



Automotive infotainment: how the OEMs can contain the digital giants' surge into the cockpit

Google and to some extent Apple have gained access to the car's dashboard thanks to very competitive infotainment software solutions. Car manufacturers face the risk of losing control of the onboard content and services.

Several containment strategies are being explored, none of which yet guaranteeing to keep the 'digital giants' at bay.

By Jean-Edmond Coutris and Ayoul Grouvel

Executive Summary:

What is at stake is nothing less than the Original Equipment Manufacturers' and suppliers' future share of the automotive value chain and profit pool. As the 'digital giants' increase their influence over the cockpit, automotive brands also risk losing direct contact with the customers.

Infotainment will emerge as a key differentiation element among OEMs' value propositions by the turn of the decade. As 'Mobility as a Service' significantly cannibalizes the 'car ownership' model, infotainment will become a key portal in mobility service distribution. Automated driving will also contribute to this trend as it frees the driver's time onboard.

The automotive manufacturers' solutions are being disrupted by Google and, to a lesser extent Apple, through 2 key software bricks: **Mirroring** (replication of the smartphone screen on the car head unit) and **core OS** (primary software layer of the infotainment platform).

As Mirroring is well suited for lower-end and mid-range segments, **generalist OEMs will be particularly tempted to switch to Android Auto (Google) and CarPlay (Apple) solutions with the risk of putting the fox in charge of the henhouse.** Some OEMs are actively looking into alternatives, teaming up to market an open source Mirroring solution.

In the **core OS** business, Google is also challenging QNX's leadership with a competitive and complete software suite. **As it dawned on the OEMs that they risk becoming too dependent on Google** for onboard services delivery, they reacted in 3 different ways:

- **'Join them'**. A group of OEMs such as FCA, and Renault to a lesser extent, are open to cooperation with Google for infotainment OS
- **'Pivot to digital'**. German OEMs are investing heavily in internal capabilities to build performant proprietary solutions – mostly based on QNX
- **'Build an alternative open ecosystem'**. A third group of OEMs (e.g. Ford, PSA,...) are promoting the GENIVI consortium to set industry standards and propose an industry-based open source solution. This appealing approach still has some governance and cost sharing issues to solve

Thanks to their strong partnership culture and an ability to team up or invest in companies capable of delivering key technological bricks, German premium OEMs are proving that an independent route is possible. **Time is of the essence for the rest of the automotive industry to decide which role Google and Apple will be allowed to play in their vehicles.**

Key takeaways:

- *Mirroring and core OS are a Trojan horse for Google and Apple to set a foot in any new vehicle and control the connected content*
- *Mirroring solutions allow the digital giants to replicate their services distribution model, thus cornering the contact with the end-user*
- *Google has gone a step further and penetrated deep in the vehicle architecture, by proposing a virtually-free, performant OS package*
- *Generalist OEMs still hesitate on the right approach, thus risking to accelerate the shift in the value chain in favor of the digital giants*

1. The recent emergence of the infotainment value chain opened 2 entry points (Mirroring and core OS) for Google and Apple into the automotive ecosystem

Automotive infotainment centers are on-boarded IT platforms bringing content and services to drivers and passengers. Tomorrow, when automated drive will have settled in – freeing driver’s time onboard – infotainment will be a key differentiation element between OEMs’ mobility value propositions. As long as driving is still partially managed by the driver, on-boarded solutions will create higher value for the customer.

Infotainment systems are more than just an automotive IT platform; they should be considered together with the application software and enabled connected services. As a result, two very different know-how are necessary to deliver a performant infotainment system: automotive electronics and digital services. This leads to the confrontation of two types of actors:

- The traditional automotive industry, and in particular OEMs who have – to date – largely relied on external suppliers to accelerate their go-to-market;
- The digital giants, who have unparalleled know-how in digital services implementation and distribution, and a strong ambition in the automotive sector.

As of today, Google and Apple have strived to get onboard the vehicle thanks to competitive and operational software packages: Mirroring solutions (replication of the smartphone screen on the car head unit) and core OS.

Figure 0. Infotainment value chain, Google and Apple entry points and example of players



Source: Emerton research

2. Thanks to their Mirroring solutions, Google and Apple replicate their services distribution model into the automotive business, and corner the contact with the end-user

Mirroring is a recent infotainment-enabling solution (first solutions were available in 2012), which principle is to replicate the smartphone screen onto the dashboard head unit. The well known Android and iOS user experiences are adapted to a driving situation (e.g. fewer larger icons, voice control, selection of content compatible with driving) in order to reach automotive safety standards.

The Mirroring approach allows to benefit from the smartphone capabilities (calculation power, 3G/4G connectivity, GPS,...), content (music, media,...) and smartphone-born services, through the vehicle interface. Since the OEMs only have to add a piece of middleware on top of their infotainment core OS, Mirroring is appealing as a relatively low cost alternative to a fully embedded solution.

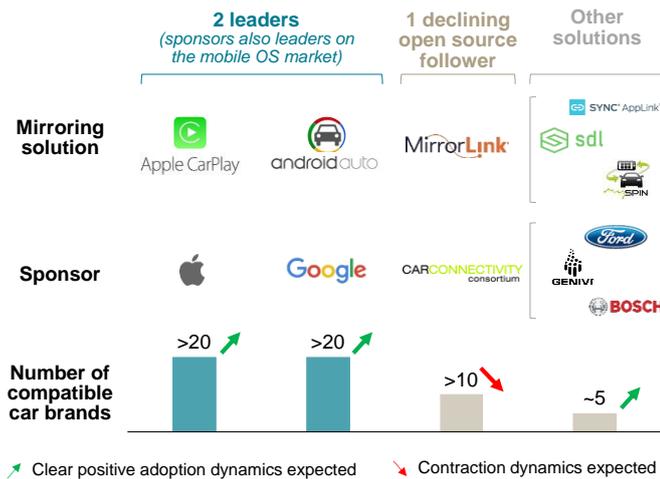
Although end-users are supportive of any solution allowing them to navigate in a smartphone-like environment, adoption of Mirroring by the OEMs has only really started this year, proposed as an option in most new model lines. It is particularly adapted to lower-end segments whereas high-end segments offer embedded solutions with Carplay and Android Auto ‘ready’ features.

Several Mirroring solutions coexist but face very uneven adoption rates and dynamics:

- Leading automotive industrials teamed up within the Connected Car Consortium back in 2012 in order to develop MirrorLink, an open source Mirroring solution, independent from the digital giants. As a pioneer, MirrorLink met an initial success but the momentum died out when the Apple and Google solutions reached the market. In comparison, MirrorLink suffered from poor user experience and connection complexity.
- Apple and Google, with respectively CarPlay and Android Auto, are the most popular solutions with the strongest dynamics, as a result of a strong traction from the end-users.

- Several other solutions with a limited market spread are marketed by OEMs, such as Ford SyncAppLink or Bosch's mySPIN. Ford's solution shows a positive dynamics as Toyota and Suzuki have already adopted SyncAppLink and several others (e.g. PSA, Honda) are considering it.

Figure 1. Mirroring and deployment dynamics



Source: Emerton research

Google is replicating its successful smartphone model for the automotive business: a software kit proposed to third-party equipment manufacturers, granting access to a content selected and distributed through its own application store. Apple has aligned itself on the Google approach. Accustomed to their smartphone environment, customers will expect Over The Air upgrades of their Infotainment, thus challenging the traditional OEM approach.

This is leading to a situation where Google and Apple are rapidly increasing their influence over:

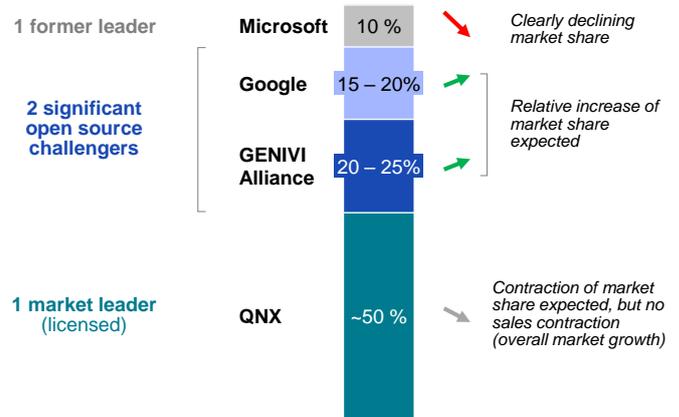
- Content and Services: Applications eligible for Mirroring are selected by Google and Apple understandingly. The 2 digital giants choose services serving their own strategy (e.g. no alternative navigation solution than theirs is available).
- Relationship with the end-user. Google and Apple impose their user experience, and in particular their distribution portals (iTunes App Store, Google Play) smartphone users are very familiar with.

3. Google is building a decisive advantage in the infotainment OS

Deep in the system, the core OS is the primary software layer which allows to activate the hardware. Within the infotainment core OS market, 3 types of actors with very different positions and dynamics can be identified:

- The market leader, QNX (subsidiary of Research In Motion) proposes a licensed commercial solution adopted by nearly half of the market.
- Two open source challengers show favorable dynamics: Google Android and GENIVI.
- Microsoft, a former market leader, is being pushed out of the market.

Figure 2. Infotainment core OS market structure and dynamics (estimated % of 2016 veh. sales)



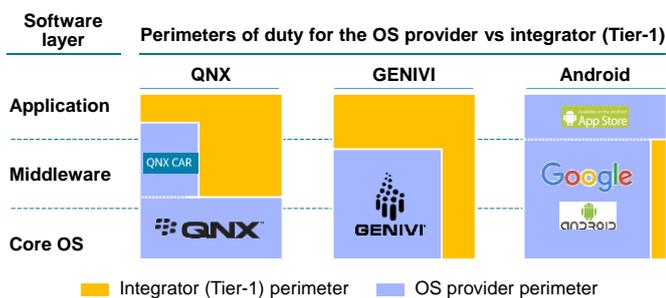
Source: Emerton research

QNX is an automotive OS pure player, offering a solution considered as performant but expensive due to high license fees and high applications development costs. For example, Audi, who pioneered infotainment for the VW group, invested in a JV dedicated to QNX-based applications: 1,000 engineers have been dedicated to the infotainment program to reach the group's ambition (500 Audi engineers in addition to 500 from the e-solutions, the partner company).

Google proposes a very competitive Android suite: free, open source, packaged (versioning and maintenance born by Google) and comprehensive (core OS and middleware available). In parallel, Google fosters the development of the Android ecosystem and steers the Open Automotive Alliance. In the end, this competitive and convenient solution could increase the OEMs' dependency towards Google.

GENIVI is a non-profit consortium founded in 2009 gathering several players from the automotive industry, which purpose is to organize the infotainment OS world in two ways: **1. Define standards for the infotainment industry**, and **2. Build an open source software bank** (for both core software and middle-ware) accessible to all members. GENIVI is built on several strengths, in particular IP cost-efficiency (license-free) and independence towards the digital world (*by automotive professionals for automotive professionals*). Nevertheless, application development remains expensive and maintenance of a constantly evolving open-source software is resource-consuming.

Figure 3. Outline of the perimeters of duty for each of the major OS solutions (directional)



Source: Emerton research

4. OEMs are adopting a scattered response in the view of Google's and Apple's intrusion in the car software markets

4.1. Mirroring. Broad adoption of Google and Apple solutions; Ford is trying to unite scattered OEMs into a significant open source opposition

Nearly all OEMs have progressively accepted to implement CarPlay and/or Android Auto in their vehicles (while MirrorLink is being progressively abandoned).

However, some OEMs are actively looking into alternatives. For example, Ford developed the proprietary SyncAppLink solution. In order to solidify opposition to Google and Apple, they contributed to the open source GENIVI with the underlying core software SDL. Only Toyota has adopted it to date; other OEMs such as PSA, Honda and Mazda are considering it. Another example of OEM exploring alternatives is JLR, who is experimenting a Tier-1 solution: Bosch mySPIN.

4.2. Core OS. Although the OEMs' positioning vs Google are still moving, 3 types of reactions can be distinguished: 'join them', 'pivot to digital' or 'build an alternative ecosystem'

OEMs are still adjusting their positioning vs Android. Nevertheless, three types of positioning can be outlined:

- Join them. A group of OEMs such as FCA, and Renault to a lesser extent, are open to cooperation with Google. The case of FCA is iconic, as they partnered with Google on the automated drive.
- Pivot to Digital. German auto-makers (Audi and the VW group, Daimler, BMW) are massively investing in building internal competencies in order to develop a proprietary ecosystem mostly based on QNX. This position requires heavy investments, in particular when the objective is to reach best-in-class user experience (ergonomics, depth of available content, compatibility with external devices,...).

- **Build an alternative open ecosystem.** A third group of OEMs (Ford, Toyota, PSA,...) chose to join forces with other players from the automotive industry (infotainment Tier-1s, automotive-grade software companies,...) to develop an independent open source alternative, in connection with GENIVI. This group is facing a challenge, since it is particularly exposed to GENIVI governance issues (more than 100 companies joined the consortium; all members do not evenly contribute).

As a matter of fact, the situation is still fluid, as illustrated by several OEMs' recent moves, such as Renault exploring options sequentially (different from one infotainment generation to the other), or BMW leading several options in parallel (BMW is a board member of GENIVI).

Given the strong asymmetry between the digital giants and the **traditional automotive players** in infotainment (cash, experience in app-based services, IS competencies,...), allowing Google and Apple to keep the lead on infotainment represents a **significant risk of disruption**. Therefore, it is essential for the traditional automotive players (OEMs, Tier1s,...) to **define and engage a clear recovery strategy**.

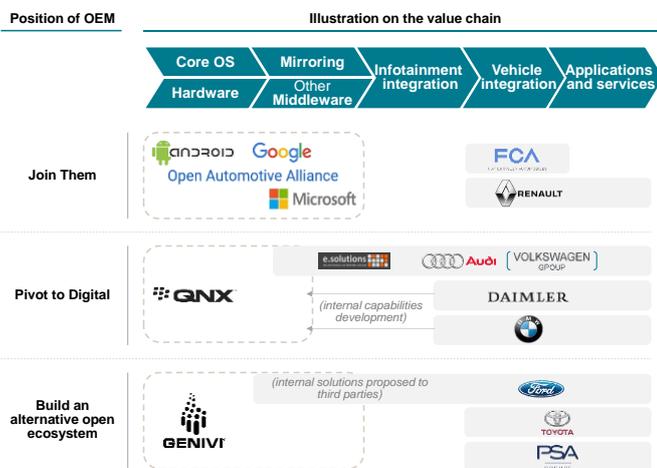
In order to catch-up with Google and Apple, the first step for industrials would be to **precisely understand their competitive environment**. In particular, they should pay a specific attention to the 'extended competition' arena embodied by digital companies – of all sizes – coming from outside the traditional automotive ecosystem.

Such industrial / digital mixed environment puts a high pressure on the value proposition. Thus, it is essential for industrials to adapt and propose a more appealing **service-based offer**. This implies a rather fundamental shift in the companies' mindset, and competences far beyond the superficial 'connectivity-washing' used for communication purposes. **External innovation** is a smart lever to accelerate the process.

Time is of the essence for the industry to adapt its value proposition to the **fast-moving 'connected mobility' environment**. For this reason, the execution **speed** – for example in organization transformation, in time-to-market,... – is key.

In the end, **investors will be able to segregate** the connected mobility actors based on their **nimbleness** (open attitude towards innovation and business model changes) and their **speed** in execution.

Figure 4. 3 types of positioning of OEMs in reaction to Google surge into the car OS – simplified view



Source: Emerton research

About Emerton

- Emerton is a premier global, mid-size strategy consulting firm with offices in Europe and North America, blending strategy consultants and seasoned industry professionals.
- Emerton has an unparalleled understanding of the Mobility ecosystem and underlying business models, deriving from our strong experiences in the Digital and Automotive sectors.

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