

Exploring the Future of Data Sharing

Lessons from the Automotive Supply Chain

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The European Institute of Purchasing Management (EIPM), in partnership with the Luxembourg Centre for Logistics and Supply Chain Management (LCL) within the MIT Scale Network, and o9 Solutions, a global leader in artificial intelligence (AI)-driven enterprise software, have established this research project to explore contemporary and future data sharing in supply chains. This initiative examines the intricate dynamics of data sharing practices within the automotive supply chain and distills insights that are valuable beyond this focal industry and are applicable across a vast range of industries. The research, its outcomes, and insights, are presented in this white paper.

Rationale for the Research

Data has become the cornerstone of operational efficiency, innovation, and long-term sustainability across industries. This is, in particular, apparent in the automotive sector, where the complexity and global reach of supply chains demand sophisticated coordination and real-time information sharing among diverse actors.

The overarching goal of this research is to understand how to unlock the full potential of data in shaping a more resilient, agile, and sustainable automotive supply chain.

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The present whitepaper recognises that data sharing is not merely a technical process but rather a strategic imperative. Such processes, however, are often fraught with challenges, including issues of trust, data security, intellectual property concerns, and the need for standardization across varied technological platforms. The research undertaken has addressed these complexities by exploring both the current state and future possibilities of data sharing practices in diverse supply chains.

Objectives and Scope of the Research

This research project aims to offer actionable strategies that can guide businesses, policymakers, and supply chain professionals in making informed, forward-looking decisions. The research project and the present white paper address critical questions such as:

- How can data sharing enhance the operational efficiency and sustainability of automotive supply chains?
- What are the primary obstacles and enablers for effective data exchange across diverse supply chain stakeholders?

Methodological Framework

A series of in-depth interviews has been conducted with executives and thought leaders from the automotive industry, providing valuable insights into current data-sharing practices, challenges, and opportunities.

Impact

The anticipated outcome of this research is to empower industries and organizations to enhance their data-sharing capabilities. The findings presented in this white paper provide actionable insights that can be utilized to drive more efficient, transparent, and sustainable supply chain operations. By undertaking this research, EIPM, LCL, and o9 Solutions aim to position themselves at the forefront of this evolution, contributing to the development of a more resilient and adaptable automotive supply chain for the future.

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Authors



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intersection of supply chains, innovation, open technologies, and digital infrastructure. Hervé's research explores the evolving complexities of these areas and their critical role in driving industry advancements.

In addition to his research, Hervé has extensive experience in designing and delivering executive and professional education programs across various industries. His expertise has made him a sought-after speaker at both corporate and public conferences, where he shares his insights on supply chain innovation and industry evolutions. As an assessor for the prestigious EIPM-Peter Kraljic Awards, Hervé evaluates organizations at the forefront of procurement excellence.

Hervé is the author of three books and numerous articles and research reports, contributing thought leadership that blends academic rigor with practical application. He believes that future industry transitions will increasingly be co-created through collaboration between companies, communities, and organizations. His work encourages engagement with the pressing challenges of a rapidly changing world, drawing on his deep understanding of innovation ecosystems and supply chain dynamics.



Benny Mantin is a full professor at the University of Luxembourg. He is the founding director of the Luxembourg Centre for Logistics and Supply Chain Management (LCL),

a role in which he leveraged the partnership with MIT to establish a thriving world-class centre that brings together research, practice and education as echoed by his guiding motto: Innovate! Impact! Inspire! — Innovate by developing methodologies and research papers, impact by working closely with industry, and inspire through educational programs.

Benny's passion is to understand, improve, and ultimately perfect decision making and process management as applied to global supply chains, transportation and logistics, pricing and revenue management, as well as sustainable operations. Over the years, he has established a solid research portfolio in these domains—including eight publications in top FT-50 journals—while developing enriching interactions and collaborations with industry. Importantly, Benny worked closely with decision makers in the public sector and his work provided guidance for policy making. Over the years, he taught to diverse audiences in both academic and practice-driven environments.



Falko Feldchen, Vice President Procurement Solutions at o9 Solutions, brings over 25 years of expertise to the field of supply chain planning and supplier collaboration. His experience spans

diverse industries, including Industrial Manufacturing (IM), Fashion and Consumer Packaged Goods (CPG). Falko has held various roles, from product management to delivery and sales, while closely engaging with global customers. Especially his contribution in regards of effective supplier onboarding enabled companies to successfully transform the way they collaborate with their multi tier trading partners.



Tim Beckhoff is a Senior Director of Industry Solutions at o9 Solutions, specializing in supply chain risk and supplier collaboration. With extensive experience in procurement,

supply chain resilience, and digital transformation, Tim has led strategic initiatives at McKinsey & Company, where he helped shape supply chain risk management solutions and advised organizations on resilience strategies. His expertise spans SaaS implementation, procurement analytics, and supplier management across industries such as automotive, industrial manufacturing, and high-tech. Tim brings deep industry knowledge and a data-driven approach to optimizing supply chain operations.

Foreword

By Beda Bolzenius, Former President and CEO of Marelli, a global automotive supplier specializing in advanced technology solutions for vehicle lighting, electronics, powertrain, thermal management, and interior systems.

The automotive industry stands at a critical juncture. As data sharing becomes increasingly vital across all sectors, the automotive industry must not lag behind. The ability to share data seamlessly along the supply chain is increasingly a necessity. This report provides a timely examination of the current landscape of data-sharing practices within the European automotive sector, laying bare both the challenges we face and the immense opportunities that lie ahead.

The way we handle data sharing—its types, resolution, frequency, and accessibility—will determine our ability to create an interconnected ecosystem where data flows freely between manufacturers, suppliers, aftermarket actors and other stakeholders. Access to accurate, relevant, and real-time data has the power to revolutionize our decision-making processes, optimize supply chains, boost environmental performance, and drive innovation. Without it, we risk falling into a quagmire of uncertainty, escalating operational costs, and strategic inflexibility at a time when change is imminent and crucial. We are already witnessing a pivotal shift in our industry. What was once a bilateral exchange of supply chain data is now evolving into industry-wide initiatives that promise to implement new business models, foster circular economies, and spearhead sustainable innovation. This transformation is not just desirable—it is urgent.

This whitepaper outlines a strategic, phased approach to fostering data sharing within the automotive industry, with an emphasis on trust, transparency, and inclusivity. It recommends the adoption of high-impact, easily implementable use cases that can deliver rapid progress and build early trust among stakeholders. Establishing a transparent governance framework, managed by neutral entities, is also essential to ensure impartiality and foster global collaboration.

Furthermore, the whitepaper underscores the necessity of committing to fair play. This means establishing clear, pre-committed rules for data usage, backed by robust enforcement mechanisms to maintain trust and cooperation across the board. Finally, the creation of industry-wide standards—developed in close collaboration with governmental bodies—and the provision of support for smaller players will ensure that the benefits of data sharing are accessible to all. This approach will strengthen the entire ecosystem, ensuring that it is robust, scalable, and equitable.

Access to accurate, relevant, and real-time data has the power to revolutionize our decision-making processes, optimize supply chains, boost environmental performance, and drive innovation. Without it, we risk falling into a quagmire of uncertainty, escalating operational costs, and strategic inflexibility at a time when change is imminent and crucial.

The future of the automotive industry depends on our ability to embrace data sharing with urgency and purpose.

Modern supply chain technology is already playing a crucial role in breaking down traditional data silos, fostering transparency, and enabling real-time collaboration across diverse stakeholders. By leveraging tools that unify diverse data streams, allow for real-time alignment and interoperability, and enable faster and more flexible decision-making across supply chain stakeholders, organizations can finally overcome many of the structural and historical challenges of complexity and fragmentation.

The future of the automotive industry depends on our ability to embrace data sharing with urgency and purpose. By doing so, we can secure a competitive edge, foster innovation, and drive sustainability, setting the stage for a new era of growth and success in the automotive sector.



Beda Bolzenius has over 30 years of experience in leadership roles across the global automotive industry in Germany, the USA, Mexico, South Africa, China, and Japan.

His career was based on a strong technical background and operational experience in engineering, manufacturing, logistics, and supply chain management. He had leadership positions in market-leading companies like Bosch, running the Body Electronics division. After that, he joined Johnson Controls to run their global automotive business. He was Vice Chairman at JCI, located in Shanghai with the responsibility of driving growth in APAC. Most recently, Beda was President and CEO of the KKR-owned supplier Marelli, one of the ten largest automotive suppliers in the world. He led significant transformational initiatives, improving the competitive position of the divisions and companies and creating recognized value. These transformations were built on new planning and controlling tools going hand in hand with efficiency gains in all major business processes. He was honored twice by Automotive News as supplier chairman of the year.



Introduction

The automotive industry faces a critical crossroads requiring urgent action. As data sharing becomes indispensable across sectors, the automotive field must keep pace. Seamless data sharing along the supply chain is no longer optional—it is essential. This report examines the current data-sharing landscape in the European automotive sector, highlighting both challenges and transformative opportunities.

How data sharing is approached—its protocols, frequency, and accessibility—will shape our ability to build an interconnected ecosystem, enabling real-time data flow among manufacturers, suppliers, and aftermarket players. Access to precise, relevant data can revolutionize decision-making, optimize supply chains, enhance environmental performance, and drive innovation. Without it, mounting operational costs, strategic paralysis, and missed opportunities for crucial adaptation could prevail.

Supply chains are essential for creating value as they enable the assembly of complex systems by integrating components made worldwide. They start with raw material extraction, rely on intricate global distribution networks, and end with delivering goods and services to consumers—all without a central command overseeing the entire process. This successful human achievement is facing recurrent threats, as in recent years we have witnessed how these supply chains became increasingly long, complex, intertwined and subject to diverse uncertainties, disruptions and changes.

Uncertainties and change emerge from diverse sources relating to upstream supply challenges, downstream demand variations and more significant societal, economic and geo-political changes.

Seamless data sharing along the supply chain is no longer optional—it is essential.

Disruptions come in different flavours; ranging from small scale ones caused by traffic conditions, production issues, and weather impacts, all the way to major events affecting the flows of goods around the globe such as the war in the Ukraine and conflicts affecting maritime flows through the Suez Canal. Ultimately, we all note the emergence of major challenges such as access to critical raw materials and impact of climate change that could reshape more fundamentally supply chains. Stakeholders along supply chains need to alter and revise their strategies, operations and planning in light of this multitude of disruptions.

Undoubtedly, data sharing between stakeholders across an industry can increase transparency and help implement major changes. Accordingly, data sharing prevails as a pivotal strategy for driving efficiency, facilitating innovation, and advancing sustainability.

Our focus is the automotive industry. This industry is rapidly evolving and changing. Demand patterns vary dramatically from one year to the next. For instance, Audi, which has experienced 20 years of growth, peaking sales at 827k in 2016, saw its demand plummet to 569k in 2022, reflecting a drop of more than 30% in demand!¹

¹ Source: <https://www.goodcarbadcar.net/audi-europe-sales-figures/>

More profound are the technological changes in the industry and the speed with which they are transforming the industry: After relying on internal combustion technologies for several decades, in the flash of an eye the industry is experiencing a massive shift towards more environmentally friendly solutions that are shaking the industry and inducing a dramatic shift in the ecosystem. Indeed, sales of Battery Electric Vehicles (BEVs) and Plug-in Hybrid Electric Vehicle (PHEVs) have taken off in recent years, turbocharged by massive exports by Chinese makers.

On top of electrification, automotive companies are now harnessing elements of circular economy to reduce their environmental impact and mitigate raw materials risks.

As in other industries, data sharing along supply chains is becoming critical to the future of the automotive sector. This article outlines and reviews the landscape of data sharing practices in the European automotive sector, exploring challenges and opportunities it presents.

The degree to which data is shared—encompassing the type of data shared, its resolution and frequency, as well as the spread of accessibility—can play a key role in facilitating an interconnected network where data flows seamlessly between manufacturers, suppliers, aftermarket and other stakeholders. Having access to relevant, accurate, and up-to-date data could enhance decision-making, optimize supply chains, improve environmental performance and foster innovation. Without data sharing uncertainties and rigidities will prevail. This will cause further operational cost and strategic inflexibilities at a time where they are more than ever needed.

Having access to relevant, accurate, and up-to-date data could enhance decision-making, optimize supply chains, improve environmental performance and foster innovation.

Many obstacles hinder the spread of data sharing practices, in general, and in the automotive industry, in particular. These include, but are not limited to, the fear of disproportionate advantages captured by car manufacturers, disparities in terms of digital maturity, concerns over data privacy and security, and the significant investments required to upgrade the existing digital infrastructures. In this whitepaper, we elaborate on these challenges and share a series of recommendations to effectively implement data sharing across the automotive industry.

In the following sections, we explore the emerging solutions designed to facilitate more effective data sharing and discuss the barriers to its implementation. Moreover, we consider the roles of industry leaders and policymakers in shaping an environment where data-driven strategies can thrive, ultimately leading to a more resilient, sustainable, and competitive automotive industry. This investigation highlights the need for a collaborative approach to overcome challenges and seize the opportunities ahead. This whitepaper is based on a series of interviews with industry leaders and industry representatives.

Why data sharing?

Data sharing² along the automotive supply chain is not a new concept. Sharing data can streamline and improve planning at diverse levels relating primarily to operational and tactical decisions.

However, to effectively tackle new challenges and seize the opportunities offered by digital technologies, we need to expand the scope of data sharing. We first consider some traditional supply chain improvements made possible by sharing data.

Forecasted demand data is crucial for both operational and tactical planning. As demand can fluctuate significantly over time, being well-prepared for these changes is vital. These data help in planning production efficiently, including managing workforce needs, and they allow for better coordination with downstream suppliers. For instance, companies may need to identify alternative suppliers to ensure a steady supply. Additionally, changes in demand volumes may require adjustments in inventory management, such as stockpiling more raw materials or finished goods and securing additional transportation capacity.

Data related to product attributes, like quality, can trigger improvement efforts, lead to revisions in production plans, or even prompt the search for new suppliers. On the other hand, suppliers also send data back to their clients, which is crucial for making sourcing decisions, positioning inventory closer to production, and considering product redesigns.

While the benefits of data sharing mentioned earlier are mostly short- to medium-term in the automotive supply chain, the scope of data sharing must be greatly expanded to address emerging challenges and leverage new opportunities offered by digital technologies.

Data sharing also presents an opportunity for larger, long-term benefits by tackling critical industry challenges. These challenges include grand societal challenges, grand disruptions, grand complexity, and grand strategic shifts. We elaborate below.

Grand Societal Challenges

The battle against climate change, the pursuit of sustainability, and the principles of circularity are imposing new demands on the automotive industry. Sharing detailed information about vehicle components, materials, and manufacturing processes is key to enhancing environmental performance. By making data accessible, companies can empower repair, reuse, and recycling initiatives, contributing to the development of a more circular economy. This transparency helps in reducing waste and encourages the use of sustainable materials, ultimately supporting global sustainability goals.

Grand Disruptions

The automotive sector has been susceptible to disruptions, as vividly illustrated by the COVID-19 lockdowns, ongoing supply chain challenges, and rising geopolitical tensions. Information sharing in these contexts becomes a strategic asset, enabling companies to regain visibility into their operations and supply chains. Access to real-time data allows companies to respond swiftly to disruptions, adapt their strategies, and build resilience against future shocks. This shared information ecosystem helps companies develop a comprehensive understanding of risks and deploy more effective mitigation strategies.

² In what follows, we focus on data sharing. Information sharing reflects a different level of communication between companies that may go beyond the creation of data channels between different entities.

Grand Complexities

In today's VUCA (volatile, uncertain, complex, ambiguous) world, the automotive industry faces the challenge of managing complex and extended supply chains. Data sharing enhances transparency and streamlines operations, making it easier to manage the complexities inherent to global supply networks. Particularly, it helps identify and mitigate risks associated with small suppliers in lower tiers who might otherwise be overlooked. By sharing data, companies can have a better sense of the type and scope of disruptions they might be exposed to and plan accordingly. Further, in the event of disruptions, such data sharing can facilitate quick detection of disruptive events so that firms can activate their response actions as soon as possible. Ultimately, broader data sharing will support optimization of inventory levels and ensure smooth production flows, thus maintaining continuity even in turbulent times.

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Grand Strategic Shifts

As digital-native firms such as Tesla, BYD or Google entered the automotive space, they have adopted the latest digital technology to manage relationships with clients. In this context traditional manufacturers must adapt quickly to remain competitive. These companies are adopting solutions that are at the forefront of digital technology to offer innovative products and services to end consumers, and even more important to manage relationships with their different stakeholders. Among others, these new players are looking at a longer-term perspective in which they aim to offer mobility as a service. Data sharing can be used by legacy companies to enhance customer experiences and operational efficiencies.

For the automotive industry, data sharing is not just a technical exercise; it is a strategic imperative that supports sustainability, enhances resilience, simplifies operations, and fosters competitive parity.

Sharing operational data across platforms can lead to innovations in product development, customer interaction, and after-sales service, ensuring that established players can compete effectively with newcomers who are unencumbered by legacy processes and systems.

In conclusion, for the automotive industry, data sharing is not just a technical exercise; it is a strategic imperative that supports sustainability, enhances resilience, simplifies operations, and fosters competitive parity. It facilitates a collaborative environment where companies, regardless of their size or heritage, can innovate and thrive in the face of societal shifts, global disruptions, and complex challenges.



The evolving landscape of data sharing within the automotive value chain

Data sharing in the automotive industry is evolving along two key dimensions. It is moving from bilateral exchange of supply chain data towards industrywide data sharing initiatives that help implement new business models, circular flows and sustainable innovation. These two dimensions are depicted in Figure 1.

The first dimension (depicted on the Y-axis) extends the reach of data sharing along a vertical logic to span further tiers within both new vehicle supply chains and aftermarket supply networks. This could result in a holistic interconnection across the entire industry by encompassing a vast array of players, including original equipment manufacturers (OEMs), large tier one suppliers, small-scale component suppliers, aftermarket service providers, part distributors and recyclers.

The second dimension (featured on the X-axis) concerns with the nature of the data exchanged. We are witnessing a shift that goes beyond traditional supply chain data such as capacity, inventory levels, lead time and quality information.

Now, there is a growing emphasis on sharing operational data that supports for instance "Equipment as a Service" models and "Maintenance as a Service" frameworks.

Furthermore, data sharing is expected to enable the implementation of circular flows and the enhancement of sustainability practices within the industry. This will require more horizontal data sharing across the whole industry. By embracing this two-dimensional expansion, the automotive sector is moving towards the creation of a digital twin for every vehicle and asset, paving the way for new performance improvement opportunities and product innovation across the entire automotive ecosystem.

We next review Catena-X, a forward-looking government-funded initiative in the context of the automotive industry established around the notion of data sharing.

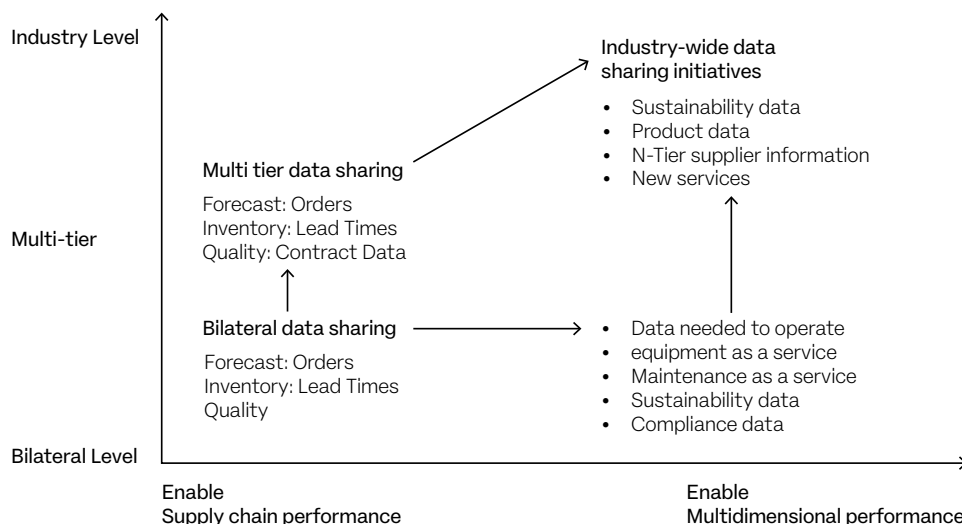


Figure 1: The evolving landscape of data sharing within the automotive value chain

Catena-X: A data sharing initiative

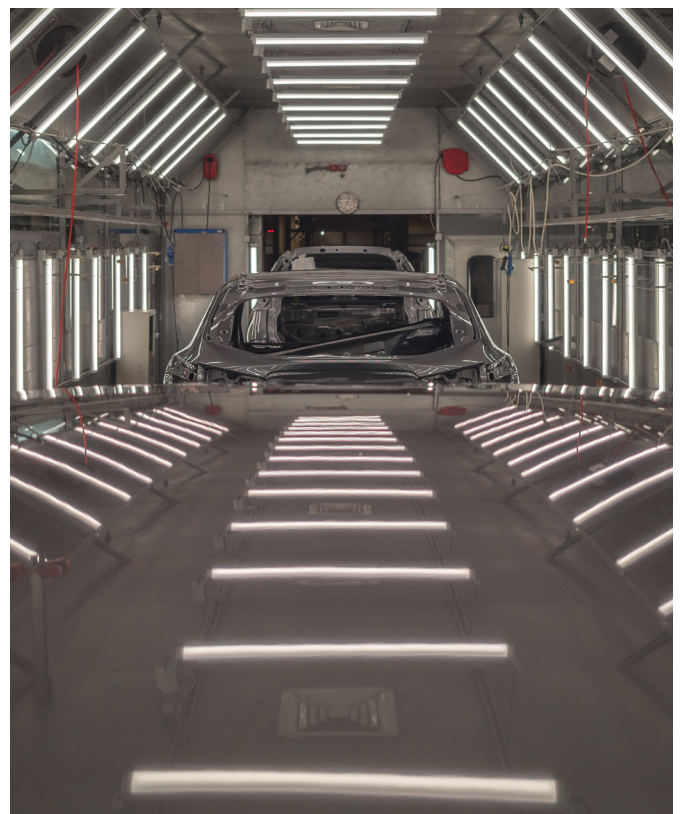
Catena-X is an initiative that aims at creating a digital infrastructure to facilitate secure and efficient data exchange along the entire automotive value chain. Established in 2021, Catena-X is an initiative funded by the German Federal Ministry for Economic Affairs and Climate Action. This ecosystem brings together automotive manufacturers, suppliers, dealer associations, and digital solution providers, to facilitate data exchange along the automotive value chain. This digital infrastructure is designed as a robust, open, and interoperable data ecosystem that breaks down data silos and to support multiple data sharing use cases. At its core, this alliance facilitates development and use of common standards so that all technologies, components, and processes are developed and deployed according to a system of uniform rules.

Evidently, the scope of Catena-X user cases is fairly expansive as it intends to cover various dimensions and types of cooperative data sharing across different players in this sector. The nature of data sharing encapsulates both vertical and horizontal data sharing as per Figure 1. Examples of the former include demand and capacity management, quality, and traceability use cases, whereas examples of the latter include sustainability and circular economy.

Catena-X Uses cases

Use cases enabled by the Catena-X digital infrastructure are summarised in the following table on the next page.

Evidently, the scope of Catena-X user cases is fairly expansive as it intends to cover various dimensions and types of cooperative data sharing across different players in this sector. The nature of data sharing encapsulates both vertical and horizontal data sharing as per Figure 1. Examples of the former include demand and capacity management, quality, and traceability use cases, whereas examples of the latter include sustainability and circular economy.



Type of use case	Description
Traceability	Achieving end-to-end traceability across the entire automotive value chain, enabling stakeholders to track the lifecycle of products and components from production to recycling.
Quality Management	Maintaining and improving product quality across the supply chain, leveraging data to identify and address quality issues early.
Sustainability	Standardizing and sharing carbon footprint data across the supply chain for different components and products.
Circular Economy	Supporting the reuse and recycling of materials, promoting sustainability and resource efficiency along the automotive value chain.
Demand and Capacity Management	Facilitating demand planning and capacity management along the supply chain to avoid or solve production bottlenecks in a tactical horizon of 1-2 years.
Business Partner Data Management	Managing and standardizing data exchange between business partners to ensure smooth collaboration and data integrity.
Modular Production	Supporting flexible and reliable production, enabling adaptation to change in demand.
Online Control and Simulation	Performing collaborative simulation along the supply chain by combining plant simulations with simulations of external logistics over multiple tiers.
Manufacturing as a Service (MaaS)	Facilitating the use of free capacity and resources by bringing prospective customers, suppliers together.
Predictive Unit Realtime Information Service	Delivering real-time predictive analytics to detect supply chain issues earlier and initiate solution-finding more swiftly.

How Catena-X leads the implementation of Data sharing

Catena-X is characterised by key organisational features and technical features. Catena-X is an ecosystem of partners that include over 100 companies including major automakers, suppliers, technology providers and others. This collaborative ecosystem develops the digital infrastructure and develops specific data sharing protocols for each use case. While Catena-X originated within the German automotive industry, it aims to build an international data ecosystem that includes all industry players. Diverse private and not-for-profit organisations can operate data exchanges on top of the catena-X infrastructure. Today only one operator has been approved in this role by Catena-X: Cofinity-X, which was established as a joint venture by German automotive companies.

The development of Catena-X is based on open-source principles, allowing for transparent development and testing while facilitating the creation of low-cost connectors.



Catena-X uses the International Data Spaces (IDS) standard as a core component for system integration. This ensures technical interoperability by connecting the data ecosystem participants together. The development of Catena-X is based on open-source principles, allowing for transparent development and testing while facilitating the creation of low-cost connectors.

The initiative emphasizes data sovereignty, allowing participants to maintain control over their data while sharing it. This is achieved thanks to diverse technologies that can for instance allow data analysis without direct disclosure. Catena-X has developed a certification framework based on a modular system for different roles and responsibilities within the Data Space. This framework ensures that services meet the standards set by Catena-X.

Obstacles to data sharing

Our research has highlighted several obstacles to data sharing within the automotive supply chain. Here is a concise description of the major type of obstacles identified along with short descriptions. These obstacles are classified into 4 primary categories, with governance being the foundation, compliance and trust forming the core elements, and value being the ultimate objective.

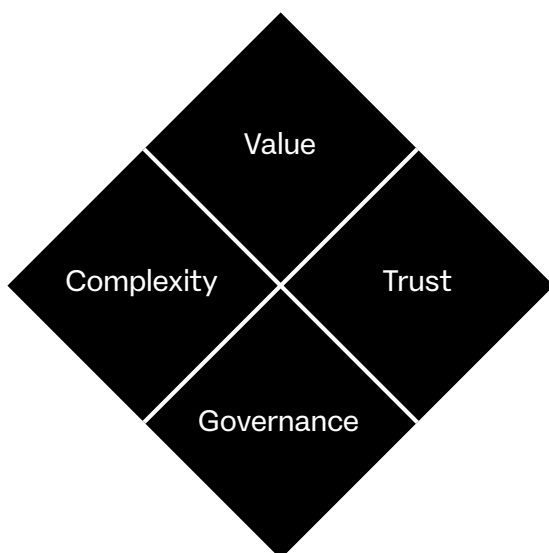


Figure 2: The 4 foundations for successful data sharing

Value creation from data sharing

Concerns on Return on Investment and Selective Value Creation

There are significant concerns about achieving a sufficient return on investment from data sharing initiatives, especially when the benefits are not immediately clear and tangible. It is often difficult to explain how data sharing can create direct win-win outcomes for all parties involved. Without clear benefits and a critical mass of successful use cases to encourage widespread adoption, motivating companies remains challenging.

Certain applications might present more apparent benefits and should, therefore, encourage participation.

Time Lag and data Incompleteness

Sharing data is often seen as a positive step, yet there remains uncertainty about its value creation. Participants in a data sharing initiative cannot be sure they will receive all the necessary data to create value. Additionally, they do not know when the data needed will become available. Beyond obtaining the data, they must also invest further resources to process and manipulate it to create value. The time between deciding to join a data sharing initiative and when one fully benefits from this data can be lengthy. These concerns can dampen the desire to share and participate. Here again, certain applications might present more rapid benefits and should encourage participation.

Cost Uncertainty

Finally, even when a company commits to participate and engage in a data sharing initiative, the full scope of effort required for implementation may not be entirely clear. Moreover, the costs and uncertainties associated with transforming data into insights are still very hard to assess. Pioneers will need to help followers overcome these challenges by sharing their lessons learned.

Complexity of data sharing

Lack of Comprehensive Industry Engagement

Achieving coverage across entire value chains—from the early stages to the end-user—is essential for some use cases yet challenging to secure. As supply chains consist of numerous participants, the risk of incomplete participation may render some initiatives ineffective. While some data sharing initiatives can generate value with only a few companies involved, others require broader participation across multiple tiers.

Unrealistic Demands and Complexity in Deep Tiers

Some executives we interviewed noted that today, OEMs, particularly car manufacturers, sometimes have unclear or unrealistic expectations regarding the data they request. This complicates compliance and can lead to inefficiencies in data provision. This also creates inefficiencies and duplicated efforts. Additionally, OEMs sometimes require data from deep within the supply chain, which can be time-consuming and complex to collect. This challenge is exacerbated when the data must pass through multiple suppliers, each with different systems and standards for data management. Despite new data sharing initiatives, such requests might still be passed to suppliers using very basic data collection tools.

Fragmentation of Initiatives

The existence of too many separate initiatives can dilute focus and hinder the creation of a unified data sharing. This fragmentation makes it difficult for industries to converge on a common set of standards and practices for data exchange. The failure to develop standards that are widely accepted and implemented could stifle the initiative. Standards are also essential for achieving data consistency. Without uniform data sharing standards and technical interoperability across diverse systems, accessing good quality data will remain challenging. The financial and operational challenges for smaller suppliers, particularly those without advanced systems, are likely to persist unless specific initiatives address them.

This is even more important in a context where many companies do not fully understand the nature of data sharing, representing a significant hurdle due to fundamental misunderstandings or a lack of awareness about the importance of interoperable data exchange for business.

Lack of Trust and Power Asymmetries

Intellectual Property Concerns and Lack of Fair Play

Protecting intellectual property (IP) remains a primary concern among the individuals we interviewed. Companies often hesitate to share proprietary knowledge or sensitive data, fearing it could jeopardize their competitive edge. Furthermore, data-sharing initiatives might allow some companies within the industry to gain what could be perceived as an unfair competitive advantage, while others may benefit minimally or not at all. It is crucial to ensure that data sharing does not lead to competitive harm or exploitation. However, with the ongoing uncertainties in the automotive industry, it is challenging to prevent some data-sharing initiatives from having negative unintended consequences for certain participants. For example, not all companies will derive the same benefits and opportunities from adopting and participating in the circular economy logic.

Relational Dynamics and Prevailing Scepticism

During our interviews, we also encountered recurring scepticism about the possibility of harmonious collaboration on a large scale within the automotive industry. This scepticism stems from a long history of events that have eroded trust among industry participants, which can diminish companies' willingness to commit resources to data sharing. Moreover, trust issues and cultural differences among various stakeholders across the automotive supply chain pose significant barriers to effective data sharing. With industry participants originating from diverse cultural backgrounds and varying in size, reaching a widespread consensus is inherently challenging.

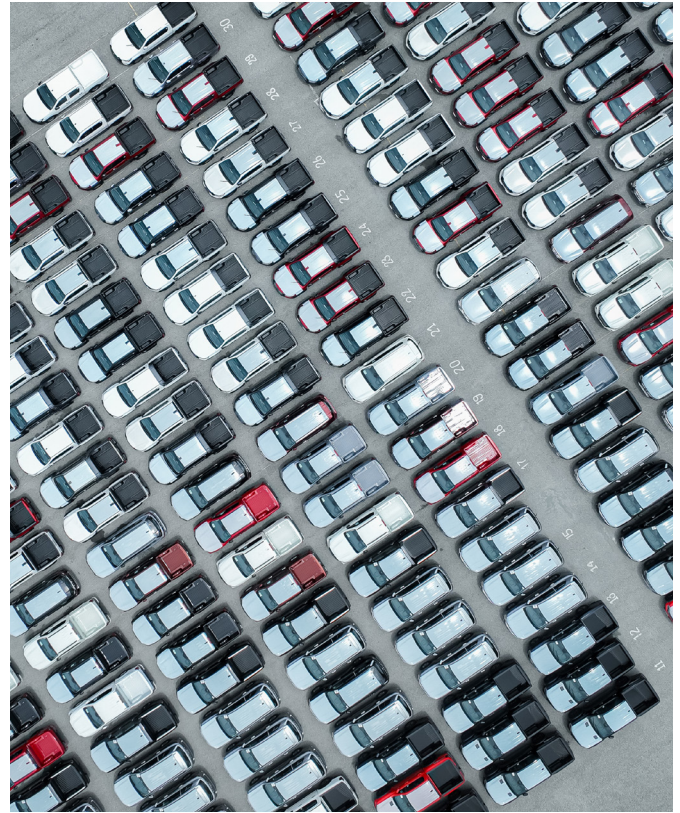
Governance related obstacles

Concerns related to the ecosystem leadership and decision-making

Reflecting on recent experience, some of the people we interviewed expressed concerns about an over-emphasis on IT infrastructure and a multiplication of use cases at the expense of addressing real-world and immediate supply chain challenges. The approach to deciding which use cases should be prioritised, which data can be shared, under what format it needs to be shared and to what purpose it can be utilised, needs to be collective, involving OEMs, suppliers, and other stakeholders. This collaborative decision-making process is essential for ensuring that the use cases developed are relevant and provide mutual benefits. However, trusting the decisions of a few companies who define data sharing protocols is regarded as a challenge in the automotive industry. Ensuring fair representation and effective decision-making in such a setting is difficult. There are fears that collaborative ecosystems, even if they are orchestrated by Not-for-profit organisations, may lack the clear strategic orientation and the required transparency to drive the necessary changes. Some of the executives we interviewed said they would never work with data sharing operators who might have a commercial orientation. They see this as a risk that would prevent them from engaging with such initiatives.

Limited proper Regulatory Incentives

Governance is not only a matter of ecosystem orchestration; Policy-makers and regulatory bodies also play a role. They can mandate, finance and control the adoption of processes, structures, obligations and the delivery of results along supply chains. They contribute to establish direction, control, and coordination within and across industries.



Without some form of regulatory push, the voluntary adoption of data sharing might be insufficient. A strong regulatory initiative may be necessary to jump-start broader compliance and motivate companies to invest in necessary technologies for data sharing. The government's role in setting and enforcing standards might become necessary to help start the data sharing process.

Recommendations

Recommendation #1: Create a progressive adoption Roadmap

To facilitate data sharing within the automotive industry, we recommend creating a strategic implementation path prioritizing high-value, quickly realizable benefits and rapid deployment. Initially, focus on use cases that offer immediate advantages in terms of risk mitigation, capacity enhancement, and quality improvement.

This approach not only lays a solid foundation but also demonstrates the tangible benefits of data sharing, fostering early trust and collaboration among stakeholders. As these initial use cases prove successful, we would suggest to progressively involve further tiers in the ecosystem and address regulatory-related use cases, such as those concerning sustainability. This phased engagement allows for the gradual integration of more complex and regulatory-driven applications, ensuring a robust and compliant engagement.

To facilitate data sharing within the automotive industry, we recommend creating a strategic implementation path prioritizing high-value, quickly realizable benefits and rapid deployment.

Finally, once the foundational infrastructure is established and trust is built, shift the focus towards implementing more intricate applications. This strategic progression ensures sustained collaboration, materialization of benefits, and reinforcement of trust within the ecosystem.

By following this methodical approach, the automotive industry can achieve a scalable, efficient, and trustworthy data-sharing environment.

An important and critical consideration that needs to be taken into account to ensure successful implementation of this recommendation is sharing foresight. Specifically, it is absolutely necessary to establish data sharing foundations in such a way that they are capable of facilitating horizontal data sharing at a later stage.

This means that the stakeholders must envision the template for broader data sharing beyond the immediate vertical application so as to encourage other stakeholders—horizontal counterparts—to engage in such expansions.

Recommendation #2: Establishing a Radically Transparent Governance Framework

To ensure effective governance and data sharing within the automotive industry, it is key to establish a radically transparent governance structure. This governance should be managed by non-commercial entities to maintain impartiality and avoid conflicts of interest.

Diverse Representation: Ensure that the governing organizations include representatives from various companies and countries. This diverse representation fosters a balanced perspective and encourages global collaboration. Ensuring that these representatives come from a mix of industry stakeholders, including manufacturers, suppliers, and technology providers, is essential for holistic governance.

Transparent Communication: Extensively communicate details about the use cases, including the entities involved, progress levels, and

the benefits realized. Regular updates on who is involved, where they operate, and the effort invested are essential for building trust. This includes clear, frequent reports on the benefits each participant receives, ensuring that all stakeholders see tangible returns from their engagement.

Annual Conference: Host regular conferences to communicate progress, demonstrate commitment, and recognize the contributions of all members. This event should serve as a platform to showcase achievements, discuss challenges, and outline future plans. It also offers a chance to publicize clear pre-commitment rules about data usage and control mechanisms.

Publicly Address Challenges: Acknowledge and address challenges openly. Transparency about difficulties and how they are being managed enhances credibility and fosters a problem-solving culture. This includes establishing and publicizing clear rules about data usage, along with mechanisms to control, report, and address any misuse of data sharing.

Benefit Demonstration Mechanisms: Develop mechanisms over time to illustrate the benefits of each use case. Clear demonstrations of value encourage broader participation and sustained engagement. This includes making sure that every participant gains some benefit from their involvement, promoting fair play within the ecosystem.

Key Group Representation: Ensure each participating company is represented by a dedicated group of individuals who facilitate implementation and contribute to the use cases. This group should include IT, operations, and strategy representatives to cover all aspects of integration. These representatives are pivotal in ensuring that the company's interests and contributions are aligned with the overall goals of the data-sharing initiative.

Neutral Governance Figures: Incorporate neutral and unbiased figures in governance roles, such as academic experts, government representatives, and industry veterans respected across the board.

Their impartial stance helps maintain the integrity of the governance framework. These figures can also play a crucial role in moderating discussions, resolving conflicts, and ensuring that the data sharing remains fair and beneficial for all parties involved.

Recommendation #3: Commit to fair play and non-commercial interests

Ensuring fairness within data-sharing ecosystems is of very importance. This begins with a commitment to transparency regarding the benefits each participant receives. By openly communicating how each entity gains from their engagement, participants in data sharing initiatives build trust and demonstrate the tangible value of participation. It is key that every participant, regardless of their size or role, experiences some form of advantage from their involvement. This could range from access to critical data insights, improved operational efficiencies, enhanced competitive positioning, or other strategic benefits.

To uphold this commitment to fairness, participants must establish clear, pre-committed rules about data usage. These rules should be developed collaboratively, taking into account the diverse needs and concerns of all stakeholders. The guidelines should cover various aspects of data sharing, including data access protocols, usage rights, data security measures, and privacy safeguards. By having these rules in place from the outset, we create a predictable and stable environment that encourages participation and reduces the potential for conflicts.

Enforcement mechanisms are equally important to ensure compliance with these rules. Robust systems should be put in place to monitor data usage, detect any deviations or misuse, and address them promptly. This could involve regular audits, automated monitoring tools, and a transparent reporting system where violations can be reported and reviewed. In cases of misuse, there should be clearly defined consequences or corrective actions to reinforce the seriousness of these rules.

This might include penalties, suspension of access rights, or other remedial measures.

This comprehensive approach not only fosters trust among participants but also ensures that the data-sharing ecosystem remains robust, transparent, and equitable. When participants see that the rules are enforced fairly and consistently, their confidence in the system grows. This, in turn, encourages broader participation and collaboration, as stakeholders feel secure that their data will be used appropriately and that they will benefit from their contributions. Furthermore, by committing to fair play, participants can create a culture of mutual respect and cooperation. Participants are more likely to share high-quality data and engage in meaningful collaborations when they believe that the system is fair and that their contributions are valued. Over time, this can lead to more innovative solutions, enhanced data quality, and greater overall benefits for the entire ecosystem.

Recommendation #4: Create a True Set of Standards and Reduce Costs

To establish a robust and cost-effective data-sharing ecosystem, it is essential to create a comprehensive set of standards that can be universally adopted across the industry.

Even if vertical data sharing can offer short-term benefits and good entry point, it needs to be built on standards that facilitate horizontal data sharing at a later stage (as per Recommendation #1).

This involves working closely with governmental bodies to champion the emergence of an industry-wide initiative. By collaborating with government agencies, we can ensure that these standards are not only widely accepted but also enforced, providing a solid foundation for consistent and reliable data sharing.



Engaging governmental bodies in this initiative is critical because it brings regulatory support and legitimacy to the standards. Government involvement can facilitate the creation of policies that mandate adherence to these standards, ensuring compliance across the industry. This regulatory backing can also help align national and international standards, promoting global interoperability and simplifying cross-border data exchanges. Furthermore, governmental support can provide the necessary legal frameworks to protect data privacy and security, addressing one of the key concerns of data sharing.

It is crucial to stay away from commercial interests during the development of the infrastructure. By keeping the development process free from commercial biases, we ensure that the resulting standards and infrastructure serve the collective good rather than individual business interests. This non-commercial approach promotes fairness and equality, preventing larger, more influential companies from dictating terms that could disadvantage smaller players.

It also encourages broader participation, as all stakeholders can trust that the standards are designed to benefit the entire industry rather than a select few.

To make the transition to these standards more accessible, it is important to collectively subsidize the implementation, particularly for small and medium-sized enterprises (SMEs) and lower-tier suppliers. These entities often lack the resources to adopt new technologies and standards independently. By providing financial support and technical assistance, we can help these smaller players integrate into the data-sharing ecosystem. This inclusivity ensures that the benefits of data sharing are distributed across the entire supply chain, enhancing overall industry efficiency and resilience.

Subsidizing the implementation for SMEs and lower-tier suppliers can take various forms. Direct financial aid, grants, or low-interest loans can alleviate the initial cost burden. Additionally, providing access to shared resources, such as training programs and technical support, can help these companies develop the necessary skills and infrastructure. By investing in the capabilities of smaller players, the industry as a whole becomes more robust, as these entities often play critical roles in the supply chain.

In conclusion, establishing a true set of standards and reducing costs involves close collaboration with governmental bodies, maintaining a non-commercial development approach, and providing subsidies to support SMEs and lower-tier suppliers. This comprehensive strategy ensures the creation of a fair, efficient, and inclusive data-sharing ecosystem that benefits all participants.



Case study: How a Leading Automotive OEMs is Solving the Supplier Collaboration Challenge

Starting Point

Like other large OEMs, the company in this case study faced challenges in collaborating with its suppliers. Material Requirements Planning (MRP) outputs were shared via Electronic Data Interchange (EDI) with the suppliers, but mismatches between the requested and committed quantities were detected and resolved manually. Moreover, with ongoing global crises and shortages, multi-tier visibility has become a persistent concern, attracting the attention of the board-room. Specifically, in the absence of deep-tier transparency, when a shortage was communicated by a tier-1 supplier, it was often too late to react.

The OEM identified insufficient data sharing with their tier-1 suppliers and non-existent multi-tier data sharing as the root cause for the lag between the time a supply chain disruption took place and the time the planning teams at the OEM became aware of it. This had three major profit and loss (P&L)-relevant implications for the OEM:

- 1. Revenue Loss:** When the unavailability of critical components was identified too late, the OEM was losing sales and, hence, revenue.
- 2. Production Rescheduling Costs:** Shortages would require rescheduling of production, which was not only costly and time-consuming, but also carried an inherent risk of production line stops.

- 3. Delayed Decision-Making:** Lack of multi-tier visibility would easily result in delayed decisions on reactive actions, ultimately leading to higher costs (e.g., expedites, broker parts) or lost sales (i.e., the inability to produce a certain finished vehicle and redirect resources to other vehicles).

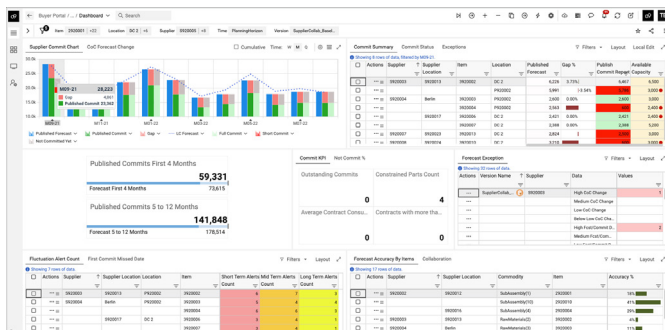
To address these challenges, the OEM aspired to transform the forecasting and capacity planning process with its multi-tier supplier network and targeted to provide a one year demand forecast with rolling updates on a weekly basis. As such, the capacity planning process was envisioned as a tool to support mid-term planning process and further serve as a mechanism to address short-term needs. The forecast and data sharing capability would not only improve internal planning, but would help suppliers to adjust their own capacity planning to the demands of the OEM. The ability to have a planning windows of 1-2 years with potential weekly breakdown becomes even more relevant from a broader supply chain perspective. Indeed, a capacity shortage at any link of the supply chain can disrupt multiple tiers of the supply chain and, accordingly, may lead to revenue loss for multiple participants.

Solution Requirements

From the outset, the OEM realized that solving this issue required a platform solution that could provide a common ground for all involved parties. The OEM aimed for several core benefits:

- **Multi-Tier Transparency:** Achieving transparency on multi-tier shortages for critical components.
- **Increased Automation:** Enhancing automation of the alignment process by which the OEM places requests to the suppliers followed by the confirmation of the suppliers (aka the request-commit process).
- **Quick Identification of Deviations:** Being able to quickly and efficiently identify deviations in the request-commit process.
- **Standardized Toolset:** Having a standardized toolset to resolve such deviations.

With these criteria in mind, the OEM initiated an innovative selection process to pick the solution and its provider. Unlike traditional methods where the OEM solely drives the decision, the process included three of their most important suppliers. These suppliers were actively involved in evaluating potential solutions, providing feedback on demonstrations, and assessing proof of concept (POC) outputs.



Buyer dashboard, showing match between shared forecast and responses of supplier commits, raising alerts where shortages are anticipated and need additional collaboration between customer and supplier

This collaborative approach ensured that the selected solution would meet the needs of both the OEM and its suppliers, creating buy-in from the parties involved before the program even started. This resulted in a platform with several features:

- **Single web-based Platform:** Having one platform in place that allows for multi-tier scenario modelling and accommodates the specific needs of the OEM without significant customization.
- **Automation:** A tool that facilitates creation of rules and policies so that once certain requests were made, the supplier could commit immediately without human involvement. For instance, if a request is within certain thresholds, it is automatically committed by suppliers. Thus, only deviations beyond the pre-defined rule are highlighted and trigger manual intervention.
- **Triage Rooms:** Once issues are surfaced, (standardized) triage rooms are opened to facilitate direct interaction with suppliers. These triage rooms are customized views on the platform that bundle all information related to the issue (demand-capacity mismatch, lead-time mismatch, quality problems) and the communication between the involved parties in one place. The parties then use these triage rooms to discuss and agree counter measures and track their implementation and their effects on the issue at hand in real time on the platform.
- **Interoperability:** Ensuring ease of use for the suppliers by allowing direct data exchange via the platform enabling extraction of data to/from other commonly used tools and systems. This would ensure that existing models of EDI can continue to operate.
- **Flexibility and Scalability:** To adapt to future requirements, the tool is able to adapt to changes in supply chain configurations, new regulations and protocols. In addition, the platform can model supply chains in an unrestricted manner allowing it to scale to larger multi-tier networks and to millions of part numbers.

Key Success Factors

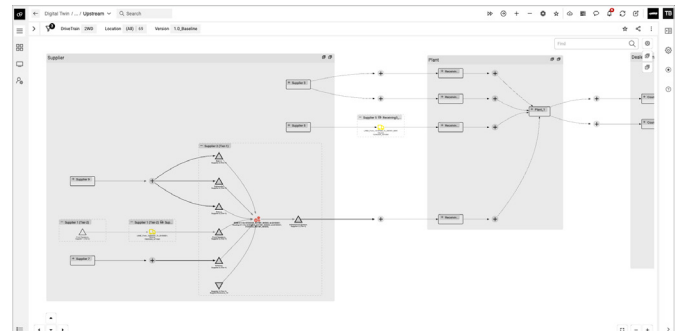
Successfully collaborating with suppliers requires more than a transactional relationship. In this case, four main factors addressing the main challenges of data sharing and collaboration contributed to the project's resounding success:

1. Value: Creating a Win-Win Use Case

Collaboration works best if all parties benefit from the efforts. OEMs cannot impose any more requests on their suppliers. In this case, suppliers appreciated the collaborative planning process which is achieved via faster identification of deviations and the hands-on collaboration feature via triage rooms. Ultimately, this saves planners on the supplier side a significant amount of time and allows suppliers to steer their capacities more effectively in case of shortages. The benefits here clearly outweighed the effort needed to leverage an additional tool for collaboration.

2. Trust: Involving suppliers in the process of selecting a collaboration platform

By including key suppliers in the selection process, the OEM ensured that the chosen solution would meet the needs of the parties involved, and ultimately increased the chances of adoption. Three key suppliers were included to drive a joint selection process. The OEM relied and acted upon the supplier feedback on demonstrators and proof-of-concept. This is a rather uncommon approach in the automotive OEM world, but involving suppliers in the process significantly contributed to the program's success, as it created some buy-in from suppliers prior to the program start.



Modelling of tier-n supply chain from customer plant to tier-n supplier, including BOM-level granularity and transportation channels

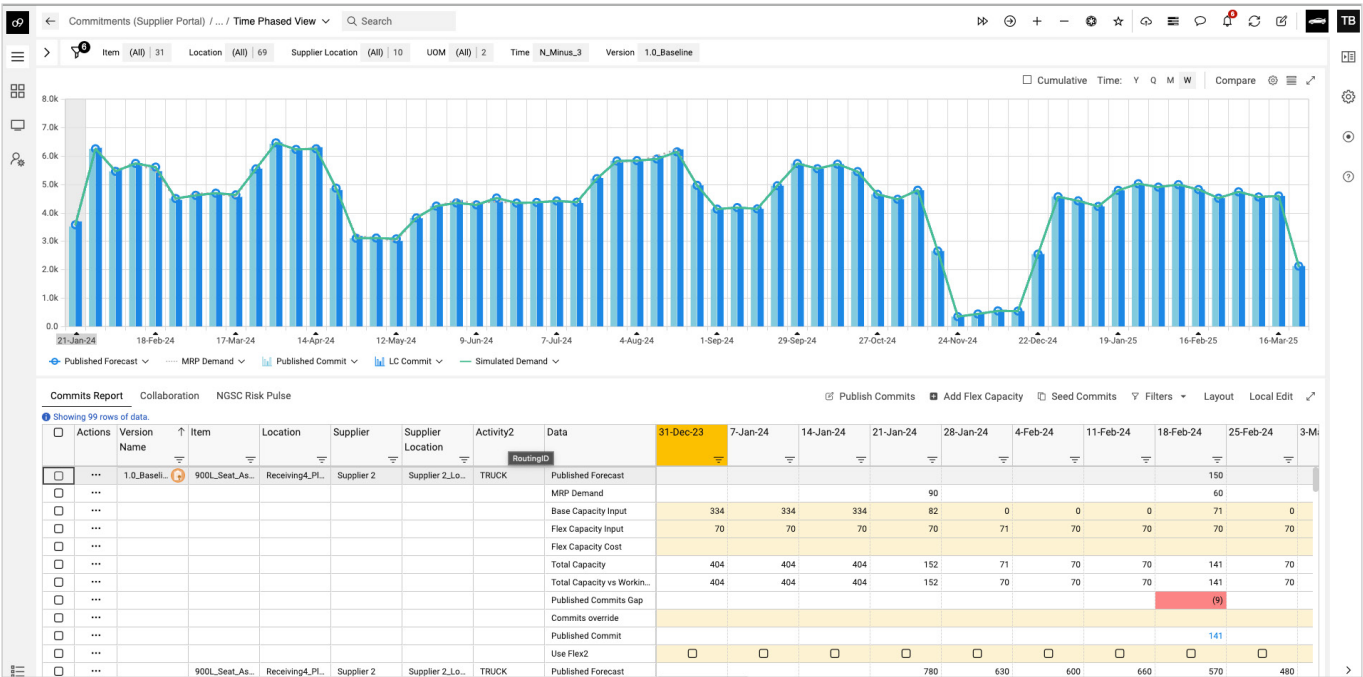
3. Complexity: Focus on Core Suppliers

Some OEMs ask their software vendors to include their entire supplier base, to map the multi-tier network and derive implications from any deviations or shortage in supply. Such a process requires significant efforts to achieve multi-tier mapping, to onboard suppliers and engaging them in adopting the solution. In this case study, the OEM took the deliberate decision to focus only on 250 core suppliers (who account for 80% of the supply issues) in the first stage to create value with them. The targeted approach facilitated solution design and allowed for the solution to go live within 6 months.

4. Governance: Data sovereignty and trusted transfer protocols

The data exchange was limited to demand forecasts (from the OEM) and capacity data (from the suppliers). This focus rapidly helped build a mutually beneficial solution. It also enabled stirring away from data sovereignty concerns as suppliers fully stay in control of the data they share and to which extent they share this data automatically.

The solution itself functions as the central platform for the data exchange and data security is assured through restrictive role based data access and adhering to the highest standards of data and internet security, regularly audited and made transparent by independent third party accessors.



Supplier input screen for capacity collaboration, to review and match forecasts and quote additional costs in cases where contracted capacities are exceeded

Future Considerations

The existing solution is only a starting point. The next steps include integrating with Catena-X to facilitate scalable data exchange. This integration has the potential to scale and speed up the adoption of the newly established collaboration processes, as more and more suppliers will have data interfaces for mutual data exchange already in place, and onboarding will not require convincing every single supplier that a secure and trustable data governance is in place.

In a market with tightening competition, being the OEM with the most cost efficient and resilient supply chain will become one of the critical success factors.

Additionally, the OEM is considering extending the scope of the collaboration to also include inventories. As soon as suppliers are convinced of the value-add of such collaboration, the extension and deepening of data sharing becomes easier and scale faster.

In a market with tightening competition, being the OEM with the most cost efficient and resilient supply chain will become one of the critical success factors. Cross company data sharing and collaboration over multiple tiers of the supply chain, enabled by an adaptive and scalable platform that integrates into the planning systems of the connected companies is one of the key requirements to drive this..

