



PUTTING CUSTOMERS AT THE HEART OF THE MOBILITY EXPERIENCE

Exploring what is possible with
software-driven transformation

A Capgemini point of view

GET THE FUTURE
YOU WANT

A RADICAL CHANGE IN FOCUS

The car has come a long way since patent number 37435. Filed on January 29, 1886 by Carl Benz for his “vehicle powered by a gas engine”, this initial idea for the motorwagon has gone on to play an unprecedented role in the world’s economic and social development. A single product that redefined personal mobility, transformed urban planning, and inspired countless innovations – while producing many of the world’s best known and admired brands.

What’s more, the soundness of the original design (even if it was for a three-wheeled vehicle!) has provided a framework for constant development and refinement. Both mechanically and stylistically, vehicles have evolved to meet a variety of market needs. Yet now more than ever this core framework – the controlling idea behind a vehicle’s design – is beginning to fail due to the sheer complexities involved in modern automotive manufacture.

This is particularly the case when it comes to electronic complexity, and the ever-growing number of ECUs found inside today’s passenger and commercial vehicles. Complexity that has increased dramatically in recent years, and is now threatening to overwhelm the limits set by existing digital architectures. A fact not lost on many original equipment manufacturers (OEMs) as they progress along the road toward more efficient electric vehicles, autonomous driving, and connected services – which only serve to further increase the demands placed on a car’s electrical components.



This is the backdrop to which the industry’s software-defined future is being set

Where an exponential rise in hardware sophistication is matched by the software put in place to utilize these components and transform customer experiences. The result being an elaborate, rapidly expanding mix of capabilities whose potential is only limited by the boundaries of the digital architecture available. A situation recognized by most automotive manufacturers who

increasingly view the software-driven car as being critical to their future growth, to reinvigorating innovation, and most importantly, to building meaningful customer relationships. Those who grasp the full implications of this modern reality understand that embracing a software-driven ethos also demands access to new tools, skills, and mindsets as much as re-imagining a vehicle’s digital heart.

Technology has a key role to play, but the bigger test for OEMs is to maximize long-term value by placing customers at the center of the mobility experience

Despite some standout performers, the industry's progress in exploiting the benefits of software-driven transformation (SDT) has been slower than anticipated. Indeed, as of July 2021, only 1% of OEMs have partially scaled – and none have fully scaled – their transformation use cases¹. The reasons behind this lack of momentum are on the face of it easily linked to various key trends impacting the industry, and shaping effective responses to issues that include:



The disruption caused by a global pandemic



Ongoing supply chain challenges



Increasingly stringent sustainability legislation



The skills gap caused by talent scarcity



Conflict in Europe impacting energy prices

Such are the external factors involved, many of which are obviously outside the direct control of an OEM. Yet equally there are internal inhibitors, less publicly acknowledged, that are also acting to restrict progress. What's more, and as this point of view argues, a larger source of inertia is to be found in these internal factors – which are centered on a lack of detailed insight into the real-world opportunities

created by SDT. A situation not helped by the early efforts served up by OEMs, based primarily on service charges for rudimentary features and post-sales support, which met with notable consumer resistance.

Another key obstacle blocking progress toward the software-driven vehicle is that the development roadmap remains unclear for many. Added

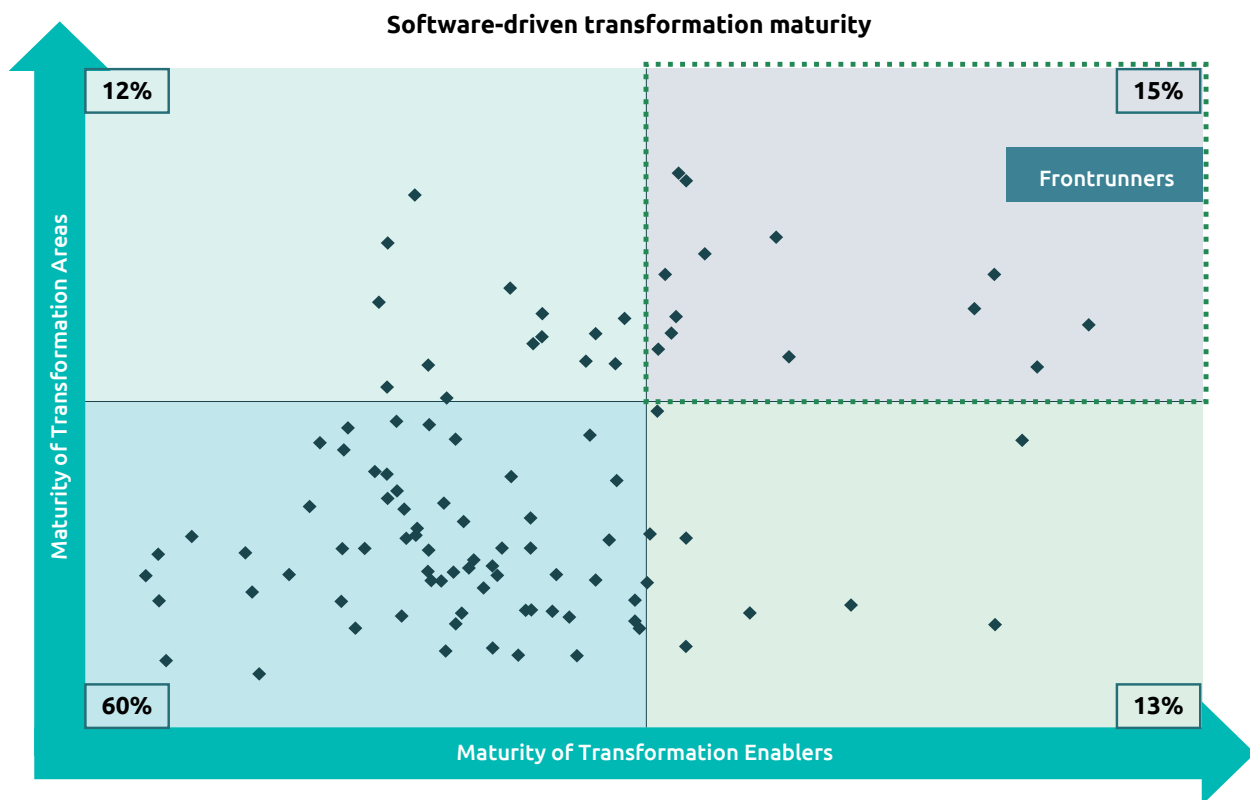
together, the lack of clear definition when it comes to tangible business benefits, combined with complex delivery challenges, are the key issues impacting progress inside the majority of OEMs. Hence why many are still to be found at the beginning of their transformation journey.



¹ Source: Capgemini Research Institute, Software in Automotive Industry survey, July 2021

The need for acceleration

60% of OEMs are still beginners in their transformation journey²



Real advances in SDT will only occur when OEMs move their emphasis from technology to the customer

This is a significant change in priority, where the focus on upgrading plant and product, alongside constant technology innovation, comes second to consideration for what makes a memorable mobility experience. A statement that can sound counterintuitive given the expectation that technology is typically seen as the key driver behind any form of strategic change. Yet here, the leaders of OEMs need to take their own leap of faith. Where each step moves them away from a reliance on innovation for innovation's sake, toward a radical evolution of the customer experience.

An understanding that is still largely lacking given the results of our recent report: *Time to level up: how to win the race with customers for superior experiences*³, which highlights the current inability of OEMs to shift their attention to that of deepening customer relationships.

Against this reality, one of the most important missing values is confidence. OEMs can feel momentum building for change, yet few have fully comprehended the primary benefits involved. It is the 'why' behind becoming a customer-first business, closely followed by the 'how', that still needs to be clearly addressed, which is the ultimate purpose of this paper.

² Source: Capgemini Research Institute, [SDT Transformation Maturity infographic](#)

³ Source: Capgemini Research Institute, [Time to level up: how to win the race for customers with superior experiences](#), Nov 2022



A GALVANIZING PURPOSE

The headline ‘why’ behind SDT is to transform customer relationships, but OEMs still need to be confident that the approach delivers measurable value

The task is therefore to list the high-level strategic benefits created by SDT, in support of the business case needed to stimulate progress. A catalog of short-, medium-, and long-term advantages that help place the customer at the center of product and service delivery – while detailing options for monetizing the engagement.

That is why the first big driver of SDT is its ability to dramatically increase an OEM’s ability to manage the roll-out of new services

Few OEMs have avoided the steep rise in complexity that comes with the development of new electronic and digital services. Yet central to the promise of SDT is a unified architecture that is already proven to simplify the management of complex products. A capability that also offers OEMs greater control and improved margins for direct-to-consumer sales (or direct leasing) and aftersales support. All made possible by the design ethos

that ultimately underpins SDT: build fewer car types and differentiate instead on software-driven features. A departure from traditional thinking that also removes the cost of variation, which has long impacted an OEM’s financial model. Where simplifying and standardizing a vehicle range can serve to cut the cost of manufacture, with R&D budgets funneled into more experience-focused innovations – a strategy already validated by companies such as Tesla.



In addition, the shift from a physical value chain where standards can be dictated, to a software-driven ecosystem, also increases an OEM's ability to control the customer experience

This is a situation based on the shared standards that emerge with SDT. What's more, it has been clearly demonstrated in the way Tesla was able to cope with the supply chain issues impacting the wider industry throughout 2021 and 2022. A response that saw the firm tweak parts and designs to minimize the impact of chip shortages, which were seen

to hit other OEMs far harder. The combination of Tesla's standardized architecture and software updates, with the latter rewritten in weeks to support the roll-out of new chips, corresponded to an enviable level of resiliency and agility when compared to competitor brands.



SDT also impacts customer revenues, and helps stimulate the transition from one-off purchases to full lifecycle engagement

A promise that is timely in its arrival, given the negative impact electric vehicles are beginning to have on OEMs' aftermarket mechanical servicing revenues. That said, the true value of SDT-inspired revenues is that they can be activated across a consumer's digital lifecycle continuum.

With selling opportunities emerging across almost every single journey (e.g., the delivery of new in-car gaming experiences) and travel destination (the provision of increased motive power for mountainous terrain, etc.).



- **Software-based features and services as a share of overall revenue are predicted to grow 3x to almost a quarter of revenues by 2031 – equating to \$640 billion⁴**
- **Those OEMs that embrace SDT can anticipate total productivity improvements of 40% by 2026⁵**

Just as importantly, the data produced, gathered, and exploited, can also be monetized via a wide range of direct and indirect service offerings. All of which help OEMs offset the impact of shared mobility, new commercial models, and competing Transportation-as-a-Service (TaaS) providers on vehicle sales – by replacing any volume decline with new, higher-margin revenues.

The more responsive and dynamic service offering made possible by SDT also leads to greater customer loyalty

As evidenced by findings from the Capgemini Research Institute in 2022⁶, the data shows that by improving customer experiences during the pre-sales, sales, and aftersales phases, customer loyalty can increase by up to 17%. A conclusion that indicates a strong impact on both top- and bottom-line growth for automotive OEMs globally, with only minor variations noted between separate markets.

Equally, SDT is proving to be a catalyst for driving improvements in sustainability performance

An outcome that is enhanced by more standardized vehicle offerings and the corresponding growth in digital development. Actions that help reduce waste in R&D processes, accelerate manufacturing efficiency, and cut time to market – alongside a more immediate decrease in vehicle emissions. Whereas longer-term benefits come from digital design principles being closely aligned to the needs of the circular economy. A quality that contributes directly to cost reduction and compliance agendas, while also serving to further engage customer preferences and loyalty.

⁴ Source: Capgemini Research Institute, Software in Automotive Industry survey, July 2021

⁵ Source: Capgemini, Next Destination: Software. How automotive OEMs can harness the potential of software-driven transformation

⁶ Source: Source: Capgemini Research Institute, [Time to level up: how to win the race for customers with superior experiences](#), Nov 2022

Ultimately, the central role of SDT is to help OEM brands to become part of a consumer's digital universe – via a fully unified user experience

In a similar way that brands like Apple provide a window into a wealth of digital apps and services, OEMs should set themselves the objective of becoming indispensable to a consumer's lifestyle. A goal made achievable by the deployment of a microservices software architecture coupled with a unified service layer, that together act to continually

transfer data and handle integrations. The result being the delivery of a rich, seamless mobility experience that takes the consumer beyond the limits of a physical car. An experience that is constantly being augmented by timely software updates, which help ensure the features and capabilities demanded by consumers are always quickly available.



Gearing up for the metaverse

The transformative power of immersive technologies, using AI and even quantum machine learning and quantum sensing, is set to shape the automotive industry in potentially fundamental ways, including such emerging use cases as digital engineering, simulation, testing, monitoring, operations, virtual training, virtual commerce, and digital identity⁷.

⁷ Source: [Capgemini Research Institute, Gearing up for the metaverse: how immersive technologies will reshape the automotive industry](#)



This more interactive customer experience is dependent on tailored digital services and software solutions that can be easily updated over the air (OTA)

A capability that emerges from the broad mobility ecosystem now beginning to surround individual vehicles. Supported by the technology needed to enable the delivery of highly personalized experiences, minus the cost and complexity of physical options. A scenario that again draws many parallels with the cell phone industry, which is increasingly defined by the convergence of hardware profiles and an explosion of software-driven features.

Even more attractive for OEMs navigating a software-driven world is how the benefits involved can also appear self-perpetuating. A reality made possible by the continual flow of data that offers a far richer understanding of each customer's habits and needs. Insight that supports more detailed predictions of user expectations, and the creation or brokering of new services to meet them – which in turn empowers the provision of a premium mobility experience, and boosts both consumer loyalty and overall revenues.

Indeed, the possibilities of SDT are only limited by an OEM's imagination.

For example, and as outlined in our report: *Gearing up for the metaverse*⁸, Distributed Ledger Technologies such as blockchain and NFTs can help increase trust in areas such as

insurance and resale. A process based on the delivery of new smart contracts, which eliminate any intermediaries and serve to better connect demand with supply.

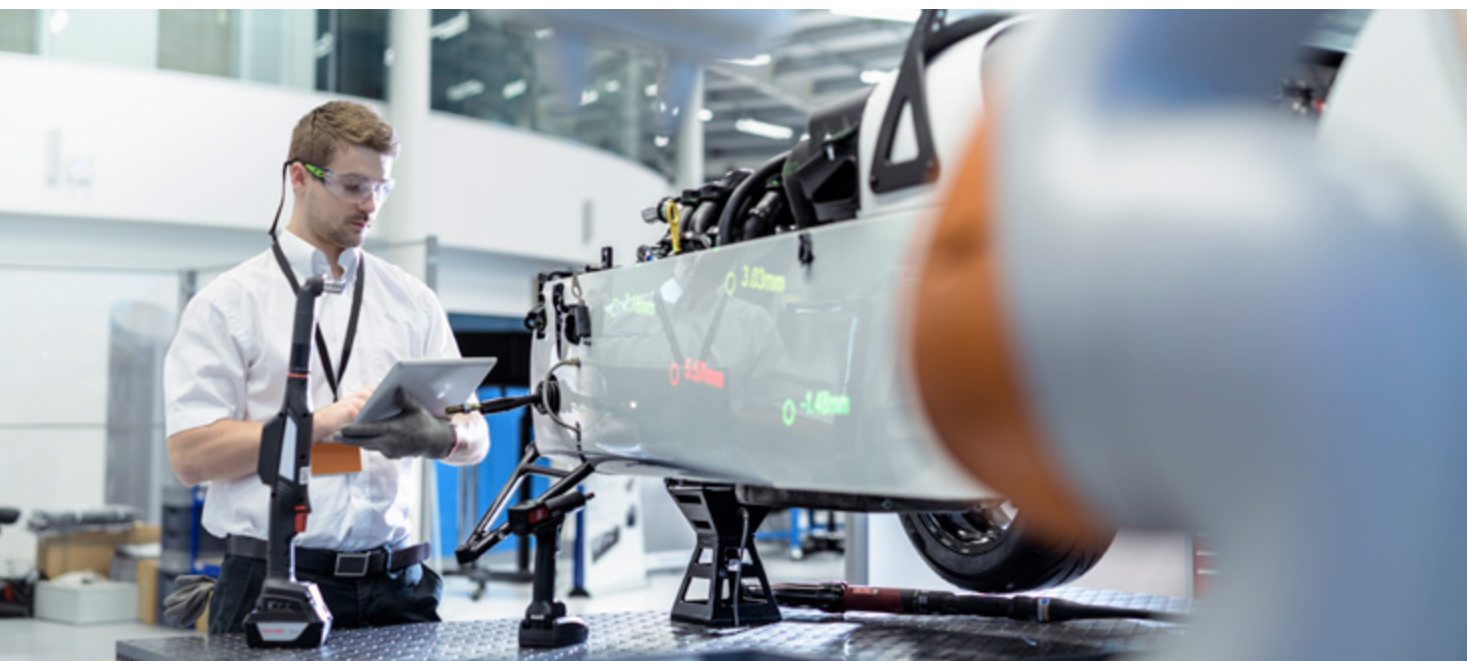
It is therefore possible to summarize the 'why' of SDT via the benefits of greater simplicity for consumers, and better control over complexity for OEMs

A software-driven future

Compared to hardware features, frontrunner OEMs plan to spend more on software features in the next five years to enhance customer experience (29% for frontrunners vs 18% for the rest of the OEMs)⁹.

⁸ Source: Capgemini Research Institute, *Gearing up for the metaverse: how immersive technologies will reshape the automotive industry*

⁹ Source: Capgemini Research Institute, *Next Destination: Software*, September 2021



THE PILLARS OF TRANSFORMATION

Just as important as the 'why' behind SDT is the 'how', and establishing a baseline for the transformation journey ahead

Where consideration turns to more practical next steps for delivering the agility and responsiveness enabled by SDT, and for placing the consumer at the heart of future mobility experiences. A development path that traverses three broad pillars of capability and intent that influence all aspects of product and service delivery, development methodologies, and workforce competency.

The first pillar, unsurprisingly, is focused on the importance of placing your customers at the center of your SDT strategy

Every OEM offers a distinct customer journey. Optimizing each of these and ensuring they are truly customer-centric, starts with a detailed analysis of the existing end-to-end journey. That means understanding every touchpoint, every interaction, and every expectation a consumer has for a vehicle in an extended ecosystem. An assessment that needs to review established procedures to find new opportunities for service delivery and user engagement. Once complete, the spotlight next turns to developing new value-adding end-to-end services supported by agile development processes. Then finally, and wrapped around all these activities, is branding and marketing that has the goal of engaging audiences on the power of experience – rather than the traditional focus on features.

The second pillar is more internally facing, as it challenges OEMs to become fully software enabled

A task that requires a paradigm shift inside the OEM in terms of workforce skills and culture. A level of change that will typically involve some form of cultural change program, as well as the introduction of the software-driven organization and governance. All supported by the upskilling of existing workforces, and a long-term commitment to recruit, train, and empower experienced software talent. The final result being the encouragement of a dynamic culture, and the adoption of technical competencies needed to embrace agile methodologies.

⁷ Source: Capgemini Research Institute, Gearing up for the metaverse: how immersive technologies will reshape the automotive industry

Finally, in the third pillar, OEMs turn their attention to deploying a software house, articulated on a service-oriented architecture, to leverage the full array of technological enablers

Building on the first two pillars, OEMs now have a more complete picture of customer demand combined with an internal operation that is fully SDT enabled. This last pillar is therefore all about practical delivery, and developing the software-defined vehicle architecture – alongside the in-vehicle and offboard software platforms, and compute or software separation. In addition, it is here that an OEM's capabilities translate into clear end-to-end software factory, methods, and tools. Where

success metrics include the highest forms of software quality, and market-leading cybersecurity.

Three pillars that together align to the incremental advancement of SDT capabilities, all enabled through the technical accelerators of cloud, edge, and connectivity solutions



IN SUMMARY



With the business and customer benefits of SDT coming into clear focus, the race is now on among OEMs to fully establish their software-driven credentials

Some automotive brands will of course find this easier than others. Especially given the uneven progress being made by OEMs on their transformation journeys. But what all are finding is that success criteria are now increasingly evident, based on putting the customer at the heart of their reinvention – with software positioned as the key enabler.

Much needs to be done, with a variety of obstacles still to be navigated. Yet equally there is a sense of excitement within the industry that is now being matched by a measurable level of determination. This is inevitable given the fact that those who succeed will reap huge rewards in terms of forging a deeper, more relevant role in the lives of their customers.

An ambition that in turn will help initiate the next chapter in the automobile's contribution to the world economy and society, achieved at less cost to the planet. A new era of people-centered mobility that is part of the future we all want.

Capgemini's software maturity assessment

To help OEMs in their journey toward SDT, Capgemini has developed a software maturity assessment which covers a range of key areas including:

- **Customer relationships**
- **Software-driven functions**
- **Governance**
- **Talents**
- **Partnerships**
- **Enablers**

The software maturity assessment model is offered at no cost. The assessment itself is a standard engagement that is designed to help OEMs better determine and prioritize their roadmap for transformation.

Capgemini experts featured in this Point of View include:



Jean-Marie Lapeyre
Global Automotive Chief Technology &
Innovation Officer
jean-marie.lapeyre@capgemini.com



Jayashree Ravichandran
Vice President, Software Leader –
Automotive Engineering
jayashree.ravichandran@capgemini.com



Our commitment to SDT

Capgemini is passionate about supporting the automotive industry on its transformation journey. Please get in touch with [Jean-Marie Lapeyre](#) in our team of experts to find out more about SDT, or to understand how you can benefit from the maturity analysis and benchmarking.

About Capgemini

Capgemini is a global leader in partnering with companies to transform and manage their business by harnessing the power of technology. The Group is guided everyday by its purpose of unleashing human energy through technology for an inclusive and sustainable future. It is a responsible and diverse organization of over 350,000 team members in more than 50 countries. With its strong 55-year heritage and deep industry expertise, Capgemini is trusted by its clients to address the entire breadth of their business needs, from strategy and design to operations, fueled by the fast evolving and innovative world of cloud, data, AI, connectivity, software, digital engineering and platforms. The Group reported in 2021 global revenues of €18 billion.

Get The Future You Want | www.capgemini.com