



Integrating the car into our digital life

It's all about software and a smarter approach to delivery

Self-driving cars provide one of the best examples of how digital technology is set to transform various aspects of our lives. However, while we wait for manufacturers, municipalities and regulators to work through the practical and legal considerations, the automotive sector is busily enhancing the traditional human driver experience. Next generation in-car 'infotainment' systems are an integral part of this, and building these is in turn dependent on software produced using modern architectures and development techniques.

Freeform Dynamics conducted a range of in-depth, confidential interviews with a number of senior managers in the automotive industry as part of a recent global study into digital transformation. Three of the individuals we spoke with, one from a mainstream car manufacturer, and two from major players in the automotive supply chain, were directly involved in the development of in-car infotainment systems. Some of the quotes captured during our conversations provide great insight into the potential and practicalities in this fast moving and highly interesting area.

Sources of input

The quotes included in this document were captured during in-depth discussions between Freeform Dynamics analysts and senior managers working in an automotive environment. Interviews were conducted as a part of broader global study into how mainstream enterprises are prioritizing and implementing various forms of digital transformation.

This comment, for example, highlights how manufacturers are starting to think about the car as much more than a discrete mode of transport:

"Our aim is to make the car more intelligent and more companion-orientated. We want it to be an extension of our connected homes and connected lifestyles."

But this doesn't just mean more buttons to press and switches to flip; in fact, the idea is to minimize such distractions by making the car more intelligent, aware and proactive:

"One of the principles is that the car is no longer a passive system. There are a lot of inputs we can tap into, and by continuously learning, the car will increasingly be able to present the right information and make the right recommendations depending on context. Location awareness and geo-fencing, together with access to your messages and calendar, for example, enables a lot to be done."

Not surprisingly, we then heard comments echoing imperatives that came through strongly from all industry sectors in our broader digital transformation research:

"It's not just about the user interface, but the whole user experience."

"It's now all about software."

Picking up on this last point, no one was suggesting that sophisticated sense and control electronics are no longer important – of course these elements are critical – it's more about a shift in emphasis enabled by a modern architectural approach:

"Even though my job is to look at things from a hardware perspective, most of the products I work on are primarily software driven. Hardware platforms are becoming more generic through the use of abstraction. The idea is that the software generally has little or no direct knowledge of the hardware it's executing on."



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The significance of this shift should not be underestimated. There is the economic impact when you consider the benefits from a high volume manufacturing perspective, for example:

“Five years ago, the hardware for in-vehicle infotainment systems was specialized and expensive, so it was only put into high class or luxury cars. Commoditization has changed this by creating a very cost-competitive market for hardware components. Because of this, sophisticated navigation and infotainment features can now be pushed into the lower-class and mid-line car segments.”

But the shift in emphasis to software creates a set of challenges that impact upstream activity during the design and development phase:

“Software development initiatives have become very large and very diversified.”

One of the tactics for dealing with this is the use of component-based software architectures, which help to manage both complexity and change in an efficient and effective manner:

“We apply a modular development approach as much as possible so software can be shared across product lines. When someone asks for change, we first look to see if it's relevant to other products. We try to avoid branching software for one small modification that only has a narrow impact. Sometimes this means we need to discuss and negotiate with our main stakeholders before making a decision.”

This in turn means adopting a modern software business-centric development methodology, though the degree of interdependency between systems means that some compromises are required:

“One of the first things we implemented here when we formed the new infotainment team was agile development. Not all components of the agile framework fit in our organization, so we had to tailor some things to suit our needs, but we apply most of the key principles.”

Moreover, the need for speed and flexibility extends beyond development to the whole of the deployment cycle, with DevOps-style continuous delivery being a natural consequence:

“Every week we are doing 6 or 7 software builds per product line. On average, each program requires a release every one or two weeks.”

Beyond internal development, another important aspect of software architecture and delivery is creating an open environment to tap into the broader developer ecosystem:

“We are moving more in the direction of APIs and SDKs to enable third party developers to interact with the vehicle's infotainment system.”

While doing this, of course, enforcing security and protecting that critical customer experience is paramount:

“One consideration is obviously security, but we also need to strike a good balance and manage the overall driver experience. We can't just open things up to Apple and Google or any other developer, and let them do what they want. We need to

allow third parties and customers to do cool stuff with the car, but within a structured framework to make sure we stay in control.”

Building on the mention of security in that last comment, the importance of minimizing risks in this area came through loudly and clearly:

“We pay a lot of attention to security. We have a large and dedicated group of specialists focused on this, consulting with development teams, monitoring and auditing throughout the product lifecycle, and ultimately evaluating the security of all the interactions with the car. This is a question of safety as well as privacy.”

Pulling all this together, the overriding conclusion is that in-vehicle infotainment systems really do have the potential to deliver on the promise of making the car a more integral and natural part of our digital lives.

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Analyst view

The pace of development and subsequent change in the area we have been discussing reinforces a set of digital transformation imperatives in a way that is easy to understand. As we look to the future, choosing a car will not just revolve around factors such as performance, comfort, looks and ecological credentials. Capabilities of the on-board navigation, information and entertainment systems, and the degree to which these connect with the services and devices that are important to us will increasingly become major considerations.

The challenge for auto manufacturers and those in the automotive supply chain is that this puts them right in the middle of a fast moving and constantly evolving area in which expectations will continue to escalate. While Apple, Google, AMD, Qualcomm and others can help by delivering platforms and services backed by strong existing ecosystems, automotive manufacturers cannot afford to let such players call all the shots. It is necessary to retain control of the overall driver experience or risk losing ownership of the digital aspects of the customer relationship, which will become increasingly key to delivering business performance and profitability. Constraining the way in which third party elements interact with the car is also critical to ensure security, privacy and safety, and ultimately maintain the trust of the customer.

Given these considerations, keeping up with customer demands and requirements while effectively managing risks is therefore totally dependent on effective in-house software development and deployment capability. This makes agile methods, DevOps and continuous delivery as important here as they are to organizations in other industries. The same is true of component-based architectures and the use of secure and properly managed APIs.

The good news is that the senior managers we spoke with who are quoted in this document understand the imperatives and realities. We know from our broader research, however, that others in the industry are not so forward thinking. With this in mind, as the industry evolves, the difference between winners and losers will increasingly come down to the effective use of technology, and in particular how well organizations exploit the software advantage.

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About this series

This interview is part of a broader global Digital Transformation study “Exploiting the Software Advantage: Lessons from Digital Disrupters” which can be downloaded [here](#).

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