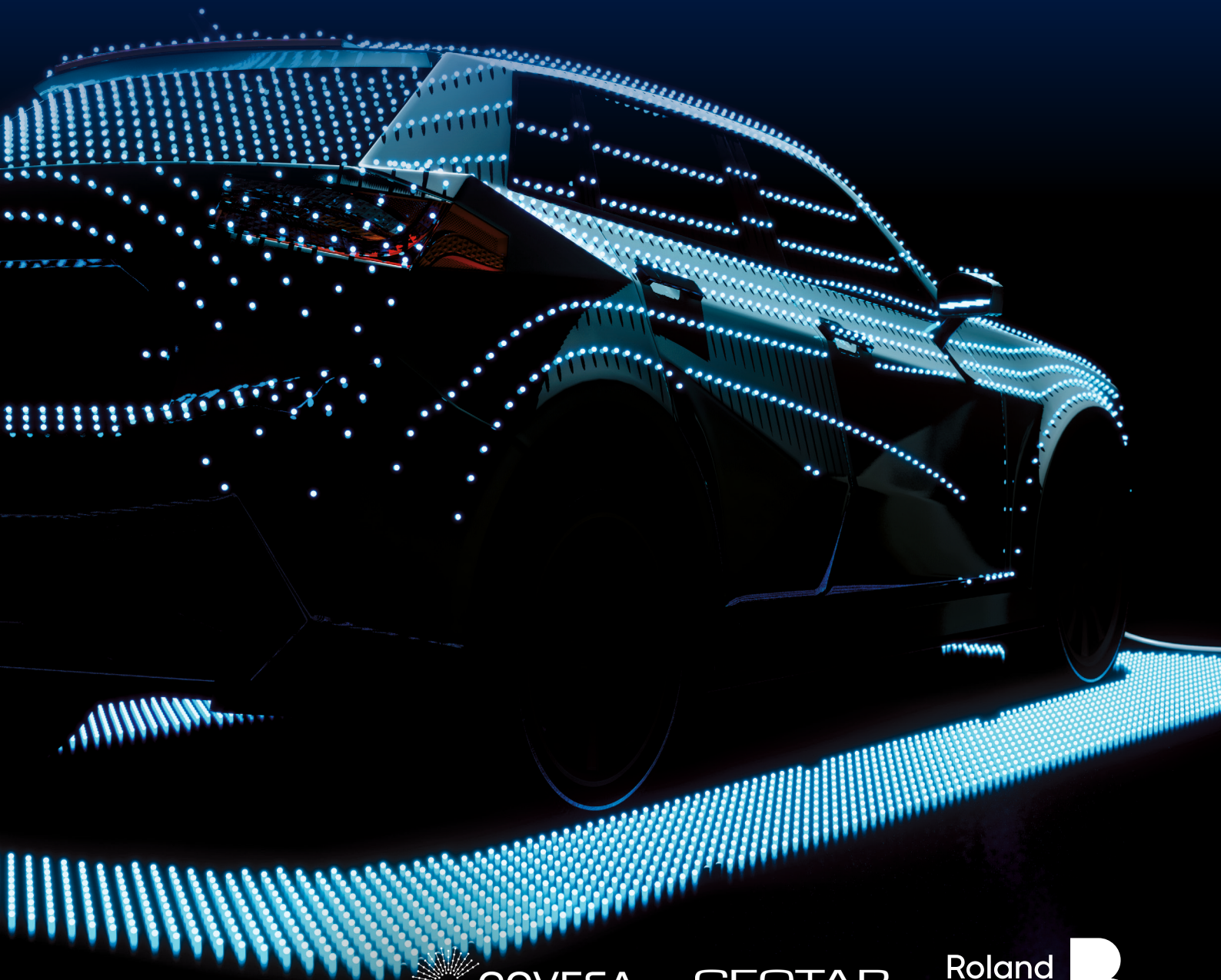
REPORT

Computer on Wheels

Unlocking the next chapter in connected services



COVESA
Accelerating the future of connected vehicles

GEOTAB

Roland Berger

Management summary

Computer on Wheels

Transformational change in a mature, complex industry is not easy. Between the growing pains of new technology and the inertial pull of old habits, even the best ideas can take some time to be adopted. Often, as Clayton Christensen noted in *The Innovator's Dilemma* nearly 30 years ago, market leaders fail to make that transition altogether.

This research paper co-authored by Connected Vehicle Systems Alliance (COVESA), Geotab, and Roland Berger looks at one such transition that is still currently in progress: the transformation of the automobile into a platform for services for consumers and fleets. A long time in development, connected services have seemed on the verge of mass adoption for more than a decade, but never quite made it.

This study focuses on connected services that improve driver experience, as well as those that benefit fleet managers using collected data from various sources such as sensors, devices, and user interactions. Direct data monetization, i.e. selling data collected from the customer to third parties, is out of scope.

This report draws on the findings of surveys and interviews with industry experts –including suppliers, OEMs, advisors, researchers, and dealers– to explain why connected services have underperformed since 2015, why industry optimism is growing, and why scaling a profitable business model remains the key challenge.

Cover: 3alexd/iStock

Contents

Fast facts

7

out of 9 critical adoption hurdles for connected services have been mostly overcome in the last 10 years

2

critical hurdles remain - working business models and customer acceptance and WTP

Quality user experience was cited as important by

100 %

of survey respondents

The launch that fizzled

1

Ten years ago, connected services seemed poised to become an important new value stream for the automotive industry with big bets placed by the largest OEMs. With a few notable exceptions (e.g., connected emergency services, advanced ADAS functionality and broader connected services for commercial fleets), connected services didn't take off as predicted.

What went wrong?
Fingers pointed to several causes, and most explanations had some validity. Ultimately, however, the answer is simple. In any industrial transformation, five elements must mature at roughly the same time:

- the technology,
- the industry's capacity to deliver that technology,
- customer interest in the new offerings the technology can support,
- customer's willingness to pay and
- a working business model.

In the case of connected services in 2015, all five of these factors were not yet in place:

1. While connected vehicle technology was fairly mature, the industry lacked sufficient affordable wireless bandwidth. In addition, the features envisioned were often too complex for existing vehicle E/E architectures to implement. And in any case, the industry lacked a sufficient base of connected vehicles to justify the cost of app development.

2. The connected platform infrastructure, both in terms of data and vehicle software platforms, was not sufficiently robust. The standards were lacking – from common data models to standard APIs.

3. The offerings were not compelling to consumers. Heated seats as a subscription-driven service, for example, were not a winner with the public.

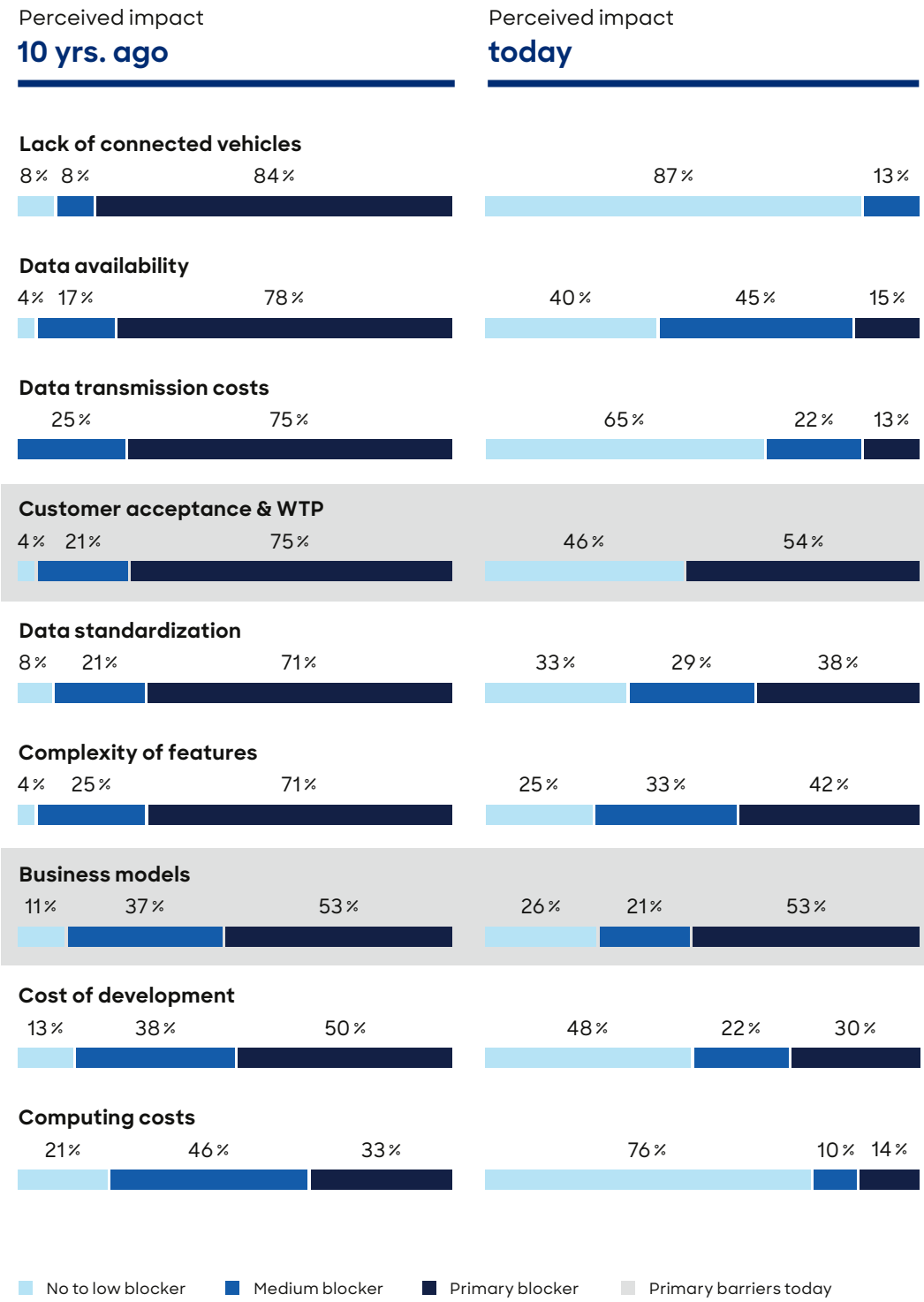
4. The business model was missing. Retail and B2B customers alike were understandably unwilling to pay for what were often badly designed and executed services. ▶ A

"When evaluating business models, it's crucial to separate the value of connected services from direct monetization—cost savings, loyalty, and efficiency gains can be just as important as new revenue streams."

Konstantin Shirokinskiy, Partner
Roland Berger

A Historical barriers to adoption have diminished …

Question: What are the primary blockers that have prevented broader adoption of Connected Services historically? n=25^



Source: Roland Berger

The future is almost here

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Flash forward to 2025, and these problems have largely been solved. Industry experts across the automotive value chain agree that advances on all five fronts now make a transformation much more likely.

2.1/ The technology is much more robust

With connected vehicles now the norm, the number of users who can receive updates and services in real-time has reached a critical mass. Network infrastructure improvements have also enhanced connectivity and real-time data processing. The number of connected devices that can be run simultaneously has risen too, even as more robust infrastructure makes it easier to provide persistent connectivity, improving the customer experience and making more critical applications possible.

Survey respondents largely agreed that 10 years ago, lack of connected vehicles was a problem (91 % identified as medium to high blocker), but it isn't anymore (87 % identified as no to low blocker). Ten years ago, computing costs were also an issue (79 %) and aren't now (76 %). Data transmission costs are also no longer seen as a barrier – a decade ago 100 % of respondents saw them as a serious barrier, but now only 35 % see data transmission costs as an obstacle.

2.2/ The capacity to deliver the technology has grown

Improved data management frameworks and a push toward central electronic architectures and microservices software architectures are unlocking new levels of interoperability and data utilization. These developments simplify the introduction of new features, including connected services, and make it possible for the network to handle larger data volumes generated by connected devices, facilitating data storage, integration, and processing. These frameworks have also strengthened security and made it easier to comply with data handling laws even as advances in data analytics have made it possible to gain much more insight from the data generated by the vehicle, and better uncover patterns, trends, and correlations.

At the same time, even as cloud computing has reduced computing costs, the growing strength of edge computing has reduced the cloud "upload" cost and mitigated data risks by reducing the amount of sensitive information that needs to be transmitted over the network. With advancements in technology, open-source software, increased standardization, cloud-native development and scalable software architectures, we are now able to reduce the cost of launching and maintaining services.

Where in the past there was a clear lack of standards, we are now starting to see industry-shaping collaborations, like COVESA, make strides in developing common data and compute frameworks for the fully connected automotive value chain. For example, COVESA Vehicle Signal Specification (VSS) and COVESA/AutoSAR collaborations seek to address both of these fundamental shortcomings gaining traction. While progress has been clear and several OEMs are moving forward with the adoption of these standards, many others remain on the fence.

2.3/ Customer interest in technology offerings has increased

Beyond these infrastructure improvements, automotive apps and other features are becoming more user-friendly, creating a more compelling value proposition for consumers. Commonly cited improvements include greater level of integration with smartphones, improved UX/UI design, and voice recognition capabilities that are vastly improved vs. earlier generations.

Among OEMs, there has been a shift in mindset about the role of connected services in their vehicles. Most leading automotive companies now view connected services as core digital products shaping customer experience, brand perception and data-driven decisions, serving customers along the entire ownership cycle, rather than afterthoughts or one-time upsells.

In the commercial space, the adoption of connected services has surged in recent years, driven by advances in telematics, AI, and regulatory mandates. This rapid expansion reflects a broader industry pivot toward fleet tracking, predictive maintenance, safety monitoring, and data-driven efficiency—underscoring how connectivity is reshaping modern fleet operations.

2.4/ Consumer acceptance still remains a hurdle

However, one positive shift is noticeable: consumers are more willing to share their data. As Roland Berger found in our Aftermarket Pulse study, most consumers are now willing to share data but want to control what they share. Chinese consumers are leading the way, followed by those from the US, Italy and Mexico. In the US, 44 % of vehicle owners are willing to give access to their vehicle data in return for a clear benefit. The share of US & European consumers who don't want to share data has significantly decreased (17 % for the US in 2024 vs. 39 % in 2023) primarily due to better understanding of the benefits and increased control over what types of data are shared.

"Given the limited adoption of fundamental standards and common data models, significant progress remains to be made on the path toward efficient development and rapid deployment of connected services."

Steve Crumb, Executive Director
COVESA

The weakest links

3

In 2025, customer willingness to pay and the service business models are the weakest links to widespread connected services adoption, according to industry experts we surveyed. The number of respondents who see customer acceptance and willingness to pay as a problem has dropped from 96 % 10 years ago to 54 % now, but working business models remain elusive: 90 % told us they saw functioning business models as a serious obstacle 10 years ago; today, that number is still-substantial at 74 %.

The industry's theory of the case is currently divided into two camps: those who believe customers just need more time to become hooked on the new services, and those who believe consumer subscriptions will never be a sizable direct revenue stream. "These services are coming, but I don't expect consumers to pay subscription fees for them. They've been conditioned for too long to expect it to be bundled with the car," said one OEM's senior manager of connected services who belonged to the latter group.

Interestingly, suppliers are bigger believers in connected services as revenue drivers. Fifty percent of suppliers told us they believe connected services will drive more than 10 % of revenue in 10 years, while only a third of OEMs share the same level of optimism.

One strategy OEMs are experimenting with involves embedding connected services costs within the vehicle price and extending the "free" subscription period to five or eight years. Time will tell if these monetization structures lead to compelling conversion rates to paid users.

In our view, the optimal strategy involves developing a differentiated model that tries to reach the market in two ways:

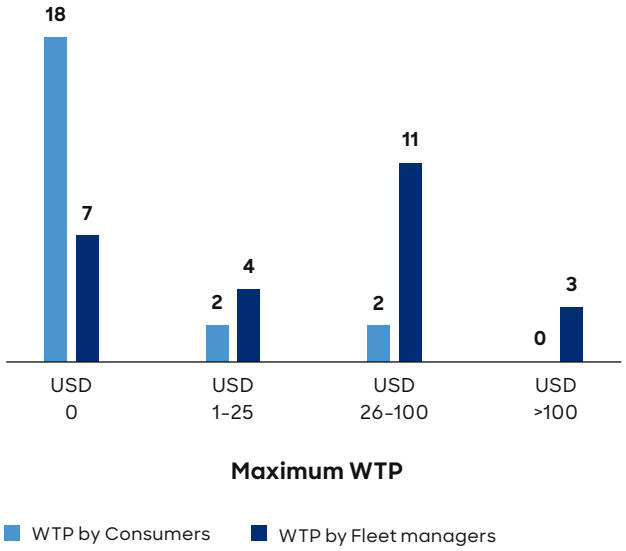
1. Fleet managers can be persuaded by services that enhance safety, optimize asset use, or facilitate regulatory compliance. They care about total cost of ownership (TCO) and the business case, and OEMs will be able to sell additional services on that basis. For acceptance of a service, novelty is not important. What matters is if it directly improves fleet efficiency, TCO, safety or uptime.

2. Consumers will need to be pursued in a different way. Cost arguments will have limited appeal. Today's consumers appreciate features that offer tangible benefits, such as integration of third-party apps or remote access features, industry experts say. Some OEMs predict that consumers will want a lot of choices. "People want more options, like in their phone's app store. The demand [for connected services] is there," insisted one OEM executive director of platform architecture and prototyping. ▶ B

> **"OEMs must empower dealers to champion and articulate digital services – meeting consumers and fleets exactly where they are in their journey."**
>
> **Elena Yakushkina, Principal**
> **Roland Berger**

B We see a stark difference between consumers and fleet managers

Question: Considering passenger and commercial vehicles, what do you expect is the maximum consumer willingness to pay (WTP), on a monthly basis, for subscription access to Connected Services (total customer spend for all offerings) n=25



"Most customers believe these services should be free with the car."
Survey participant, Insurance/Advocacy

"Fleet owners are excited about connected service use cases because it makes operations more efficient."
Survey participant, Cloud provider

Source: Roland Berger

However, low willingness to pay remains a hurdle, especially in the B2C segment. Most consumers believe digital services should be included in the car's price tag without additional monthly payments.

Fortunately, there is a third customer to consider: the OEM itself. Ultimately, cost savings may be a more compelling value driver for the OEM than direct monetization. For instance, AI can now better predict when a vehicle component is likely to fail, facilitating more proactive maintenance and reducing downtime. Connected services can also reduce warranty expenses, optimize supply chains, and improve software deployment processes – benefits that may be more tangible, sustainable, and lucrative than monthly subscription fees. In our survey, 68 % of OEMs and suppliers saw cost savings as the primary value potential of connected services, more than those who saw connected services as boosts to market share (60 %).

Suppliers may also see gains, as real-world data and aftermarket intelligence enhances usage data, informing product design. Retailers may be able to profit from these systems as well, through predictive maintenance services and regular vehicle health reports that enhance customer trust, and targeted promotions to increase customer loyalty. Additionally, connected services and captured vehicle data can help shape tailored offerings for customer retention – data-driven sales support is a benefit for both OEMs and dealerships.

Make it good

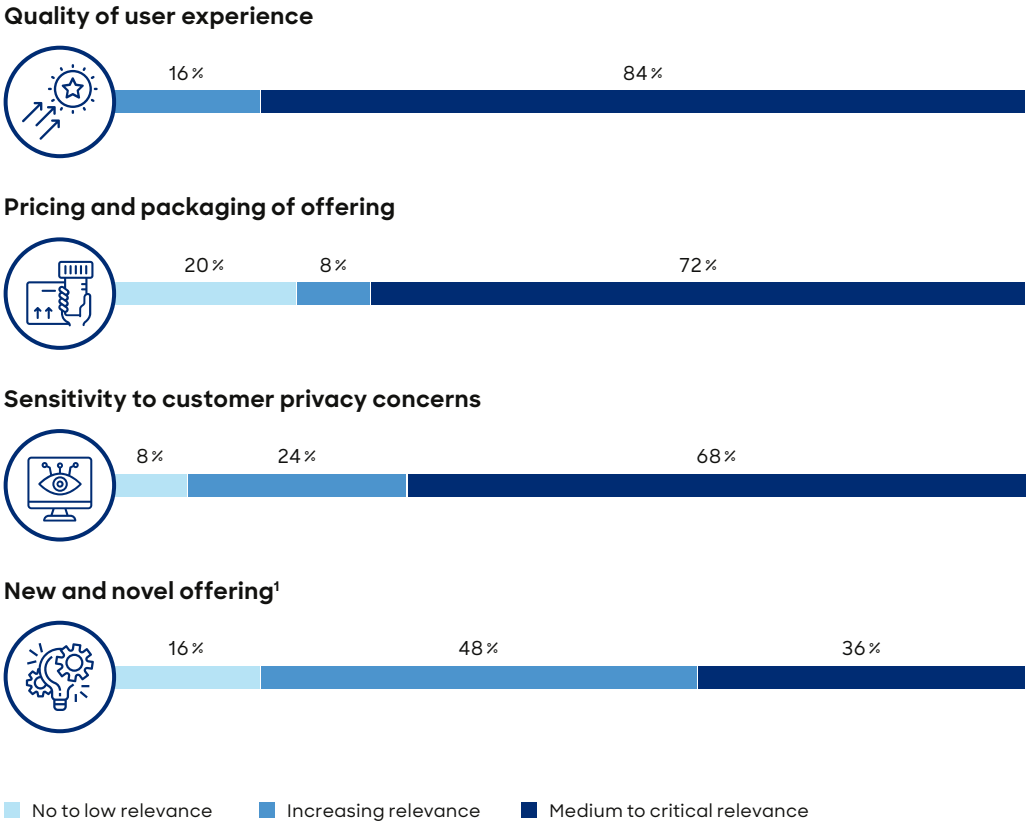
4

Although connected services are on the cusp of broad success, it's important that OEMs do not get too far ahead of their customers this time around. The degree of buyer hesitancy suggests to us that OEMs will be best off if they don't strive to develop a "killer app" but instead focus on creating platforms that will allow frictionless and fast deployment of new features and start with simple, useful services. Industry experts say driver and emergency assistance and vehicle maintenance are the connected services most likely to create the most economic value.

Making the user experience positive is crucial, survey respondents say. One hundred percent of our survey respondents cited the quality of the user experience as important, more than sensitivity to privacy concerns (92 %), a novel offering (84 %), or price (80 %). Noteworthy is the fact that only 36 % of respondents view the novelty of the offering as critical – as we said before, no "killer apps". ▶ C

C User experience and pricing & packaging are key to address primary adoption concerns

Question: What attributes of a potential offering make it most likely to succeed? n=25



1 i.e., not one that customers already take for granted

Source: Roland Berger

Delivering on those modest expectations will not be easy.

To realize the full potential of connected services, OEMs will need to encourage digital integration across the entire value chain, from product development to service delivery. OEMs and their suppliers will need to:

- Build modular, cloud-based architectures that support real-time analytics and over-the-air updates.
- Create seamless digital experiences that match or exceed consumer tech expectations.
- Collaborate with regulators and industry groups to set data handling standards and assuage security and privacy concerns.
- Develop metrics of service success that can drive continuous improvement efforts.
- Enable dealerships to promote and explain connected services to customers.

Beyond that, creating a standardized platform will be necessary to incentivize independent app developers to generate new offerings. "App developers don't want to create 20 different versions for 20 different vehicles," one researcher explained.

While there is still significant work to be done, the industry has shown an increasing commitment to common solutions. Organizations like COVESA are actively addressing challenges such as the lack of fundamental standards, common data models, and APIs. A noteworthy success in this area is the CCC Digital Key certification, developed by the Car Connectivity Consortium – a global network focused on advancing cross-platform compatibility solutions.

> **"While connected vehicle consumer space is still working out business cases and customer needs, commercial interests such as fleets and insurance are leveraging vehicle data presently to achieve significant ROI in terms of productivity, safety, and sustainability. We are looking forward to more standardization, actively participating with manufacturers and providing our perspective and our mutual customers' specific data and service needs."**
>
> **Edward Guild, Connectivity Standards Lead**
> **Geotab**

Getting there from here

5

For OEMs, the challenge to a successful roll out of connected services will be to adopt a new operating model that fuses new value creation and monetization models with software product development processes, traditional automotive engineering and sales competence for digital services at retail. This will require the industry to make some fundamental strategic and organizational shifts:

- **Decouple monetization of connected services from value creation.** Not every service needs to generate revenue directly. Services that boost efficiency or loyalty also create value.

- **Create dedicated cross-functional teams focused on service design, data management, and customer experience.** Especially in these early days, finding talent that spans automotive systems and software may be challenging.

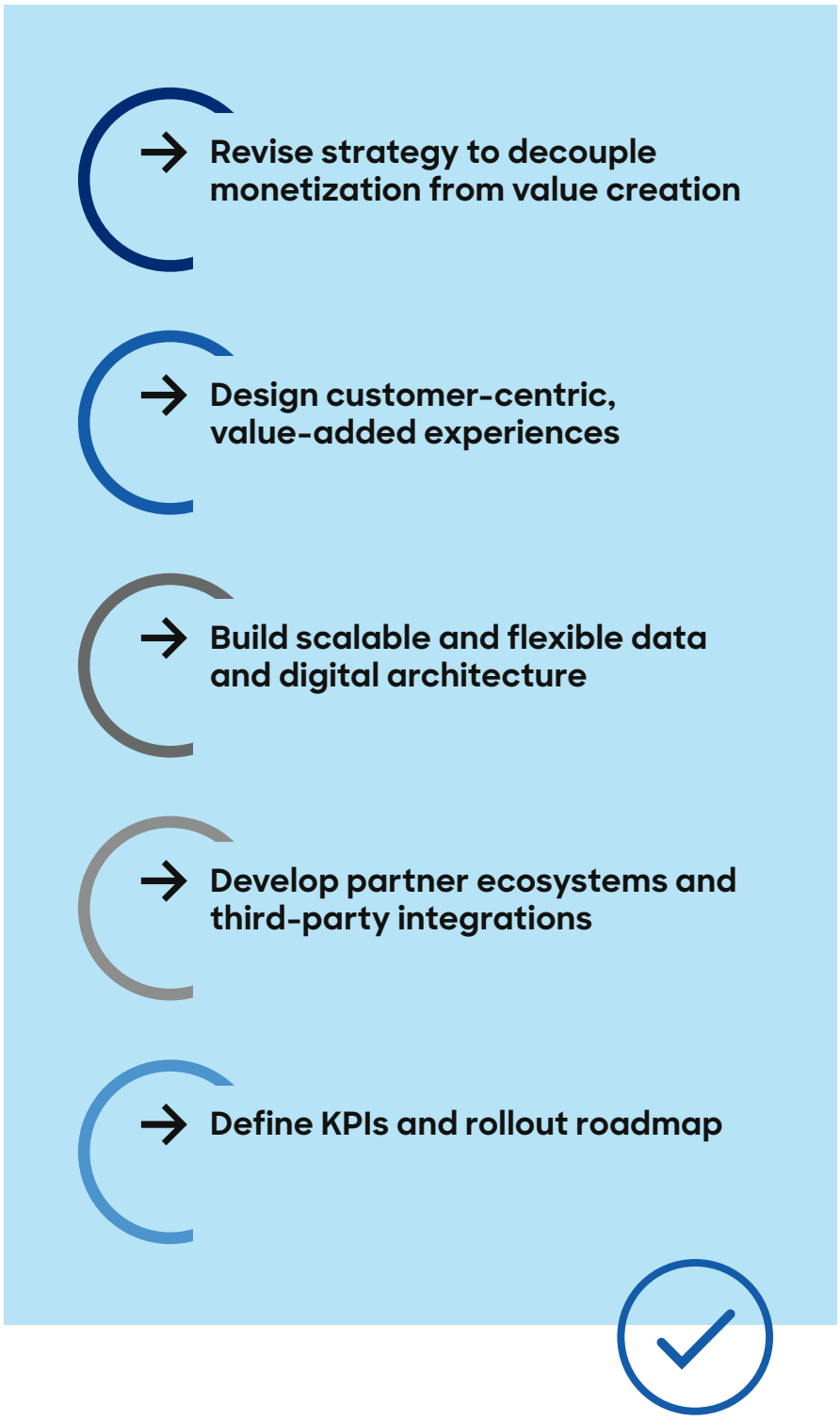
- **Partner across the ecosystem, with open consortia like COVESA, cloud providers, startups, and peer OEMs, to drive interoperability and scale.** This last step is likely to be a big one, as it will require OEMs to open their operating systems to suppliers. While this is not a technical challenge, it could create new risks. "They worry about customer data protection and privacy concerns," one researcher and author told us.

The barriers are real, but not insurmountable. As one survey respondent put it, "The technical capabilities are there, but what's missing is the go-to-market muscle." In the long run, this may be good news for OEMs, as marketing has always been one of their core competencies. For over a century, the automotive industry has built products that meet customer's deepest aspirational values – automakers should be well-positioned to forge personal connections through persistent, data-rich services that endure long after the vehicle is driven off the lot.

▶ D

> **"A decade ago, we had the ambition but lacked the ingredients. Today, with scalable platforms, mature tech, and greater customer openness, connected services are finally ready to scale."**
>
> **Markus Baum, Senior Partner**
> **Roland Berger**

D Strategic considerations for OEMs and Suppliers



Source: Roland Berger

AUTHORS

ROLAND BERGER

Konstantin Shirokinskiy
Partner
+1 248 480-1044
konstantin.shirokinskiy@rolandberger.com

Markus Baum
Senior Partner
+49 711 3275-7121
markus.baum@rolandberger.com

Elena Yakushkina
Principal
+1 416 659-9602
elena.yakushkina@rolandberger.com

Kaimook Chirapathama
Senior Project Manager
kaimook.chirapathama@rolandberger.com

Charlie Pope
Senior Project Manager
charlie.pope@rolandberger.com

Soumya Sen
Senior Consultant
soumya.sen@rolandberger.com

COVESA

Steve Crumb
Executive Director

Paul Boyes
Community Director

GEOTAB

Edward Guild
Connectivity Standards Lead

Amir Sayegh
Product Safety Principal Strategist

Further reading

- *AUTOMOTIVE AFTERMARKET PULSE 2025*
- *COMPUTER ON WHEELS: COMMERCIALIZING AUTOMOTIVE SOFTWARE*
- *GLOBAL AUTOMOTIVE SUPPLIER STUDY 2025*
- *AUTOMOTIVE OUTLOOK 2040*

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COVESA (Connected Vehicle Systems Alliance) is an open, collaborative, and impactful global community accelerating the full potential of connected vehicles. COVESA is a not-for-profit organization, and the only alliance focused solely on developing common approaches and technologies for connected vehicles. We are well-aligned to address opportunities and challenges in the automotive industry, which is experiencing a digital transformation driven by fundamental customer expectations.

GEOTAB is a global leader in connected vehicle and asset solutions, empowering fleet efficiency and management. We leverage advanced data analytics and AI to transform fleet performance, safety, and sustainability, reducing cost and driving efficiency. Backed by top data scientists and engineers, we serve over 55,000 global customers, processing 80 billion data points daily from more than 4.9 million vehicle subscriptions. Geotab is trusted by Fortune 500 organizations, mid-sized fleets, and the largest public sector fleets in the world, including the US Federal Government. Committed to data security and privacy, we hold FIPS 140-3 and FedRAMP authorizations. Our open platform, ecosystem of outstanding partners, and Marketplace deliver hundreds of fleet-ready third-party solutions. This year, we're celebrating 25 years of innovation. Learn more at *www.geotab.com* and follow us on *LinkedIn* or visit *Geotab News and Views*.

Publisher

Roland Berger LP
1217 Woodward Avenue, Suite 450
Detroit, MI 48226
US
+1 248 729-5000

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