

How to become a finely tuned machine

The automotive business of the future



teradata.

Create the future of mobility

The automotive industry is being disrupted more than any other. And this disruption goes beyond vehicles. The world needs those in the industry to redefine mobility. And data lies at the heart of this transformation.

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Change is no longer optional

18 years after Tesla was founded, the perception persists that they remain years ahead of the competition. As traditional auto manufacturers continue their struggle to catch up, startups are busy carving out their own pieces of the market.

The future of automotive is not yet set in stone. However, one thing is clear: change is no longer optional.

Throughout every stage of the vehicle lifecycle, data is created. These data form digital threads – key information that follows an individual vehicle, customer, or piece of equipment from vehicle inception right through to the vehicle being recycled or scrapped.

It is only by knitting these threads together – to form a digital fabric – that new automotive business models can be discovered and accelerated.

This brochure will show you how.



Put data in the driver's seat

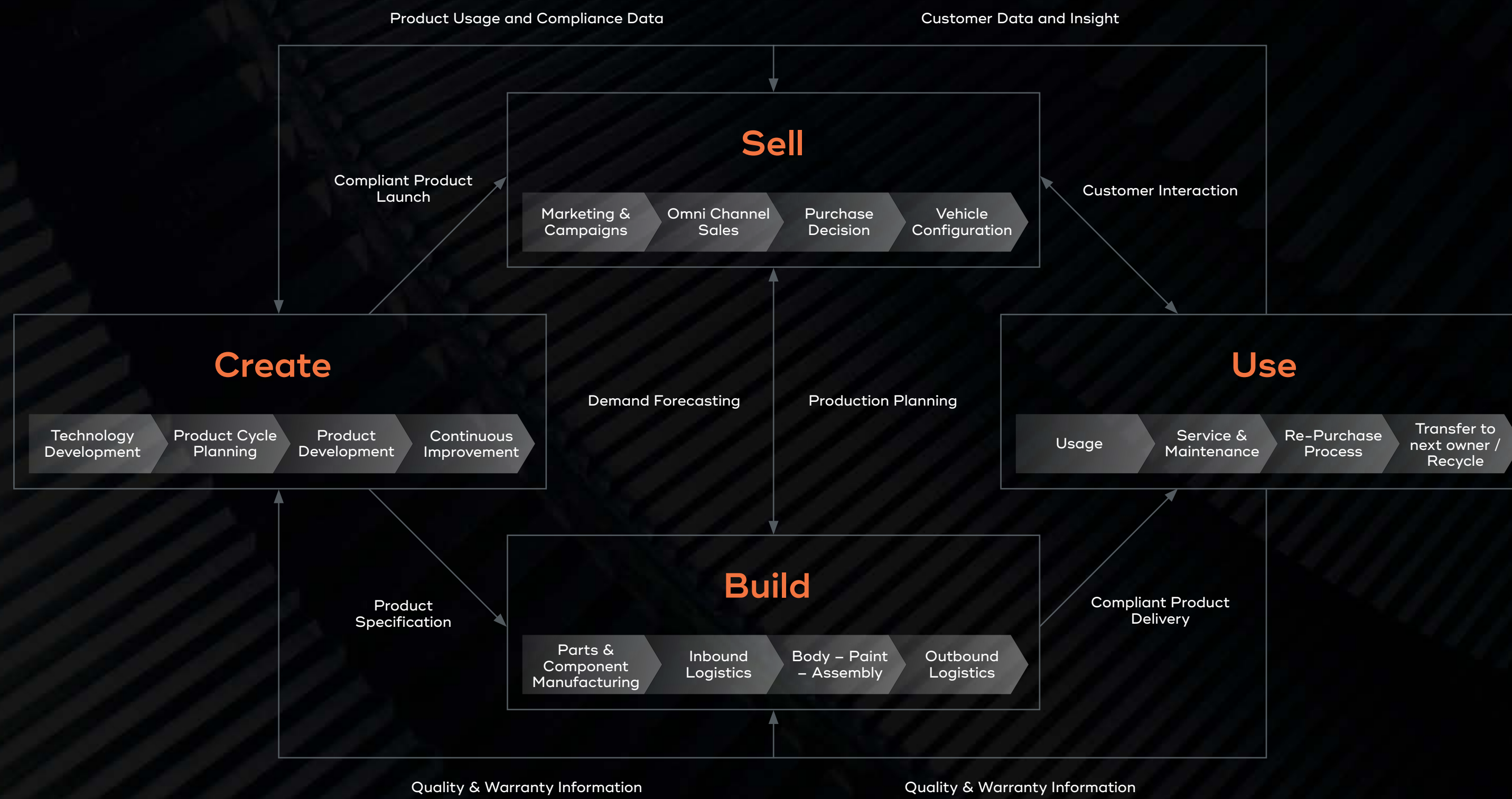
From R&D to customer service; massive amounts of data are collected throughout the lifecycle of a vehicle. But whether from smart machines in factories, sensors in vehicles, or interactions between brands and customers, the majority of this data sits in isolation today.

The vehicle moves along a physical path as it is planned, designed, produced, sold, and used by the end customer. But the data generated and used at each point remains behind – rarely if ever impacting any other part of the lifecycle.

A new, connected model is needed to compete in today's digital economy. A digital fabric that connects data from disparate processes, to create a complete and accurate picture across the entire enterprise.

Many are looking to machine learning and AI as the silver bullet to build and retain competitive advantage. But the truth is that automotive businesses must first create the right context and data environment for these technologies to deliver the intended business value.

The Digital Fabric: Data drives efficiency and value as it integrates the automotive product lifecycle



Create

Feed back data from across your business to continuously plan, optimize, and deliver new technologies and product innovations in shorter R&D cycles.

Build

Capitalize on flexible manufacturing by providing visibility over parts and component manufacturing, inbound and outbound logistics, and the next generation of connected factories to minimize risk and improve productivity.

Sell

Anticipate vehicle sales opportunities, optimize the digital sales journey, and enable personalized vehicle configuration prompts.

Use

Deliver and monetize connected vehicle services, proactively manage maintenance, personalize customer experience and strengthen loyalty.

01

Create

Model 0.11010-G > Perspective View > Part Selector
Electric powertrain

> Part Selector

Base Principle
Using electric motors in generator mode allows to store braking energy which usually disappears as heat, to electric battery which contributes to electric energy consumption.

Regenerative Braking
One pedal driving is a way of driving when a driver uses only on pedal for acceleration and braking. It works by switching electric motors in generator mode when accelerator pedal is not pressed.

Friction Brakes
Conventional friction brakes still are very important part of driving experience as they needed for quick deceleration and in emergency situations.

Range
Using Regenerative Braking: 395km
Without Regenerative Braking: 290km

Efficiency Graph

CO2 Output

Drag Index 0.26

START SIMULATION

AUTOMOTIVE DESIGN AND SIMULATIONS

File Edit Sim 3D Help

Drag Index

TESTING ENVIRONMENT

Pressure Monitoring

0.3158	DIFF INDEX1	0.3158	0.3158	0.3158	0.3158
1.3581	DIFF INDEX2	1.3581	1.3581	1.3581	1.3581
2.3318	DIFF INDEX3	2.3318	2.3318	2.3318	2.3318
0.3158	Total Value:	0.3158	0.3158	0.3158	0.3158

START PRINT

Wind Tunnel Simulation In Progress... Drag 0.26

In the past, research and development (R&D) would design a new vehicle, then partner with manufacturing to the point of that vehicle's launch. This operational model no longer applies.

As vehicles increase in complexity, manufacturers have the opportunity to continually learn from vehicle sensor and driver data.

The expectation is fast becoming that vehicle performance and customer experience are updated and improved – using software – long after the vehicle is driven off the forecourt.

In short, R&D today is continuous, with opportunities and challenges at every turn.

Contact Teradata to explore how the digital fabric can help you build better.

GET IN TOUCH

Construct agile R&D



Modern vehicles are becoming increasingly reliant on code, essentially becoming software defined vehicles. A modern car contains about 100 million lines of code, and that number is expected to rise to 300 million by 2030. To put that in context, a passenger plane has around 15 million¹.

R&D must balance long-lead-time electromechanical development with the expectation of frequent updates and new features delivered by software. Risk levels across vehicle portfolios are at an all-time high, and it is practically impossible to effectively assess and understand that risk using experience and human cognitive capabilities alone. Harnessing the data from R&D can help manage risk, predict the impact of changes, reduce project lead times and ultimately reduce costs.

¹Petzinger, J., Yahoo Finance, 2019.

How can it be done?

Hardware and Software in the Loop (HiL and SiL), and simulation must replace physical tests. Data and analytics with the feedback loop from the actual use of products and services are key to optimize and minimize the need for physical tests.

Analytics enables OEMs to continually train and run predictive models of each vehicle, including hundreds of thousands of possible variants.

These same analytics can help trace model predictions back to historical data and customer usage/personas.

This gives you the insight necessary to act and improve processes.

Keep an eye on your finances

Automotive manufacturers should be able to walk into a parking lot, scan a VIN (or part number), and immediately understand the margin on that vehicle through its entire lifecycle. This requires linking data from all lifecycle stages – which most automakers are yet to achieve.

Vehicle design and manufacturing are complex processes. Manufacturers are pushed to create innovative, customer pleasing vehicles with strong warranties at reasonable price points, while meeting increasingly stringent regulatory requirements. Shareholders expect them to do so efficiently enough to maintain or grow profits. At the same time, they are forced to undergo a massive transformation in business model – from a traditional vehicle producer to a technology company that provides mobility solutions.

This is no easy task, which is why understanding your cost base, and hence profitability, right down to the VIN level is so critical. Such understanding demands that companies have extremely detailed and quantifiable visibility of every component, part and process, how they interact, and their effect on profits and customer satisfaction.

How can it be done?

By leveraging the data fabric, which is created by integrating data across financial and non-financial processes, sophisticated analytics can be run against the complete set of data to understand and allocate costs in the most granular detail.

This analytical environment not only forms the basis for Performance (KPI) and Statutory/Regulatory reporting, but crucially, enables faster, better business decisions all along the value chain.

Moving beyond individual vehicle profitability, the same data can be used to quantify and inform the effectiveness of sustainability efforts, moving way beyond drivetrain emissions targets to create a much more holistic perspective.

The DHL logo is displayed in red, featuring the letters 'DHL' in a bold, italicized font with horizontal lines above and below the letters.

Learn from DHL Express

DHL Express implemented a transformation project to provide financial business insights through a single global application on Teradata, replacing their costing system.

[Read more](#)



An aerial, high-angle photograph of a highway interchange. The highway curves through the frame, with multiple lanes of traffic. Above the highway, a large, rectangular parking lot is filled with hundreds of cars, arranged in neat rows. The scene is captured during the 'golden hour' of late afternoon or early morning, with a warm, orange glow from the sun. The overall composition is geometric, with the lines of the highway and parking lot creating a strong sense of order and scale.

02

Build

The industry prides itself on delivering exceptionally high-quality products with extreme efficiency. However, the industry is beginning to realize that it must dynamically disrupt itself to meet rapidly evolving customer expectations and deliver new business models.

Global supply shortages in 2020 and 2021 have highlighted the fragility of some supply chains, causing large scale stoppages and the inability to deliver vehicles as ordered. Improved visibility across the inbound supply chain and production is a daunting task – but will feed transformative risk management capabilities and minimize the financial impact of disruptions.

The efficiency of a mass-market production line must be transformed to deliver mass-customized products, on multiple drive trains, and without adding back the costs or inefficiencies so effectively squeezed out over decades of progress.

Contact Teradata to explore how the digital fabric can help you build better.

GET IN TOUCH

Make your supply chains resilient

The shock of COVID-19 exposed the fragility of many global supply chains. By necessity, focus has shifted to resilience. Automotive companies must find the right balance between agility, resilience, quality, service, and cost in today's dynamic market.

Supply chains have been traditionally split into silos for ease of management. It is simply too hard for human-oriented processes to manage the complexity and scale of end-to-end, granular supply chains. But this creates gaps in data, information, and visibility between silos.

But what if you could manage this level of complexity at an enterprise scale? End-to-end visibility, operating in real time, at a granular level for both the physical supply chain and demand signals, is the essential foundation of resilience. It enables earlier visibility into disruption risk on the production floor, as well as optimizing risk mitigation strategies by supporting tactical decisions (which car should I build in the next 15 minutes), and strategic supply chain design (inventory holding levels).



How can it be done?

Advanced data analytics with a resilient data platform that enables flexible querying of part and BOM data allows you to create the perfect balance between resilience and the traditional supply chain KPIs of service, cost, and quality.

Integrated, granular data gives companies the ability to constantly tune their supply chains to suit evolving needs, including the increasing demands to track and reduce environmental footprint.

Learn from a leading global OEM

Teradata Vantage enabled a leading global OEM to see granular details about suppliers, pricing, and key performance indicators (KPIs) that are shared across all process partners. This allowed insights into pricing across all suppliers and processing plants. The supply chain analytics identified if one location paid a different price for the same part from the same supplier than another plant, and if so, why it was happening.

Realize the benefits of Industry 4.0

Only about 30 percent of companies are capturing value from Industry 4.0 solutions at scale today². Initial efforts have already shown that individual, isolated Connected Factory projects will not deliver the step change in productivity anticipated.

Isolated projects are neither repeatable nor shareable, and quickly incur costs that outweigh any benefits due to repeated data and analytics management overhead. In order to combat rising costs, analytical productivity needs to be industrialized.

"The use of process data for 100 percent process monitoring is a decisive step towards the smart factory and will be the basis for further applications that contribute to continuous improvement."

Mathias Boomgaarden,
project manager at Volkswagen's Emden plant.

How can it be done?

An integrated analytics platform enables reusable, shareable and portable analytics solutions to be created faster. It allows the efficient reuse of data and analytics solutions within an enterprise, while minimizing the vital overhead of data management and governance.

Due to the scale of the data and the complexity of analytics associated with Industry 4.0, increased analytical productivity and efficiency is a must to improve productivity metrics at an Enterprise level.

Without it, OEMs may find themselves simply transferring costs from the shop floor to the data centre instead of achieving the full value of productivity improvements.

Learn from Volkswagen

With "Spot Welding Analytics", an interdisciplinary team from Volkswagen, AWS and Teradata has created an intelligent solution that enables greater transparency and efficiency in car body construction. The solution integrates and analyzes data generated by welding robots – a previously untapped source of manufacturing data. "Spot Welding Analytics" is already in use today at the Volkswagen plant in Emden, where it is transforming the body shop into a digitized factory.

[Read more](#)



A hand is pointing at a laptop screen displaying a financial chart. The chart features a candlestick pattern with red and green bars, overlaid with several colored lines (red, green, blue) representing different data series or trends. The background is a dark, blurred view of the laptop screen with various data points and text.

03 Sell

The most successful companies in the world are those that have established a platform, created their own applications, and allowed third parties to contribute to and leverage their user base.

The more users a platform gains, the more data they create through interactions, enabling platform holders to improve and tailor solutions and experiences. And in turn drive user growth and more interactions.

Big Tech companies dominate their markets using data to improve products and experiences with every interaction.

The automotive industry has been slow to learn the lessons of Big Tech, but that too is changing.

Contact Teradata to explore how the digital fabric can help you build better.

GET IN TOUCH

Optimize the digital purchase journey

For many years the trend has been that the journey is moving online. In the past, decisions were made at the dealership over multiple visits. Increasingly, new vehicle decisions are being made online with as little as one or two dealership visits to confirm and finalize option choices.

The wealth of media created by brands, dealerships and independent influencers continues to increase. Customers are increasingly comfortable with online advice and decision making. Brands are responding by investing heavily in the online sales journey.

To get the maximum return from this significant investment, the purchase journey must be well understood. From this base of understanding, brands can optimize campaigns and content, integrate online and offline portions of the journey, and guide customers in real time to improve conversion ratios.

How can it be done?

All data from customer interactions must be captured and integrated to form a digital thread that follows individual vehicle purchase journeys – both online and in the dealership.

Successful sales journeys can be compared with unsuccessful ones, and the contribution made by marketing campaigns and content can be calculated, allowing for more effective marketing spend, preventing churn and streamlining customer interactions.

Once journeys are understood and content optimized, customers can be guided down the path that increases the probability of a final sale. These guides can be automated in real time through a website or delivered through sales tools and CRM platforms to enable personalized experiences.

Mitsui Sumitomo Insurance
MS&AD INSURANCE GROUP

Learn from Mitsui Sumitomo Insurance

Mitsui Sumitomo Insurance developed a sales support platform for its agents called MS1 Brain, which provides assistance to more than 34,000 domestic agents. MS1 Brain integrates data from disparate systems and uses AI to forecast demand, suggest next best actions to agents, and personalize content to help customers navigate complex decisions.

[Read more](#)





04
Use

Monetizing car data through new business models is not a new idea. In 2016, McKinsey estimated that the connected vehicle would deliver \$750bn in incremental value by 2030.

That estimate has since been downgraded to between \$250bn and \$400bn³, due largely to slow uptake from automotive OEMs and other ecosystem participants.

However, change is happening. Millennials have now overtaken Baby Boomers as the largest living adult generation. This change marks a dramatic shift in technological competence and changing attitudes to ownership models.

Aftersales, vehicle servicing and maintenance are key areas for customer transformation, and re-use and recycling are now key concerns for manufacturers. Additionally, all generations now have increased personalization expectations based on their everyday experiences with digital native retailers and social media platforms.

³Malak, S., MotorFinance, 2021.

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GET IN TOUCH

Make the most of connected vehicles

To discover and deploy new services and business models effectively and profitably, automotive companies need to better understand how customers use their vehicles and extended services.

Vehicle data has a core role to play in this understanding, and OEMs have a clear advantage in terms of generating, accessing and interpreting this data ahead of 3rd party competitors.

Learn from a connected car brand

With over 80% of their cars connected, this car manufacturer analyzes 500,000 hazard incidents weekly to gain critical answers to fuel innovation in design, predict failures in cars, and improve diagnostics and service. That same data is even shared among vehicles to act as advanced warning signals, helping the manufacturer to deliver on their core values: quality, safety, and the environment. Smarter cars make for happier customers.

How can it be done?

Vehicle data is a key thread in the digital fabric that connects the customer journey to R&D, manufacturing, and sales, creating virtuous feedback loops that will keep automotive brands relevant to their customers, whether offering new services or providing aftercare and parts in a more efficient and personalized way.

Most automotive brands include offering value-add services in and around the vehicle in their strategic goals, and many have begun to build this capability. Vehicle data will be the primary source for more efficient micro-sales cycles for these services.

Quickly moving from experiments to deploying analytics in production is critical to capture these highly profitable new opportunities.



Deliver personalized mobility experiences

With connected vehicles, automotive companies have the opportunity to create their own network effect. They gain data on how individuals, both private and professional drivers, interact with their vehicles. With this they can – and should – improve the vehicles themselves and tailor the functionality and performance of the vehicle to specific users.

Connected vehicles, enhanced infotainment systems and vehicle apps all provide data that can build customer insight from individual journeys. And upgrading a vehicle long after it first drives on the road is possible even today.



How can it be done?

With the rollout of advanced connectivity technologies such as 5G, activating software-enabled performance or features will only get easier for the end customer. This highlights the need for the automotive industry to understand and personalize offers.

Different combinations of features, services and even the way engines are tuned can be created to meet the specific requirements of discrete markets or segments.

Automotive companies already have the data to answer these questions – but is locked into several different systems that prevent complete customer understanding.

Connecting these data together as a digital thread will transform the relationship between customer and brand, allowing interaction across 100% of the ownership cycle.

The Digital Fabric: Important considerations for building analytics at scale



Accelerate innovation that delivers positive business outcomes

Feed back data from across your business to continuously plan, optimize, and deliver new technologies and product innovations in shorter R&D cycles.



Rapidly deploy analytics, AI and ML into business processes, vehicles and services

Increasing analytic throughput from idea to operationalization is critically important, as is managing analytic model maintenance throughout the full lifecycle.



Digital trust – governance and data traceability

Teradata customers enjoy appropriate response times even when ML is run concurrently to simple reporting. This removes the need to fragment data into silos, reducing data governance overhead and increasing digital trust through an auditable analytic production line.



The road ahead

The journey from isolated pilot projects to enterprise-ready capability is a treacherous one. To support thousands of projects, which together create millions of models and consume petabytes of data, you need a co-driver with an unprecedented level of data expertise. Because for the automotive industry, this is a brand new race. But for Teradata, it's one we have been perfecting for decades.

Why Teradata?

Only Teradata offers true scalability without exponentially increasing costs. We are cloud-first, and offer multi-cloud and hybrid infrastructure for the ultimate in data flexibility. And only Teradata Vantage is capable of scaling in every direction – handling the immense data demands that you will be required to meet tomorrow, today.

Teradata is working with leading manufacturers in the Open Manufacturing Platform community to develop solutions for Industrial IoT and Industry 4.0.

[Read more](#)

Teradata is supporting the Volkswagen Industrial Cloud – an open IoT platform combining the data of all machines, plants and systems from all facilities of the Volkswagen Group – with cloud-based data analytics to optimize production processes and drive productivity increases in the plants.

[Read more](#)

Talk to the experts

Book a virtual or face-to-face meeting with an expert from Teradata to explore how we can help you become the automotive company of the future.

[BOOK A MEETING](#)

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