. Which parts of their systems could become obsolete and what new capabilities do they need to develop? If electronic systems replace hydraulic systems, for example, what will the impact be on manufacturing, disposal, and service operations, and what will the cost savings be? And if updating hardware and software can rejuvenate a car, what new capabilities do automakers need and how much will they cost?

In addition, each automaker will have to answer some fundamental strategic and operational questions. Considering that the value of an automaker’s electronics division could exceed that of the traditional business, how will the company maximize its value? How will it make money in the Age of Electronics? Should the automaker introduce a particular innovation in mass-market or premium brands? Should it offer an innovation as a standard or optional feature? Should it charge little or nothing for a feature and make money on service or upgrades? Should it offer services such as navigation for free and try to make money on advertising? How can the company achieve the huge economies of scale that many kinds of electronics require? Will it be able to depend on a big supplier or should it team up with other OEMs?

Automakers—and suppliers—should assume that the switch to electronics will happen sooner rather than later. They should not underestimate the challenge of changing the way that their organizations think about pricing and costs. And, most of all, they should realize that the Age of Electronics presents unprecedented threats and opportunities. There are an extraordinary
number of new ways that companies can make money and create value for shareholders. But to make the best choices, companies will have to figure out which of their traditional strengths they can leverage and how to develop the new sources of competitive advantage that they will require.

Arthur Kipferler
Riccardo Monti

*Arthur Kipferler is a vice president in the Stuttgart office of The Boston Consulting Group and coordinator of the firm’s global automotive activities. Riccardo Monti is a vice president in BCG’s Milan office.*

You may contact the authors by e-mail at:
kipferler.arthur@bcg.com
monti.riccardo@bcg.com
# The Boston Consulting Group

<table>
<thead>
<tr>
<th>City</th>
<th>City</th>
<th>City</th>
<th>City</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amsterdam</td>
<td>Hong Kong</td>
<td>Paris</td>
<td></td>
</tr>
<tr>
<td>Atlanta</td>
<td>Jakarta</td>
<td>San Francisco</td>
<td></td>
</tr>
<tr>
<td>Auckland</td>
<td>Kuala Lumpur</td>
<td>São Paulo</td>
<td></td>
</tr>
<tr>
<td>Bangkok</td>
<td>Lisbon</td>
<td>Seoul</td>
<td></td>
</tr>
<tr>
<td>Berlin</td>
<td>London</td>
<td>Shanghai</td>
<td></td>
</tr>
<tr>
<td>Boston</td>
<td>Los Angeles</td>
<td>Singapore</td>
<td></td>
</tr>
<tr>
<td>Brussels</td>
<td>Madrid</td>
<td>Stockholm</td>
<td></td>
</tr>
<tr>
<td>Budapest</td>
<td>Melbourne</td>
<td>Stuttgart</td>
<td></td>
</tr>
<tr>
<td>Buenos Aires</td>
<td>Mexico City</td>
<td>Sydney</td>
<td></td>
</tr>
<tr>
<td>Chicago</td>
<td>Milan</td>
<td>Tokyo</td>
<td></td>
</tr>
<tr>
<td>Copenhagen</td>
<td>Monterrey</td>
<td>Toronto</td>
<td></td>
</tr>
<tr>
<td>Dallas</td>
<td>Moscow</td>
<td>Vienna</td>
<td></td>
</tr>
<tr>
<td>Düsseldorf</td>
<td>Mumbai</td>
<td>Warsaw</td>
<td></td>
</tr>
<tr>
<td>Frankfurt</td>
<td>Munich</td>
<td>Washington</td>
<td></td>
</tr>
<tr>
<td>Hamburg</td>
<td>New York</td>
<td>Zürich</td>
<td></td>
</tr>
<tr>
<td>Helsinki</td>
<td>Oslo</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

[www.bcg.com](http://www.bcg.com)