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Interview: KPIT's approach to streamlining software integration in the automotive sector

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S&P Global Mobility's Calum MacRae sat down with Venkatraman V., senior practice director at KPIT, to discuss the changing role of software and hardware in vehicle development.

KPIT is an Indian-headquartered company best described as a software integrator solely focused on automotive. Its 13,000 employees provide services, solutions and products on a worldwide basis. KPIT is supporting six original equipment manufacturers in North America, Europe and Japan in its software-defined vehicle (SDV) journey from defining the electrical/electronic (E/E) architecture to the development of domains such as advanced driver assistance systems, powertrain and connected vehicles. What follows is an edited transcript of the discussion.

S&P Global Mobility: What does your day-to-day role entail?

Venkatraman V.: I come from the cockpit practice (division) and am responsible for the hardware-software synergy offering of KPIT. This focuses on the separation of the software road map from the hardware roadmap for OEM customers. The second part of my role involves supporting certain accounts in Europe and Japan and taking responsibility for the deliverables.

Why is a decoupled approach to software and hardware development now necessary, and how do you see it transforming the industry? I see you are advocating that for cockpit systems development too.

There are primarily three issues in the industry for cockpit system development. First is faster development of cockpit features (pre- and post-SOP [start-of-production]). [The] second issue is faster time to market. And the third issue is the cost of development and maintenance. Over the last five to six years, cockpit software development costs have gone up multiple times. This is because of increasing personalization features and updates that are getting added to the cockpit systems, both up to start-of-production and continuing past the delivery of the car to the customer. To address these issues, decoupling the development roadmaps is the best approach. Engaging with a separate software-focused organization is key to handling the above-discussed issues.

This will bring multiple benefits to OEMs. First, it will reduce SOP timelines by about **30%,** from a typical 30-month cycle to between **18 and 20 months**. Second, it gives more control over the software, which many OEMs do not currently have. This is important because a large amount of software is reusable across vehicle variants and future model years of cars. Again, this reduces time to market and cost of vehicle development. This reusability will help in software cost reduction of about **25%** on current programs and close to **40%** of software development for future programs.

If we look at cockpits, there is a huge amount of personalization going on. What are the specific technological advancements that are driving this need for personalization in

cockpits?

These are changes that are happening in consumer and other industries that are affecting the automotive outlook. Automotive customers want the integration of all these solutions from the consumer world within their cars. Typically, people spend about 10% of their day in their cars, so they want the ability to accomplish certain tasks while they are in the car. Three technologies are making these things possible. We had Bluetooth and WiFi already. Next, we have the car's external connectivity, including V2X [vehicle-to-everything], which is now enabled by 5G technology. Finally, we have Artificial Intelligence (AI). People are looking at AI-based personal assistance that supports multiple or multidomain use cases. For example, this could be a blended audio (music preferences) experience when there is more than one person in the car, and you want to have both audio choices to be streamed. It could be things like your phone connecting securely to the car and performing a task like continuing the Teams call into the car or listening to your audio book, which you were half-way through, or your car recommending in real time an item in your cart [that] is cheaper in a store on your route. It could even be installing specific car features through subscription while at home, for a long ride that you will be taking over the weekend or getting to know the remaining useful life (RUL) of a particular part for preventive maintenance to reduce ownership costs.

Where do you see all this ending? Is there any end to human creativity in terms of cockpit personalization?

The end is the point at which the consumer starts rejecting it. But I do not see it ending at any point because of all the multiple demographic, geographic and cultural requirements that we see. If you look at the mainland Chinese ecosystem, there are more frequent updates of the cockpit. This is now at a point where this frequency is more than the mobile devices themselves. Mainland Chinese OEMs even provide a roadmap of the software features that are coming inside their car post-delivery. That keeps the consumers engaged. For example, if we look at the average ownership age of a luxury-car brand in China, it is 36, versus 53 in Europe. The use cases and consumer preferences are different in these two markets.

You do not see the paradox of choice creeping into any of these markets, and consumers being turned off and needing simplification?

Simplification is there. OEMs in the West are now in the process of returning some buttons to the cockpit after going completely touchscreen. Again, if you look at mainland Chinese OEMs, they did it very differently. They have a plug-and-play button concept. Your infotainment system can actually plug-in a bunch of buttons that you really want, and then they start working as physical buttons. So, there is a very different and innovative way in which these problems are being solved by different OEMs and different companies. But there will not be an endpoint. When the autonomy problem is solved, people will have more time to themselves inside the car, and that will drive more use cases.

If we get back to talking of decoupling, do you have any sort of real-world examples of OEMs successfully doing that? And do you have any lessons that we can draw from those experiences?

There are a couple of examples that come to my mind. One North American OEM went down this route for low-end infotainment system development, where the software ownership was with a single supplier and the hardware was with the traditional tier 1 [supplier]. And in this program, there were four SOPs over four years across 13 car lines. Every program was delivered on time, and the software costs were 30% less. The incidents per 1,000 vehicles reduced by 50% over the previous model year for this OEM. Another case was with a Japanese OEM, which also went with this model of

engagement for an Android-based system that they had. This was a post-SOP scenario because there were continuous upgrades, updates and feature additions that needed to be done. Here, [it was] able to reduce the time to migrate the Android-based system by 30%. Also, the integration process was streamlined, resulting in 20% lesser time for deliveries (from check-in to production software development kits (SDK), Moreover, there was a reduction in software maintenance costs by 20% for year one and [an] additional 5% from year two onwards.

On a general point, what is your opinion on why the mainland Chinese OEMs are leading in so many areas of automotive now?

[Mainland] China OEMs work in a decoupled manner in terms of hardware and software development, leading to highly accelerated delivery of features and fixes, not to mention at lower costs. The other reason is the mindset, which is very fresh. They do not get constrained by process. If they want to bring a feature in, they just do it, and then they will figure out how to reduce their costs. They also have a lot of internal competition in the mainland Chinese market that keeps discipline. Then there are the economies of scale from such a huge domestic market. Fundamentally, they are not hung up on processes. They know that mistakes do happen, and they can always figure it out during the journey. In fact, there was one OEM customer whom we spoke with, and they told us they deliver 60% of their features by SOP. They will deliver the remainder post-delivery because over-the-air (OTA) works fine, and customers are supportive of this approach.

How do you see the role of software integration partners changing as the automotive industry shifts towards this new decoupled model?

Positive product outcomes are determined by good architecture and the governance of it. As a software integrator, we have the expertise to ensure this with the right tools, processes and technology. Once the OEMs take this path, they are going to look to us or any other software integration partner to bring new technology innovations in the software space, which would not have been accessible to them via the traditional tier 1 [suppliers]. But as a software integrator, you cannot just stay with the here and now problem statements — you need to look at the forward product programs and the future architectures (SDV and beyond) and engineer solutions that work not only for now but are easy to implement in the future.

How many major competitors as software integration partners do you see globally?

Some traditional tier 1 [suppliers] are moving into the space as their traditional share of the pie gets smaller. There have been two tier 1 [suppliers] who have been successful in that. But we also know of a few tier 1 [suppliers] who have raised their hands and said that they will not go in that direction and focus on hardware provision. Aside from the two tier 1 [suppliers] who have transitioned into the space, there are about two other companies we see as lead software integrators who understand how to do it and have the capability to do it. Altogether, there are about four, or a maximum of five competitors, worldwide.

One of the things that occurs to me is that there are a lot of headlines around the world now about OEMs reducing their white-collar headcount. If you are decoupling software and hardware, it will double the vendor relationships that they have to manage with fewer people. Do you see that as a hurdle that you must overcome?

I think one of the aspects that many OEMs have to understand is that in today's market landscape, both the top and bottom line are challenged. This is primarily due to the declining sales in one of their largest markets, which is mainland China. And now mainland Chinese OEMs are also beginning to export their vehicles in significant volumes. This revenue pressure is going to continue until

midterm. To manage this scenario effectively, one thing they will definitely have to do is consolidate their software suppliers. Many OEMs have multiple suppliers for different parts of the software. Historically, this is understandable because they want to mitigate risk exposure and drive down the individual costs. But this does not help the supplier management overhead. Ultimately, this integration and overall ownership of software should be restricted to one or two players.

The second part of it is investment in technologies for faster integration cycles like having virtual cockpits, virtualization tools, automate migration and AI-based triaging, etc. For most of these things, the OEMs have been dependent on tier 1 suppliers, and this is something that they will need to change.

The third part is validation. When you bring in higher levels of automation, encompassing various ways of interaction like voice, touch, steering, etc., there is end-to-end connected validation from mobile to cloud to the cockpit. This is necessary to detect any issues early and to reduce the time to market as well.

The last part is the supplier and ecosystem management. When you have multiple vendors of multiple products with different project timelines, they all must be managed and integrated. So, there are certain things that OEMs can do to make this transition more manageable.

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