



Automakers and tech companies meet at the intersection of in-vehicle electronics

Ford did it with telematics. Audi did it with graphics and navigation. GM did it with smartphone applications. These, and many other automakers, are reinventing the automotive supply chain by breaking the stronghold that traditional tier-1 electronics suppliers have had on the market. The pace of automotive innovation has quickened, yet there are trade-offs for automakers when working directly with the largest technology firms on the planet.

In years past, an automotive original equipment manufacturer (OEM) would source a navigation system from a supplier with little interest for what it did or how it was designed. Now OEMs work directly with “nontraditional” suppliers like NVIDIA, Sharp, Flextronics, and Google to ensure their infotainment systems meet quality, usability, and performance guidelines.

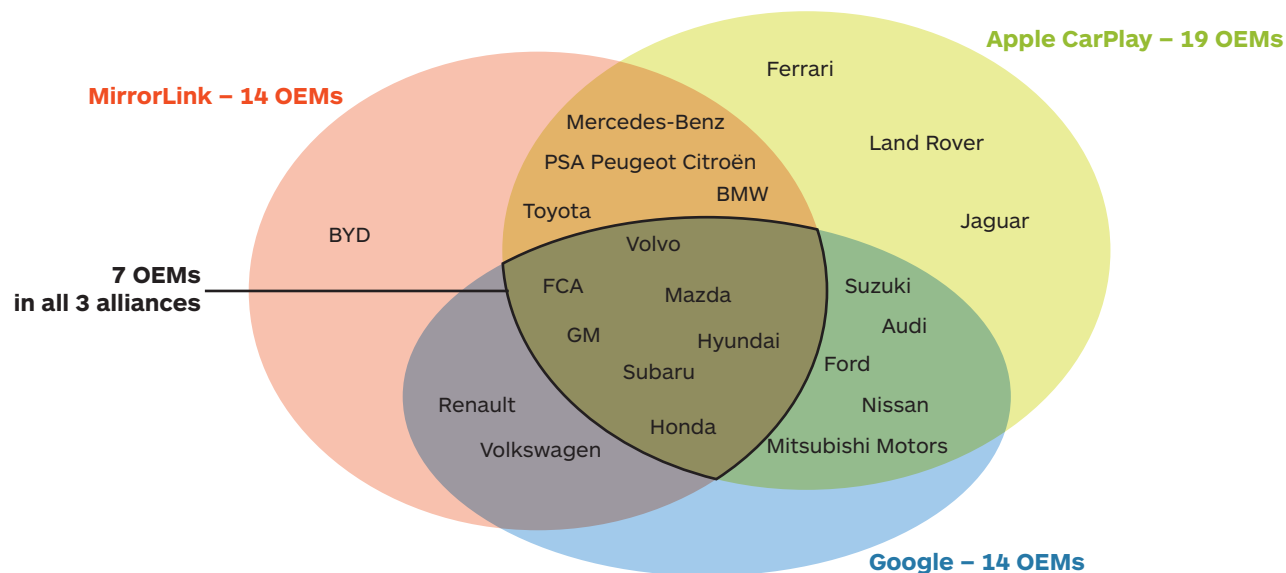
This new trend has 100-year-old industrials working directly with technology leaders to find innovative

design solutions. According to Phil Abram, chief infotainment officer at GM, they are “establishing a community where developers can join in exploring what’s possible with in-vehicle apps.” Clearly, this is external innovation at work.

Other automakers are pursuing the same end game. Ford, for example, has worked to in-source technology development in a number of ways. Ford used its own engineering team, partnering closely with Microsoft, to deploy MyFord Touch in record time. While the system clearly could have benefitted from additional fine-tuning prior to its launch, the OEM remedied the errors and has since seen an 80% -plus penetration rates on some models.

Volkswagen Group, meanwhile, set up a multi-company joint venture, e-Solutions, which has provided comprehensive development of a new global connected car ecosystem. e-Solutions, comprising the Modular Infotainment System (MIB) architecture, launched

Distribution of OEM relationships with Apple, Google, and MirrorLink, July 2014



Source: IHS

recently on the seventh-generation Volkswagen Golf and the new Audi A3. From hardware components to software code to service partnerships, the whole ecosystem was built semi-internally with close partnership between VW and its electronics suppliers.

Accelerating infotainment design cycles

Although these examples show the changing configuration of the supply chain, they do not address the three- to five-year product cycle challenge that the automotive industry faces. The car is the most complex volume-manufactured product in the world, which results in a lengthy timespan between product enhancements and redesigns. However, automakers increasingly see electronics and infotainment as an area that must be kept fresh and relevant not only during the design cycle, but also over the 10-plus-year life of a vehicle.

Software and connectivity are the essential elements that facilitate the shorter (6-12 month) design cycle for automotive infotainment. In the near term, the development focus is on integration of the smartphone and personal cloud content. The difference here is the “nontraditional” suppliers in this case are not startups, by any means.

Significant attention has been paid recently to smartphone projection systems, namely Apple CarPlay. Google also has a solution, Android Auto. MirrorLink,

which started it all, is well known but struggling to find scale. Apple and Google have the advantage of pushing their solution up through a mobile operating system via hundreds of millions of devices, whereas MirrorLink, an open-source collaboration, must work to build momentum one device-maker at a time.

As of March 2014, 14 OEMs were part of MirrorLink (developed by the Car Connectivity Consortium). Sixteen OEMs had either announced their intention to join, or were in development, with Apple for CarPlay deployment, and only four OEMs were a part of the Open Automotive Alliance, which is predominantly Google and Android focused.

After the Google I/O, its annual developer conference, IHS updated its tracking of OEM participation among the three initiatives. As of July 2014, the 14 OEMs with MirrorLink had not changed. However, the number of OEMs affiliated with Apple’s CarPlay had increased to 18, and those associated with Google had expanded to 14. Most notable are the seven OEMs (FCA, GM, Honda, Hyundai, Mazda, Subaru, and Volvo) that are now linked to all three initiatives. These OEMs will be in a position to offer consumers a wide range of infotainment and navigational technologies to choose from when buying a vehicle (See figure above).

Connected car development is shared among nearly all major automakers today, and the pace of change

in the partnership announcements foreshadows how quickly the development might just take place. Based on announced OEM development platforms and the accelerating speed of change in the partnership landscape, IHS Automotive forecasts sales of Apple CarPlay to reach 16 million unit sales in the next four years and Google's Android Auto to reach 17 million unit sales in the same timeframe (See figure below).

One reason for the seemingly slow pace of technology development, is the incongruent cultures between an industry without safety-critical components and one with a storied history of product-safety recalls. While many OEMs claim to already have one to two years of development work alongside Apple and Google, neither solution will reach 10 million sales until 2017, since these initiatives require some hardware upgrades. Nevertheless, the expansion of these alliances in the last year has occurred at a faster pace than the automotive industry has adopted any other technology or feature in the past.

Bridging the Gap

For many years, automakers and tier-1 suppliers tried unsuccessfully to integrate smartphones and other mobile devices into the car. Consumers demanded it. They did not want to leave their connected lifestyle outside the car. Ford and many other OEMs began thinking like a consumer electronics company.

Attempts to bridge the gap between automotive and consumer electronics lead to significant deployments of Bluetooth, Wi-Fi, USB, in-vehicle infotainment (IVI) software platforms, application software-development

kits (SDKs), and other technologies. While many have tried, no single infotainment or telematics platform has succeeded to achieve the same consumer electronics (CE) user experiences.

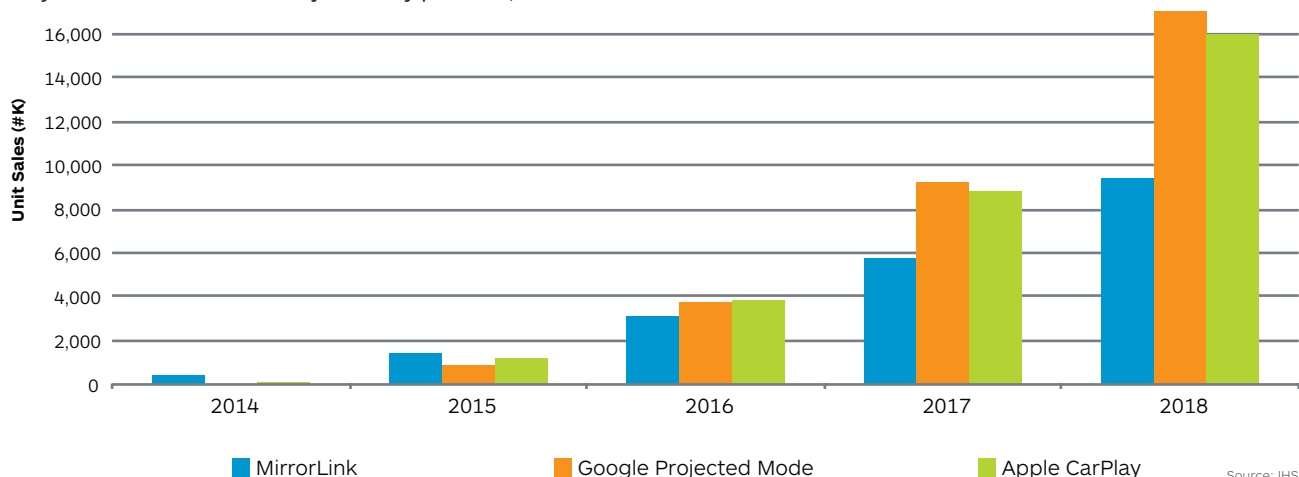
And thus it has fallen on Silicon Valley to extend the olive branch back toward the automotive industry. As recently as the 2013 LA Auto Show, Tarun Bhatnagar, director of Google Maps for Business, was invited on stage for the keynote speech by Jim Farley, Ford's EVP, global marketing, sales, service, and Lincoln.

Bhatnagar proceeded to discuss Google's approach and commitment to automotive. He stated there are now 12 billion miles driven on Google Maps every year, but that the car in large part is not yet truly connected. Problems of compatibility, policy, user experience, and content have kept these worlds apart. Bhatnagar made four recommendations on how the CE world can facilitate progress in automotive technologies:

- Enable differentiation—The CE world needs to make the devices that people use daily work with the vehicle, while allowing for automakers to differentiate services, content, and UX. If differentiation disappears in the interest of compatibility, then automakers have little left to market to buyers.
- Address safety—CE companies should begin to consider, understand, and implement automotive safety standards into their products. Although much of a smartphone's use will exist outside of a vehicle, its activity inside the car should not ignore the car's inherent safety-critical considerations.
- Design for seamless integration—CE firms should

Big tech companies are making inroads into the growing connected car market

Projected sales of in-vehicle systems by platform, 2014-2018



work with automakers for seamless integration of personalized content, services, and cloud(s). While battles between content ecosystems continue outside the vehicle, consumers should not be forced into buying one car brand over another simply because of their affiliations and content subscriptions outside of the vehicle.

- Share UX best practices—CE businesses should actively and openly share UX best practices. Device and software companies should work with automakers to help build better, more intuitive, and less complex UX platforms across the automotive landscape. This does not mean making all systems into one but, rather, sharing research data on font size, contrast levels, cognitive testing, haptics, system redundancies, and more. BMW's iDrive can still be uniquely BMW. Audi's MMI can still be uniquely Audi. However, if both subscribe to the same principles in user experience design, then both are well positioned to reduce distraction and enhance customer satisfaction.

It is clear that if automakers are to continue progress to successfully integrate consumer electronics into their vehicles, they will have to work with technology companies to make it a reality. Most major automakers have set up shop in and around Silicon Valley to co-locate with some of the most innovative thinkers in the world. Yet, a culture shift by both parties will be required to optimize this collaboration—or the aforementioned developments will have been a waste.

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