



Who will win the software-defined vehicles race?

by Marek Jersak, Vice President Automotive Advisory

Three factors that will help you gain the lead

While the software-defined world becomes the key to organizational change, the automotive industry is going through its most significant transformation in decades. Software and data are taking center stage, unlocking fundamentally new capabilities and promising novel business models around personalization, automation, connectivity and electrification (PACE). While this presents opportunities for increased customer touch points and new revenue streams, it also leaves established automakers and suppliers facing new competition and

challenges like never before. To remain competitive and maintain a leading market position, existing automakers and suppliers must create business models and capabilities akin to tech and software companies.

In this series of whitepapers, we look at the main factors driving these changes, the most significant challenges automakers face and the solutions, which will help determine who wins the software-defined vehicles race.

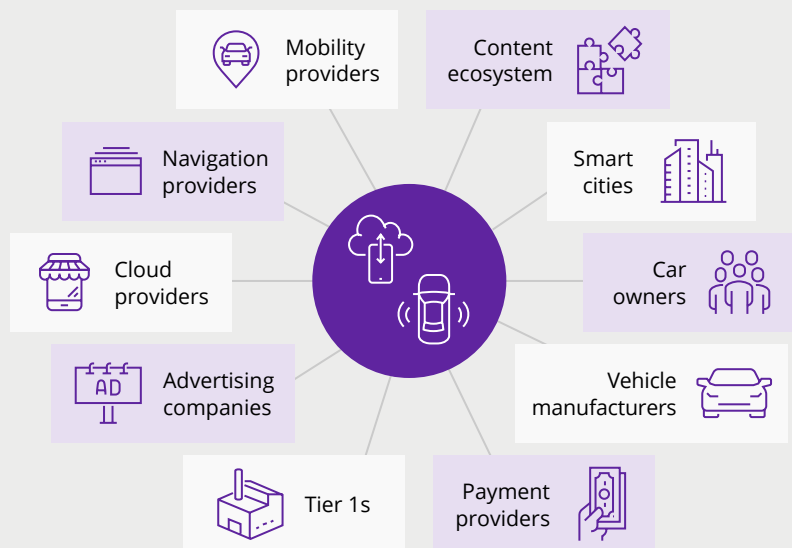
New competitors

As hardware increasingly takes a back seat, the software-driven landscape opens the door to a range of new players. OEMs must compete with mobility startups on one-end and tech powerhouses — including hyperscalers and semiconductor vendors — on the other. Often, automotive incumbents with deep expertise in engineering find themselves outpaced by more innovative and agile new entrants with a deep software and data culture.

Established auto companies need a fundamental shift in how they think about software: It is no longer bound to

specific ECUs, and in fact often transcends the vehicle. With the seamless experience car users expect across platforms, automotive software now needs to live flexibly across in-vehicle high-performance computers (HPCs), the cloud and personal mobile devices. Furthermore, business cases and value pools transcend industries into telecom, banking, home automation and manufacturing to name just a few (Figure 1). Big tech companies also have an edge here because of their vast experience serving different industries.

Figure 1 Stakeholder landscape beyond core auto

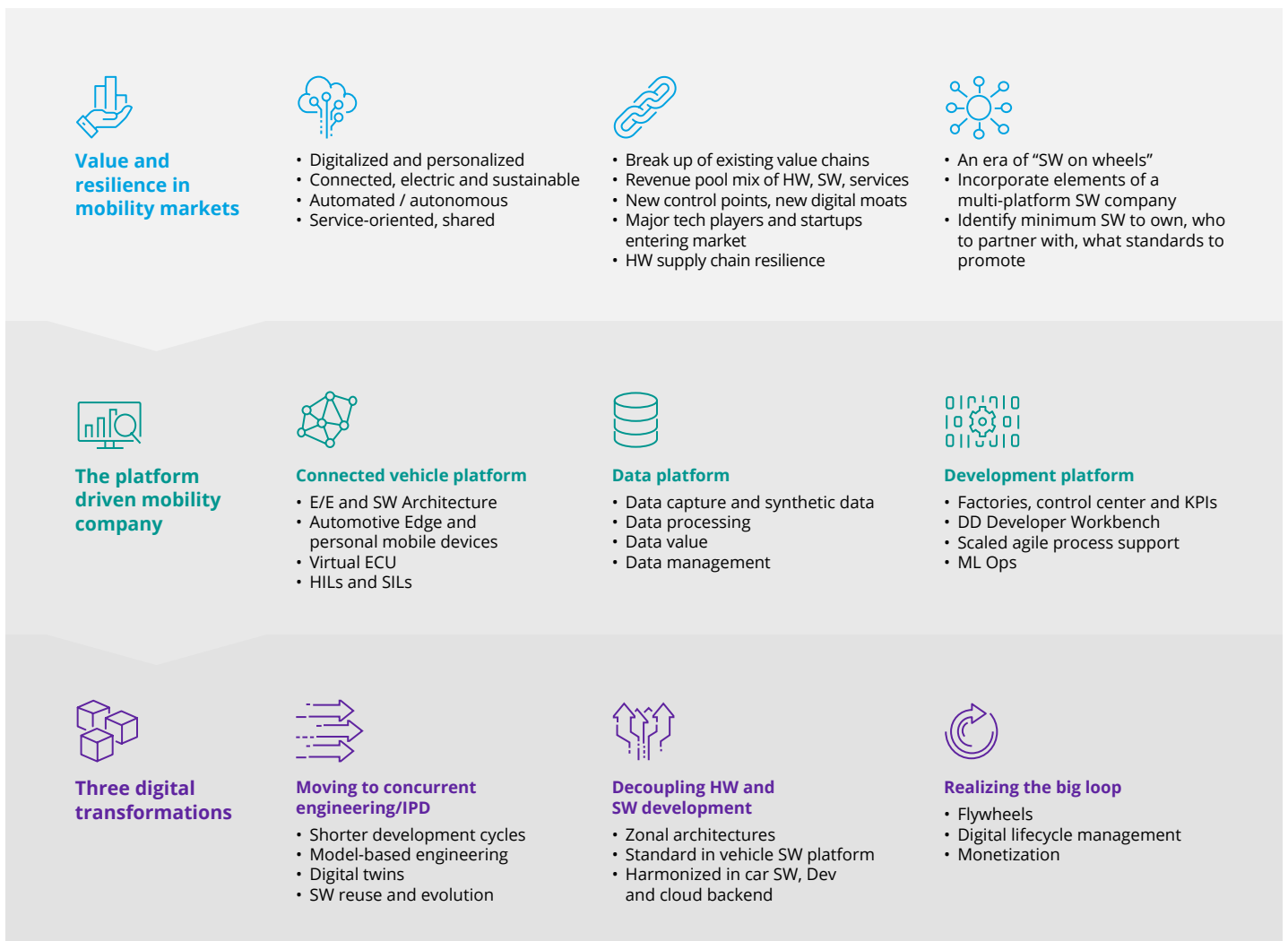


The keys to transformation

The idea of transforming into an agile, complexly-hybrid organization is one that most OEMs and suppliers see as critical to remaining competitive and unlocking new revenue streams. These organizations will be more than software companies or hardware companies; becoming 'cyber-physical' to make software and hardware work well together at low cost, through life cycle, to gain a relatively new competitive advantage. However, such a change is turning out to be a lot harder than many established companies expected. In particular, the approach of hiring

thousands of software and data engineers, then trying to integrate them effectively into established automotive structures and processes is showing its limitations (and it's practically impossible given the fact that the labor market is swept empty). Instead, what many automakers need is a cultural shift, system thinking and a genuine willingness to collaborate. Figure 2 shows an overview of the main trends for successfully producing software-defined vehicles.

Figure 2



System thinking

Let's look at Figure 2 in more detail:

Value and resilience

The first row shows how you can create value and resilience through software. All the PACE megatrends are enabled through software, but the question is, how do you build genuine value-adders? As an OEM or supplier, you must figure out the specific touch points or control points that you need to own, in order to establish successful software- and service-based business models (and these vary from company to company). Once you've established the relevant control points, you must identify the ideal way of gaining the software you need — what is the minimum amount that you need to develop yourself, in which areas is it more beneficial to collaborate with others, and where does it make sense to outsource either with SaaS or by purchasing pre-packaged solutions?

As we've learned from disrupted supply chains due to global macro events, resilience requires a reduced dependence on specific hardware, while software is generally less affected. However, automotive industries can only repackage and retarget software if the underlying architecture and associated processes are up to the task. Fortunately, the user-centric, value-driven approach to software described above almost automatically creates a more resilient architecture; this should further motivate the software-defined vehicle transformation.

The platform-driven mobility company

Platforms are key to enabling value and resilience from software. You need the actual connected vehicle platform — an in-vehicle platform that is connected to the outside world — then you need a data platform that runs in the background, and importantly, you need a development platform that enables you to develop software very quickly.

The connected in-vehicle platform is layered. At the bottom is a capable vehicle E/E architecture with centralized or zonal HPCs and secure connectivity to cloud services and personal mobile devices: It consists of a mix of processing cores for various purposes such as control, graphics or AI, and enough reserves for updates and upgrades during the vehicle lifetime. On top of that is a stack of standard operating systems with different properties regarding real-time, safety and performance, followed by a standardized middleware that enables a service-oriented architecture of functions and features that create the vehicle user experience.

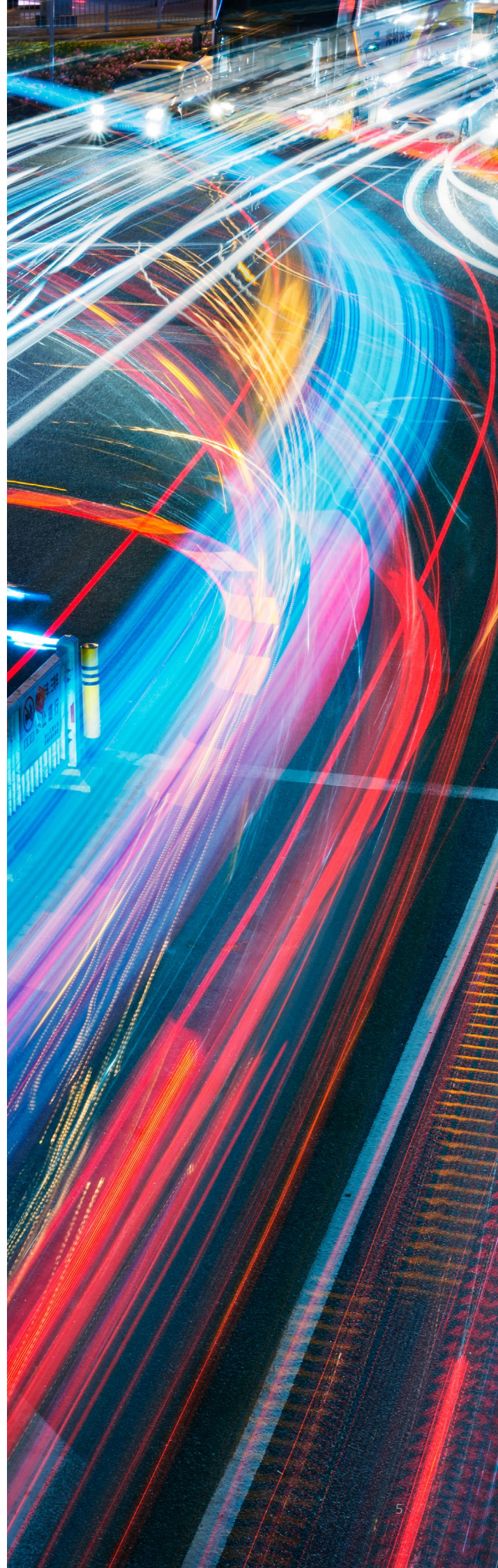
The data platform enables a wide range of services running in the cloud, on the edge and on personal mobile devices. The emphasis is on real-time data related to traffic, charging infrastructure, commerce or infotainment. The highest fidelity data can even enhance automated driving (e.g., with infrastructure sensors that enable vehicles to self-park in a complex parking structure). The data platform also enables any number of value-add business processes, from purchasing or leasing/renting to operating, upgrading and servicing a vehicle.

The development platform supports both secure software DevOps, as well as data-driven development for both massive amounts of data/scenarios needed for automated driving, and many smaller data points around vehicle and driving behavior that can be leveraged through big data analytics and AI to derive feature improvements and identify new business opportunities. Data-driven development and software development are tightly integrated, so the seamless development platform needs to support multiple tenants (various in-house stakeholders as well as clients, suppliers and partners).

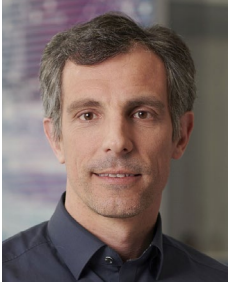
Three digital transformations

It's not just about structuring the business and building the platforms, but a big transformational change is also needed. Firstly, you have to be able to work in concurrent streams — right now (and traditionally) there are a lot of sequential processes in the automotive industry. With the increase in CI/CD pipelines and DevOps, plus the elastic cloud architecture which enables fast scale-up and -down, there's a much bigger opportunity for automakers and their suppliers to work on software, models, digital-twins and hardware concurrently, push-left (virtual) testing and accelerate through many smaller, faster cycles. Indeed, for many companies it makes huge sense to collaborate with partners and suppliers on a common cloud platform — for increased flexibility and better financial control. Secondly, it's vital to realize and accept the importance of software to justify the decoupling of hardware and software development. Traditional — hardware-based — ideas of a set order that must be followed in development can disrupt the fast agile methodology that is a linchpin of software development. Ultimately, the development process should be looked at in loops that encompass not only the functions that design, build, manage and operate the car, but the huge data streams produced by the modern vehicle and its ecosystem partners. Creating analysis loops drives valuable insights that enable you to extend existing products and create new products and markets. Creating loops is fundamental to making many iterations and improving your capabilities in the software world.

In this series of white papers and blogs, we'll take a deep dive into the development processes and pipelines for software-defined vehicles. We'll look at the organizational transformation that ensures automakers remain value-based. And we'll discuss the new opportunities of the automotive software supply chain. If you'd like to discuss developing software-defined vehicles, or if you have other questions, please reach out to us at AutomotiveAdvisory@dxc.com.



About **the author**



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Dr. Marek Jersak leads Luxoft's Automotive Advisory, focusing on digital transformation toward software-enable, data-driven, automated, connected, personalized vehicles, and the needed change in architectures, processes, culture, and organizations from vehicle to cloud. He is excited about the future of sustainable mobility, unlocking new services across industries and returning time to drivers.

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