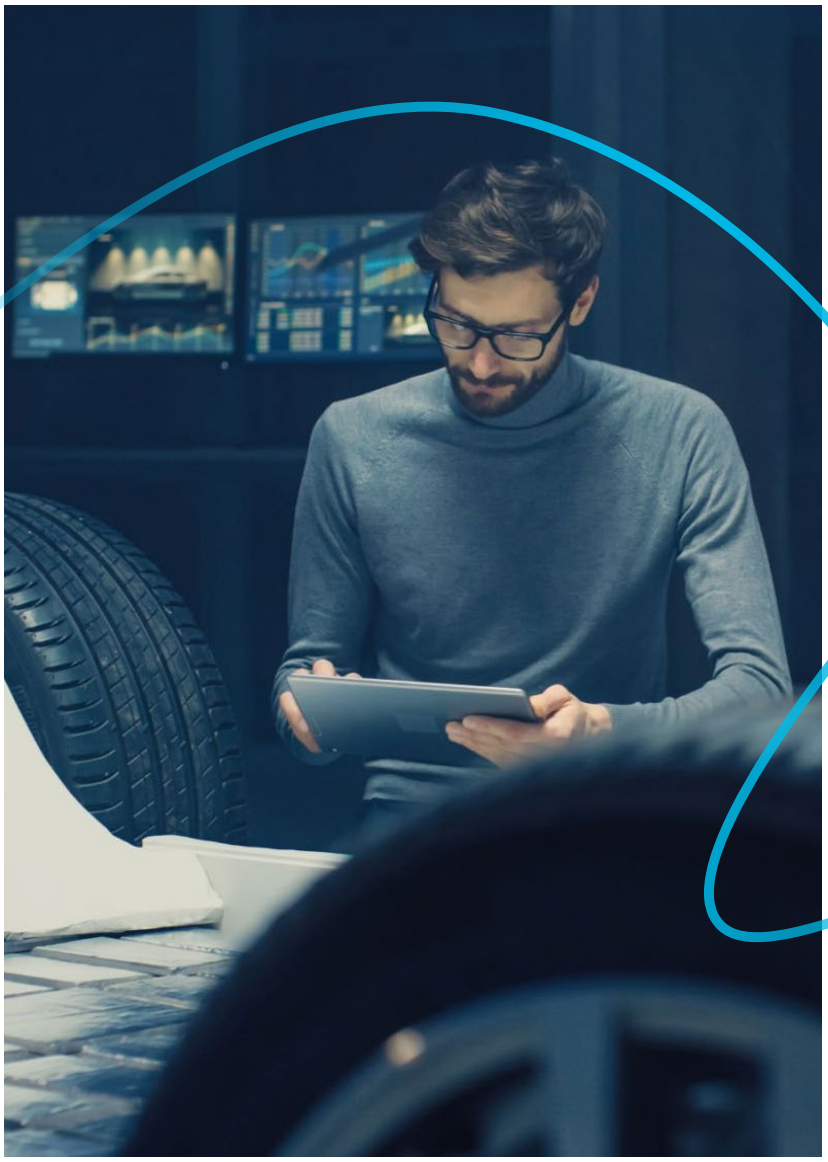
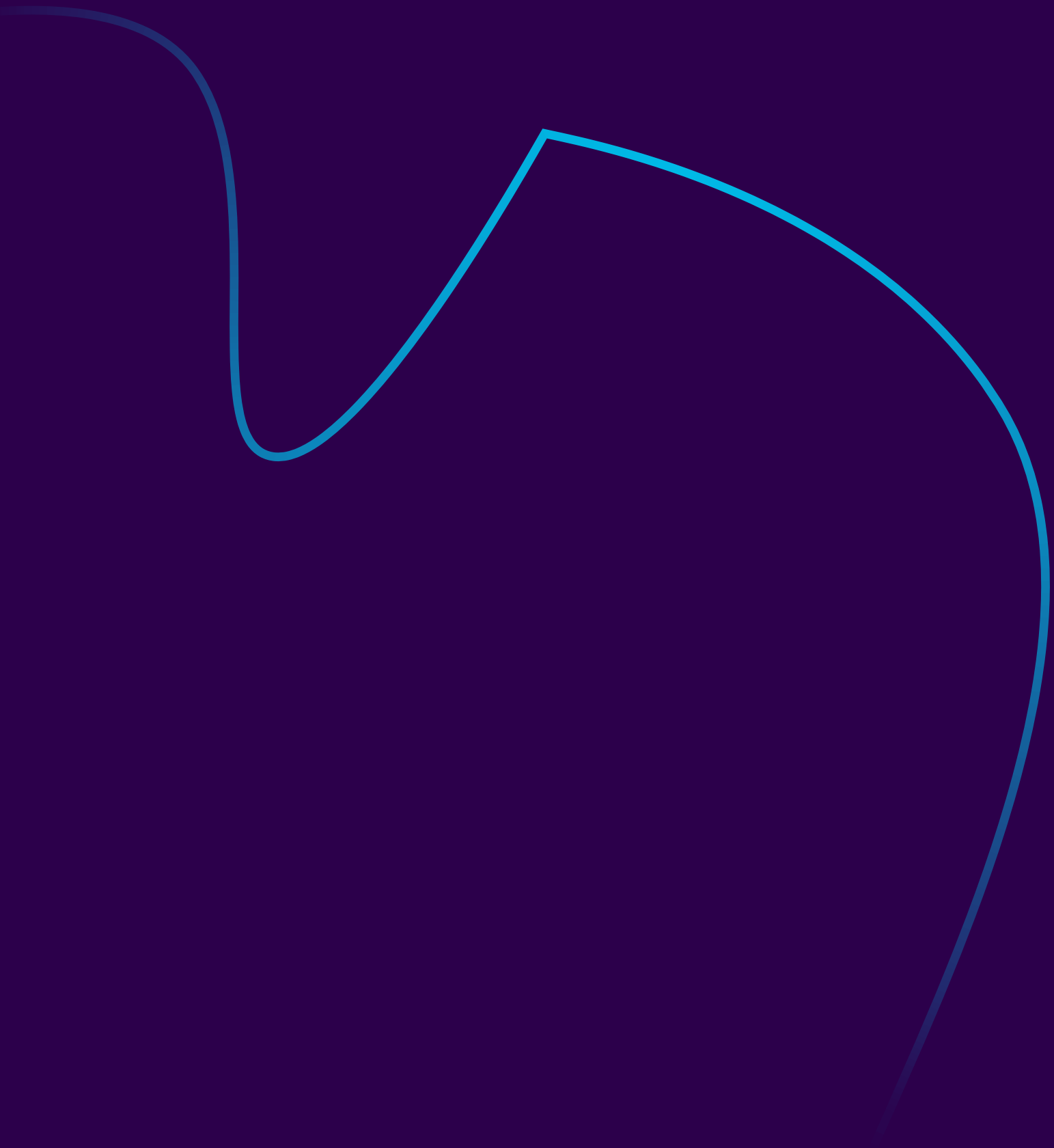
GAIN COMPETITIVE ADVANTAGE IN THE NEW ERA OF AUTOMOTIVE WITH MODERN DATA ECOSYSTEMS





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EXECUTIVE SUMMARY

As data is created everywhere across the automotive product life cycle, leveraging data assets becomes the main differentiator for business success.

But simply tapping into the data inventory within your organization will not be enough to create new business models and boost innovation in the automotive sector. Projects like smart manufacturing, customer-centric experience, sustainable supply chain, and shared mobility require more than just your organization's data to be successful.

Data exchange across several market participants like manufacturers, OEMs, and Tier 1 suppliers is the first step into data ecosystems that will scale collaboration along the value chain and beyond. Data ecosystems form partnerships between the participants to share and manage data to create additional value. As collaborative data supply chains, they can unlock a whole new world of business insights and data-driven services. The higher the level of collaboration and data sharing, the more all participants in the data ecosystem will benefit from it.

However, collaboration in this complex type of data sharing model can only happen if there is a trust in the data ecosystem. You'll need to build trust to overcome resistance towards data sharing and to have confidence in external data.

In this whitepaper, we will discuss a governed approach to collaborate around data. We will quickly compare different types of data ecosystems with different levels of collaboration: data brokerage, reciprocal data sharing, federated analytics and finally collaborative data-supply chain. A high level of collaboration in-line with regulatory requirements around privacy and security will be enabled through encryption and access management for collaborative analysis, without sharing the granular data themselves.

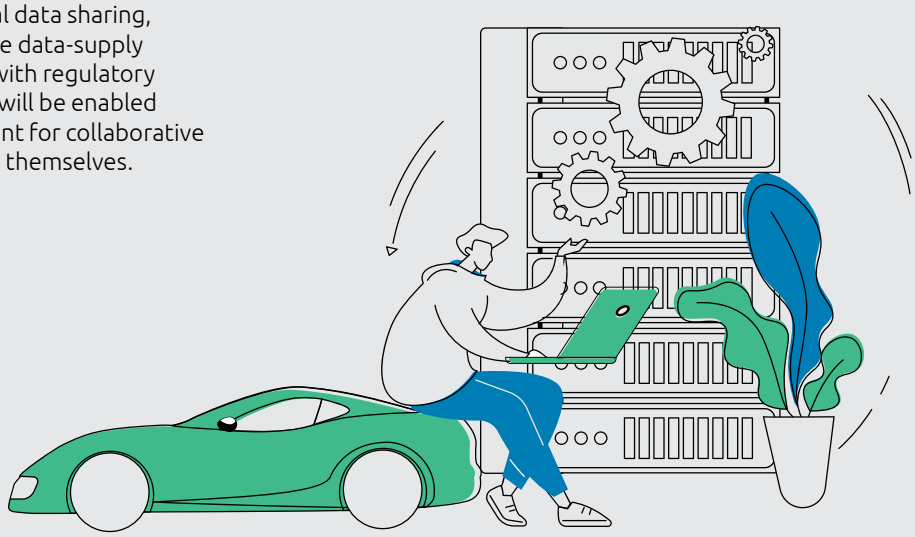
Capgemini's data ecosystem approach addresses key questions around ecosystem strategy, design decisions, and implementation scope which need to be answered

with the specific business cases in mind to build a sustained advantage. Privacy, ethics, trust and regulatory requirements should be proactively addressed in all phases of the roadmap.

Snowflake is the ideal data platform to enable this approach with a high degree of data collaboration using ***Snowflake***'s seamless data sharing capabilities. ***Snowflake*** supports various data sharing and collaboration models while also providing solutions for the sensitivity challenges by enabling a data-clean room to securely share data, and generate new insights without exposing granular information.

Talend's data integration and governance capabilities ensure only quality data flows across the ecosystem and accelerate the sharing of trusted data. Intelligent data lineage tracing and compliance tracking tackle the regulatory and data privacy challenges in complex data sharing scenarios.

Although the potential of data ecosystems is huge, the first steps into higher levels of data collaboration and complex data sharing are yet to be taken by most organizations. Ultimately, they will need to act fast and increase their data collaboration or risk to fall behind those who already aggressively leverage data across organizational boundaries to their competitive advantage, with the potential to disrupt the industry.



1 Why do we need data ecosystems?

Intelligent traffic and mobility systems as well as smart production processes need a large amount of data to support decision making in the best possible way, and automate processes in any phase of the value chain, or to generate new business models. Even though countless mobility and IoT data has already been collected and processed within the companies today, a comprehensive utilization of this data for technical, legal or economic reasons is often not possible. Especially, the exchange of data across the boundaries of an organization is the next level to gain competitive advantage. The transformation from a car producer to a mobility service provider requires integrated data platforms across its several market participants.

OEMs, suppliers, and mobility providers are able to create new data-driven business models. Secure standards and accessibility of data along the whole automotive value chain are a prerequisite. Also, policymakers and society can benefit from mobility and traffic control, e.g., to reach their sustainability goals, by reducing their emissions. The data ecosystems have to assure safe transactions and data privacy across all players.

Fields of application that are enabled and can benefit from shared data ecosystems are:

R&D and Engineering

- Technological progress such as ADAS (Advanced Driver-Assistance Systems) can improve drivers' safety by minimizing human error.
- Car durability is expected to increase, thanks to predictive maintenance and remote quality checks.

Smart manufacturing & supply chain

- Factory digitalization and digital twins could save billions yearly in supply chain efficiency increase, asset maintenance, or after sales and consumer service.
- Big data analytics are becoming central for the automotive industry, increasing transparency throughout the value chain, and allowing manufacturers to integrate the sustainability KPIs into their strategy (CO^2, water and energy consumption).
- Supply chain improvement, better inventory management, reduced delays for orders, and optimized resources use.
- Smart factory with the collection and analysis of data from the production line in real-time to increase asset efficiency and reduce the need for maintenance.
- Quality control is continuously controlling the production to allow for early problem detection in products and processes.

Customer centricity

- The definition of a driver's identity opens the way to more personalization, multisensorial live interaction, virtual chauffeurs, identification at point of sales, and many more.
- A more customer-centric view implies more control linked to data privacy but also, multiple uses of the customer data (multi- consumer journeys, off/online seamlessness…).
- Autonomous driving could account for 66% of passenger kilometers in 2040.
- Aftersales with improved quality management and direct customer feedback.
- Digital twins, constant vehicle improvement by enhancing the car's software through continuous deployment to improve the customer experience.
- Battery management and charging optimization for EVs help optimizing the battery charging and usage to increase the car's lifetime.
- Intermodal mobility by understanding the trends of shared mobility to give more flexibility to the customer.

Sustainability, regulation, compliance, and shared mobility

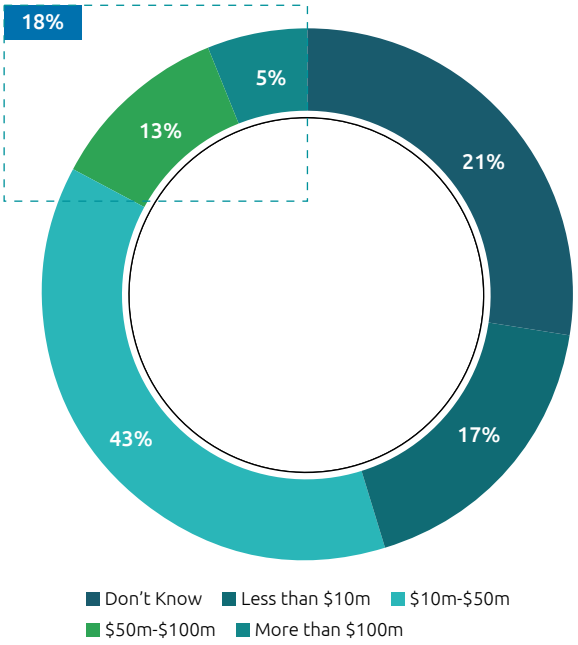
- Sustainability can be integrated in all the steps of a car's life: components management, production, usage until end-of-life. In the case of EV batteries, recycling could become increasingly important.
- Several OEMs already have announced their goal to make their production plants carbon-neutral in the near future.
- Smart city innovation aims at optimizing resource consumption and decreasing the carbon footprint of urban areas by interconnecting mobility infrastructures.
- Recycling and waste management, especially for EVs. Waste management can reduce production cost for future vehicles.
- Sustainability across all steps of the value chain: Observing regulations regarding sustainability through all the phases of the product life.
- Parts traceability: Controlling the parts through all the steps of the value chain to increase transparency.
- Analysis of accident data, compliance with safety regulations: collecting and analyzing customer and vehicle data during and after its lifetime to increase safety and reduce accidents probability.

Data ecosystems are emerging both within industries and across industries. Data ecosystems help in building economies of scale and a collaboration network. Manyorganizations with similar interests join ecosystems to pursue common goals.

According to the recent work by the Capgemini Research Institute1, one in five automotive companies plans to invest more than $50m in data ecosystem initiatives in the next three years.

What is the total investment to be made/planned in your data ecosystem initiatives (in the next 2-3 years)?

Figure 1 **Planned investments in data ecosystems**

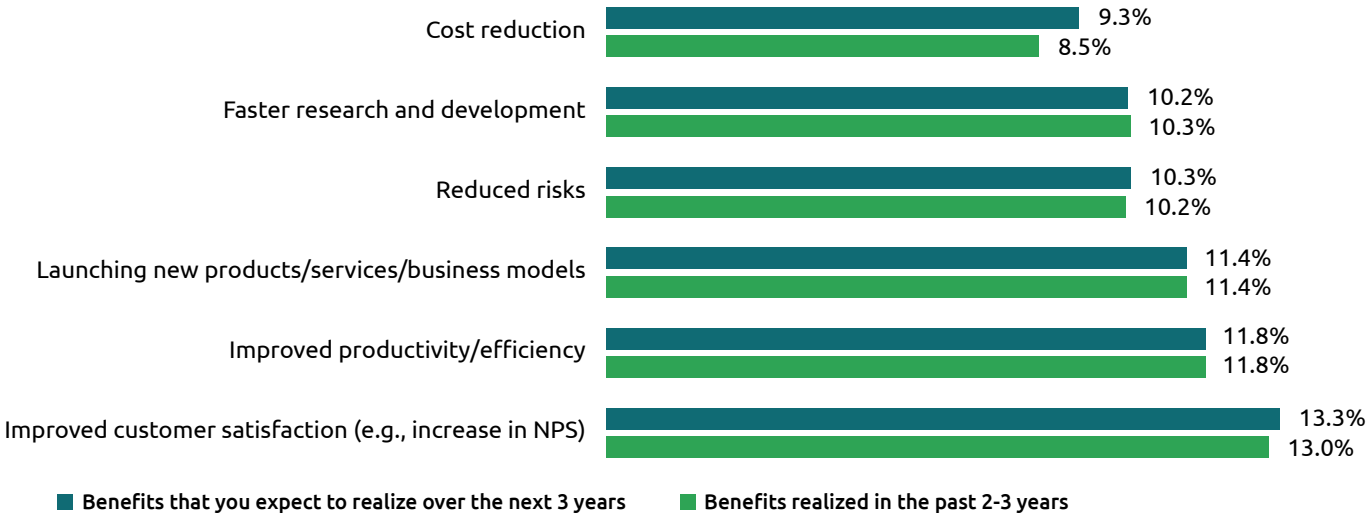


Source: Capgemini Data Ecosystem Survey, 2021

[1]Capgemini Research Institute, 2021: Data Sharing Masters

According to the Capgemini Research Institute study, automotive companies have improved customer satisfaction by 13 percent, improved productivity/efficiency by 12 percent, and reduced costs by 9 percent annually in the last two to three years by engaging in data ecosystems. Data ecosystems also contribute much to extending business models and launching new products and services. And they essentially reduce business risks.

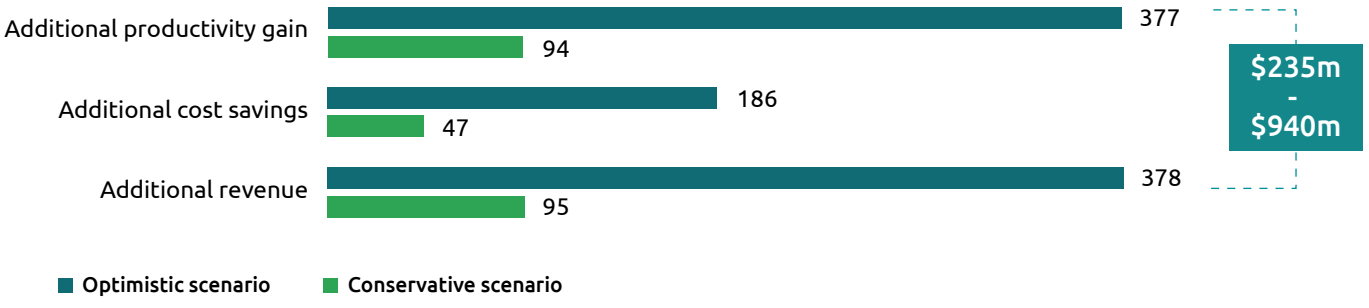
Figure 2 **Amount of benefits from data ecosystems – Automotive (annualized)**



Source: Capgemini Data Ecosystem Survey; N=75 automotive firms, April-May 2021

It's hard to predict the future benefits from data ecosystems,but a typical organization with $10 billion annual revenue participating in data ecosystems has the potential to gain total financial benefits of up to $940 million or over 9% of annual revenue in the next five years.

Figure 3 **Additional benefits from data ecosystem per company, cumulative in five years (USD M)**



Source: Capgemini Data Ecosystem Survey; N=75 automotive firms, April-May 2021

2 What is a data ecosystem?

The Capgemini Research Institute (CRI) defines data ecosystem as "a partnership between multiple institutions to share and manage data to create new value that would not have been possible in the previous, siloed system." Data sharing is based on a mutual value exchange, thus making data more beneficial for all participants. Data coming from a variety of sources also enhances the diversity of information and increases inclusivity for all individuals, consumers, and citizens. This sharing happens in compliance with all local regulations and guidelines, and in an anonymous and aggregate manner (especially for personal data).

In a typical data ecosystem, multiple organizations, contributors, aggregators, and user organizations come together to facilitate data sharing and provide value. However, the data ecosystem participants need a clear win-win business model and must address key challenges of data ownership, regulatory compliance, ethics, trust, and privacy.

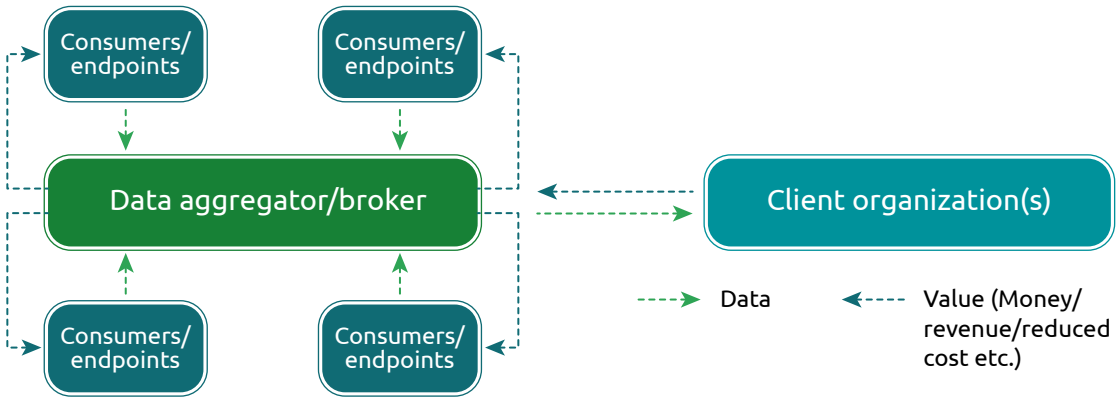
2.1 Types of data ecosystems

2.1.1 Data brokerage

Data brokerage is the traditional way of data sharing and the primary ecosystem type for 55% of the participants in the Capgemini survey. In this type of ecosystem data, or the insights derived from it, are often commoditized:

- Multiple organizations (data-source organizations, for example) pool their data on proprietary end-consumer relationships.
- There could be one or more aggregator/broker organizations that facilitate this data sharing; data ecosystems may or may not have mediators, or one of the source organizations can serve as an aggregator. The aggregated data holds direct value for the client organizations.
- The client organizations use data aggregated by the broker and, in exchange, provide some value in the form of monetary (revenue, income) or non-monetary incentives (e.g. reduced costs, reduced risks, improved customer experiences).

Figure 4 **Data brokerage**



2.1.2 Reciprocal data sharing

Reciprocal data sharing is the primary model for 20% of organizations in our survey. In this model, multiple companies work together to drive efficiency. Data sharing results in the increased value of collaboration. Usually, one of the partners is the "dominant" player but smaller players can also obtain value from sharing data. Often, this starts with sharing information around terms agreed beforehand.

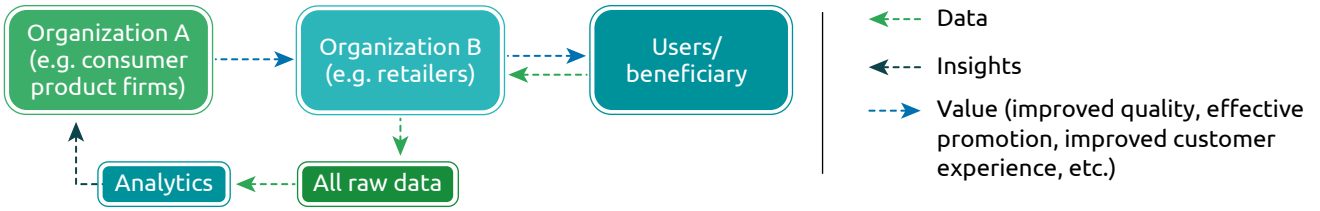
Figure 5 **Reciprocal data sharing**

2.1.3 Federated analytics ecosystem

Newer technologies, such as homomorphic encryption and differential privacy, are enabling more detailed collaboration while meeting regulatory requirements around privacy and security. Differential privacy allows parties to give access to granular data for collaborative analysis without sharing the granular data themselves. With homomorphic encryption you can achieve significant advances in data protection and data. Companies can perform data analysis on encrypted data, share data with competitors without revealing any secrets and share data with third parties for processing without fear of losing, compromising, or stealing it.

Federated analytics ecosystem is the primary model for 13% of organizations in our survey. The key objective of this model is to run analytics on and derive insights from another organization's data, which can't be directly shared or accessed owing to regulatory concerns, data volumes, or other reasons. The business model of this ecosystem is to sell access to data for running analytics, and charging is based not only on data supplied but, also on the complexity, and the form of analytics.

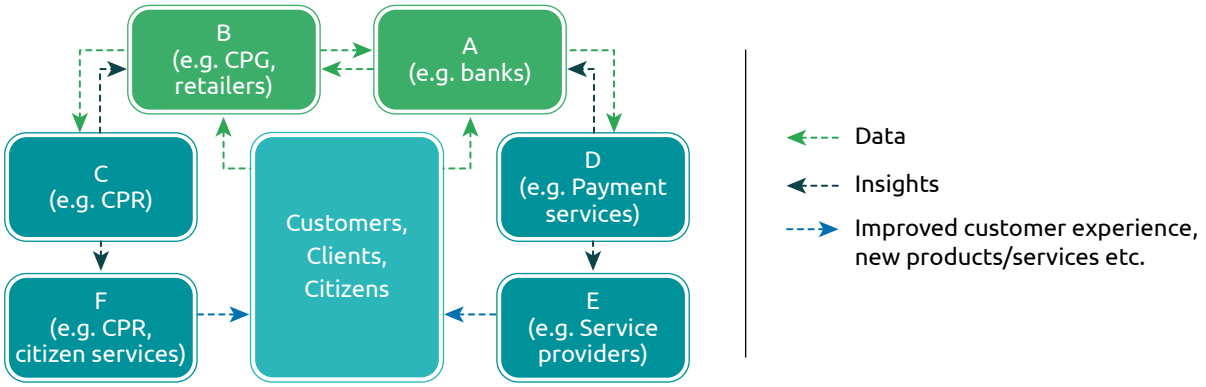
Figure 6 **Federated analytics ecosystem**



2.1.4 Collaborative data-supply chain

Collaborative data-supply chain is the primary model for 11% of organizations in our survey. This is the most collaborative model of data ecosystem partnership, in which multiple organizations serve a single customer or market. In this model, the collaboration between organizations itself becomes a new product or service, driving an outcome for the customer.

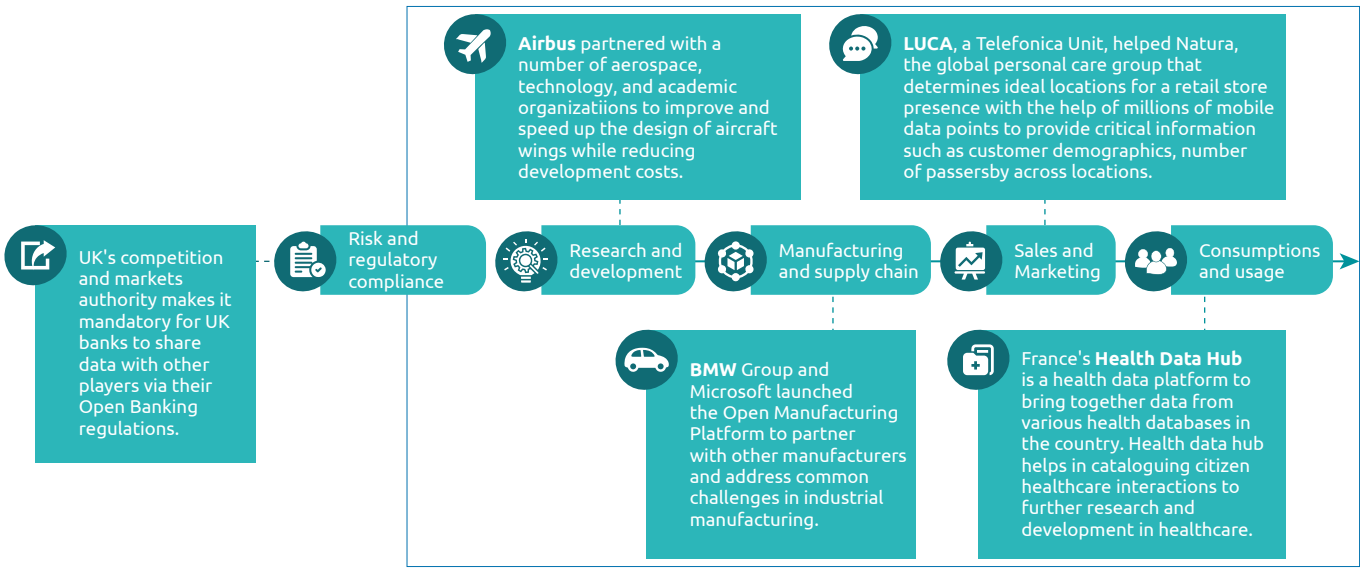
Figure 7 **Collaborative data-supply chain**



2.2 Typical use cases for a data ecosystem

The most common use cases across sectors span from research and development to consumption of products and services.

Figure 8 **Common cross sector use cases**

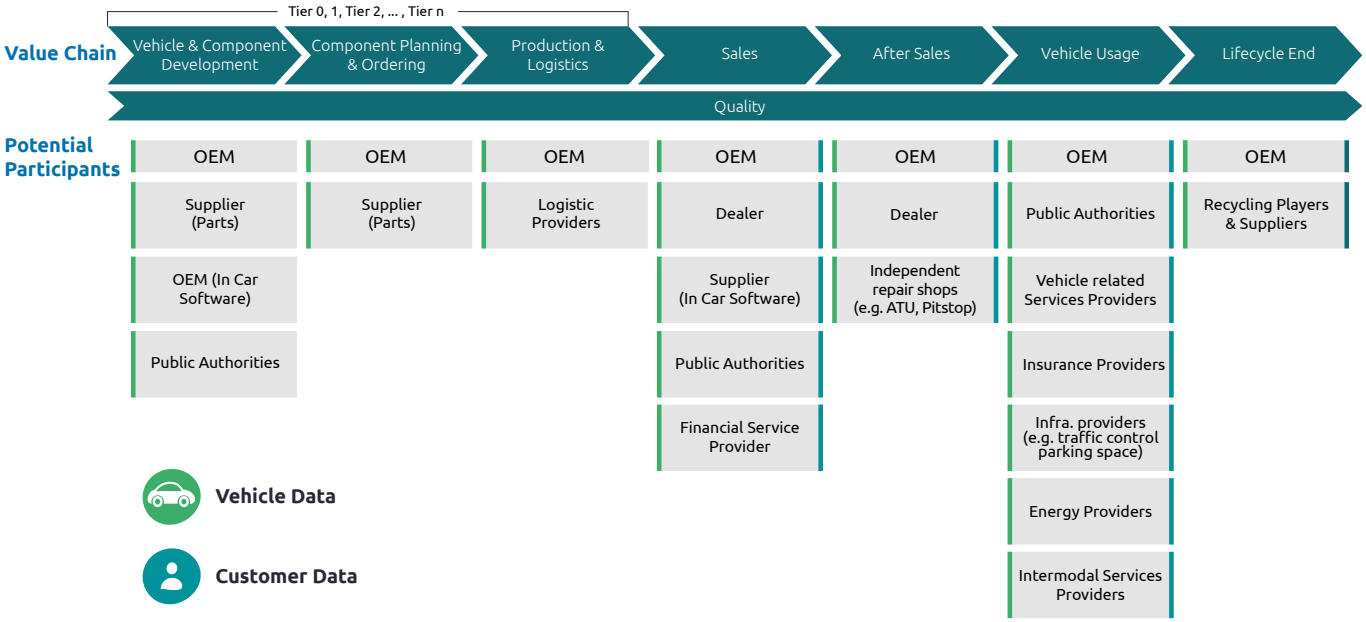


A non-exhaustive list of typical use cases in the automotive industry:

- Industrial cloud that combines data from all plants and makes it available across the supply chain partners and integration partners for the purpose of supply chain optimization, component quality improvement, root cause analysis.
- Connected car data cloud for
  - sharing operational data of vehicles such as maintenance log, fuel efficiency on an aggregate level for the purpose of proactive and predictive maintenance, monitoring emissions, etc.
  - sharing anonymized and aggregated telematic data of vehicles with city governments, service providers, etc.
  - sharing vehicle usage data with insurance and finance organizations to create new business models.
- Sharing sales data by brands and types.
- Sharing aggregate mobility data for services such as smart cities, parking, mapping, etc., to create new business models or sell new services and products.

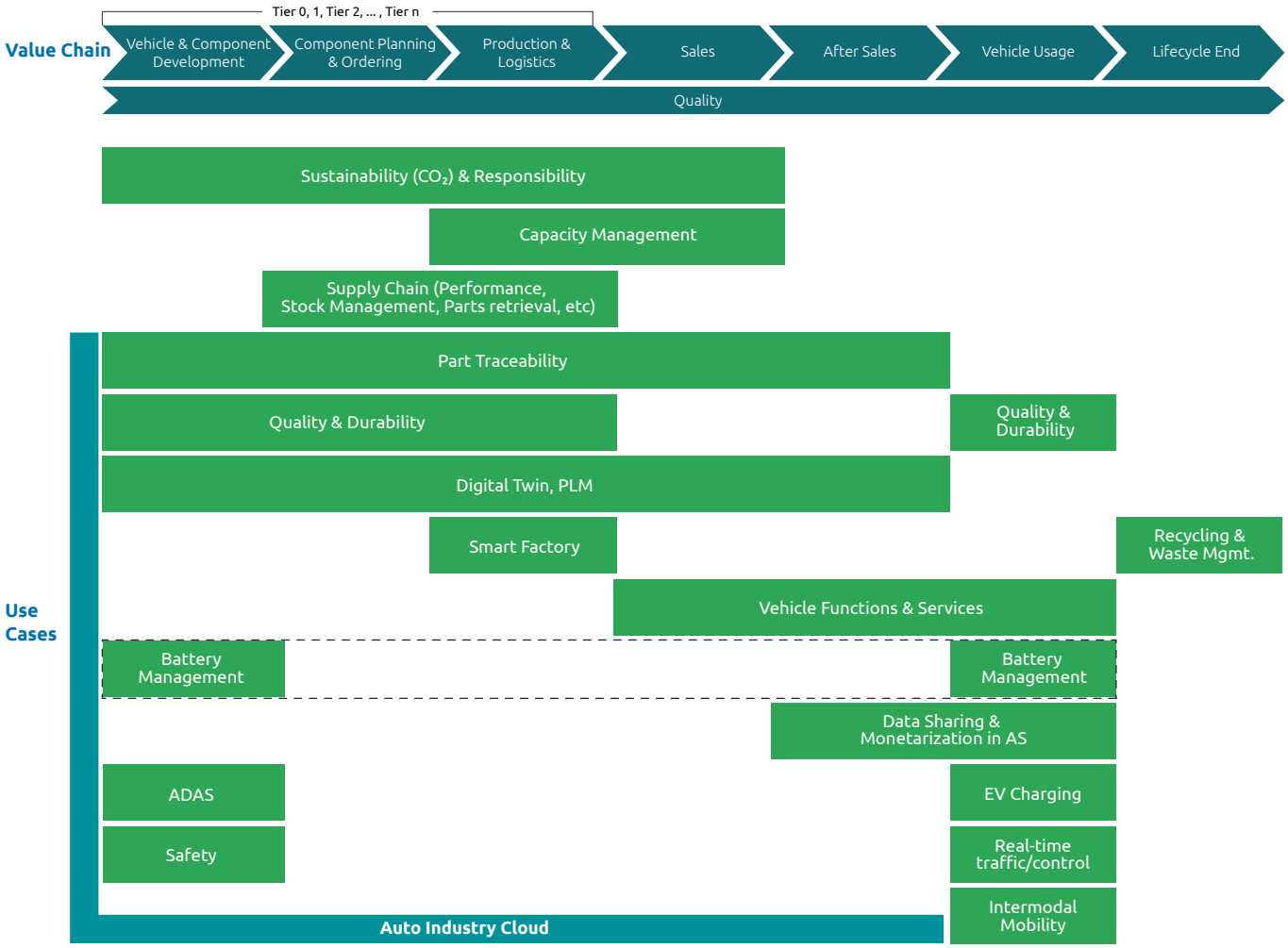
A data ecosystem connects OEM, supplier, dealer, logistics provider, public authorities, and other third parties across the value chain. The most important data assets are customer data, vehicle data as well as production and supply chain related data.

Figure 9 **Data collaboration partners accross the automotive value chain**



Data sharing enables game changing use cases for the whole ecosystem in the lifecycle. It is a precondition for a comprehensive sustainability improvement, an intelligent battery management and charging infrastructure or new vehicle (in-car) services. Also, integrated connected quality, supply chain, and capacity management between OEM and supplier require data ecosystems.

Figure 10 **Data ecosystem enabled use cases**



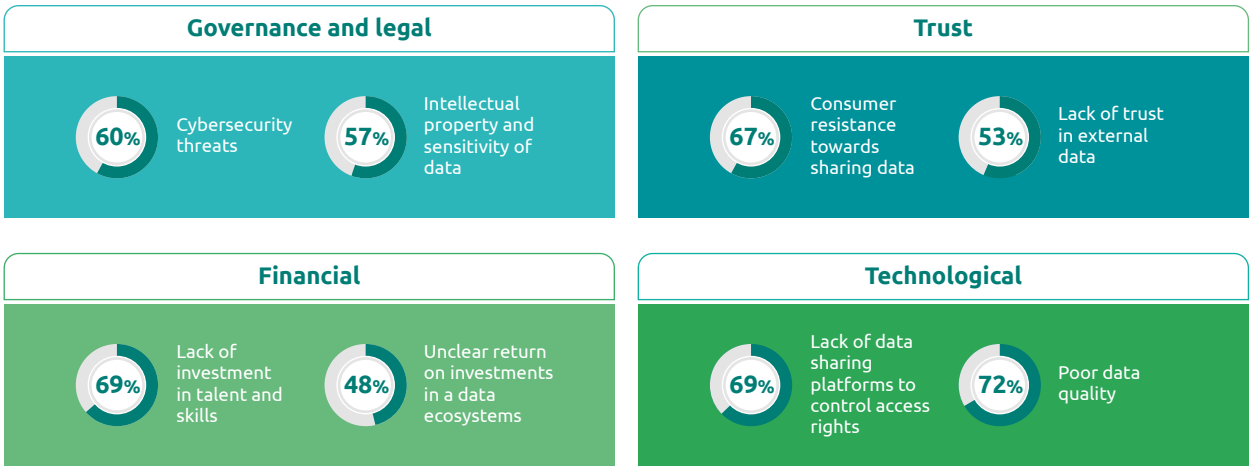
3 How to build a data ecosystem?

3.1 Challenges to tackle

Clearly, data ecosystems help to create a sustained advantage for participants. However, some key challenges need to be addressed. First, the right business model needs to be established that contains a unique value proposition and is an obvious win-win for all participants. Second, especially when data is personal or in other ways sensitive, issues around data ownership, regulatory compliance, ethics, trust, and privacy need to be addressed.

From the various challenges that hinder large scale adoption of data ecosystem initiatives the following hurdles were pointed out by the organizations in our survey:

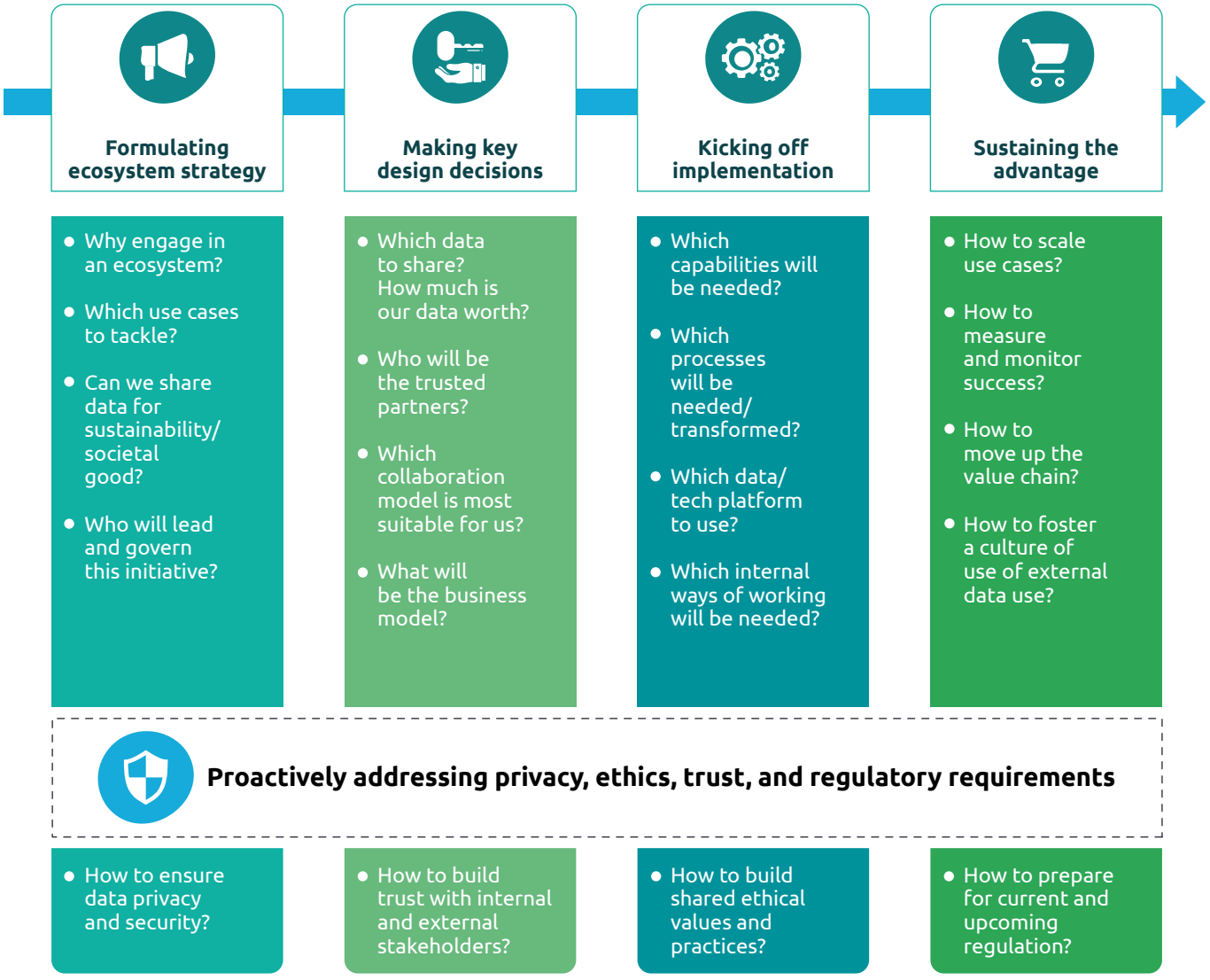
Figure 11 **Challenges for adoption of data ecosystems**



3.2 The approach

To build a sustained advantage with your data ecosystem your roadmap needs to answer these key questions:

Figure 12 Capgemini's approach for the data ecosystem



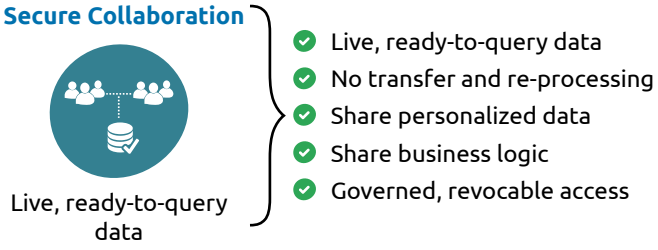
3.3 The platform for the data ecosystem

Snowflake is a single, global platform for data and essential workloads, with seamless data collaboration. It means, it's not only designed for loading, processing, and analyzing data at scale, but it also supports sharing between organizations to create a new data enrichment and distribution opportunities. As such, *Snowflake* allows organizations to quickly deploy new business ecosystems and accelerate time to value.

3.3.1 Seamless Data Sharing

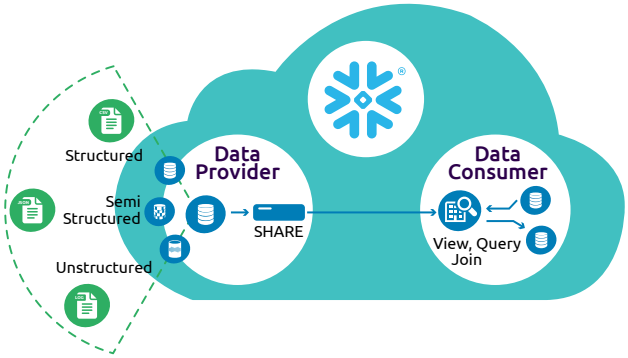
Until very recently, organizations have been forced to rely on traditional data sharing methods that are labor-intensive, costly and error-prone. These methods are also more open to hackers and produce stale data. *Snowflake* Data Sharing capabilities eliminate those barriers and enabled organizations to easily share live data in real time without having to move the data between parties. Those capabilities allow consumers in the ecosystem to perform live queries combining their own data with third party data at any scale.

Figure 13 **Snowflake Collaboration**



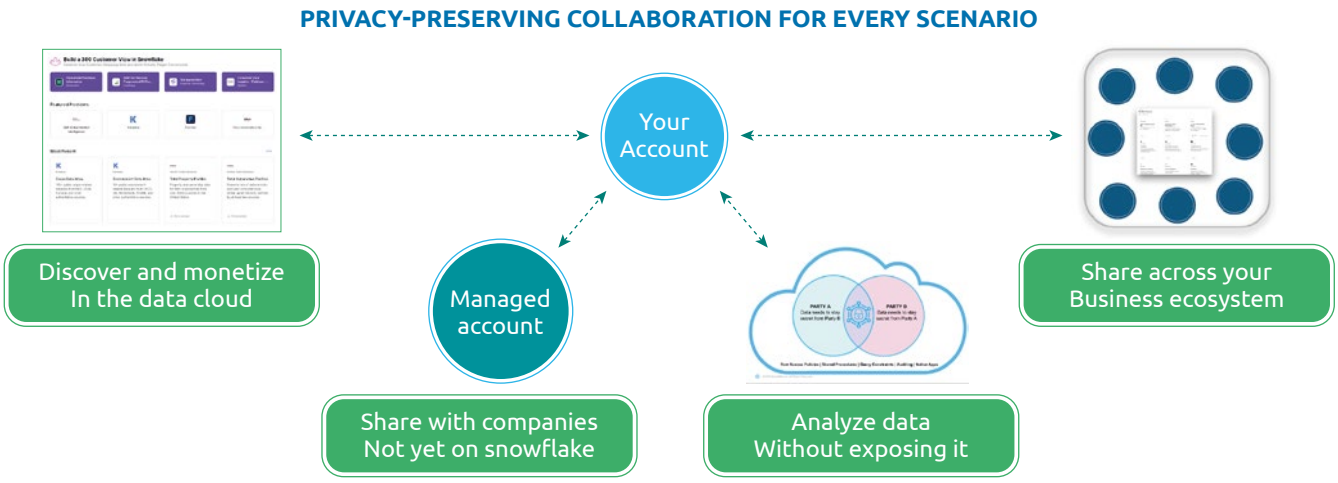
Along the automotive value chain, the nature of data shared between parties can vary. From highly structured data from ERPs (ex: supply chain, sales), to semi-structured data (IoT coming from the smart factory, the vehicles, the repair shops) to unstructured data (ex: raw logs, pictures of part defects, scanned documents). In *Snowflake*, any data type can be stored, processed, and shared with a third party.

Figure 14 **Sharing any format**



Snowflake also supports various data sharing and collaboration models, from 1-to-1 relationships, to many, via a private exchange between multiple designated parties, to public marketplace models. By combining these models, it's then possible to create all ecosystem types we mentioned previously corresponding to the business requirements.

Figure 15 **Collaboration in the data cloud**

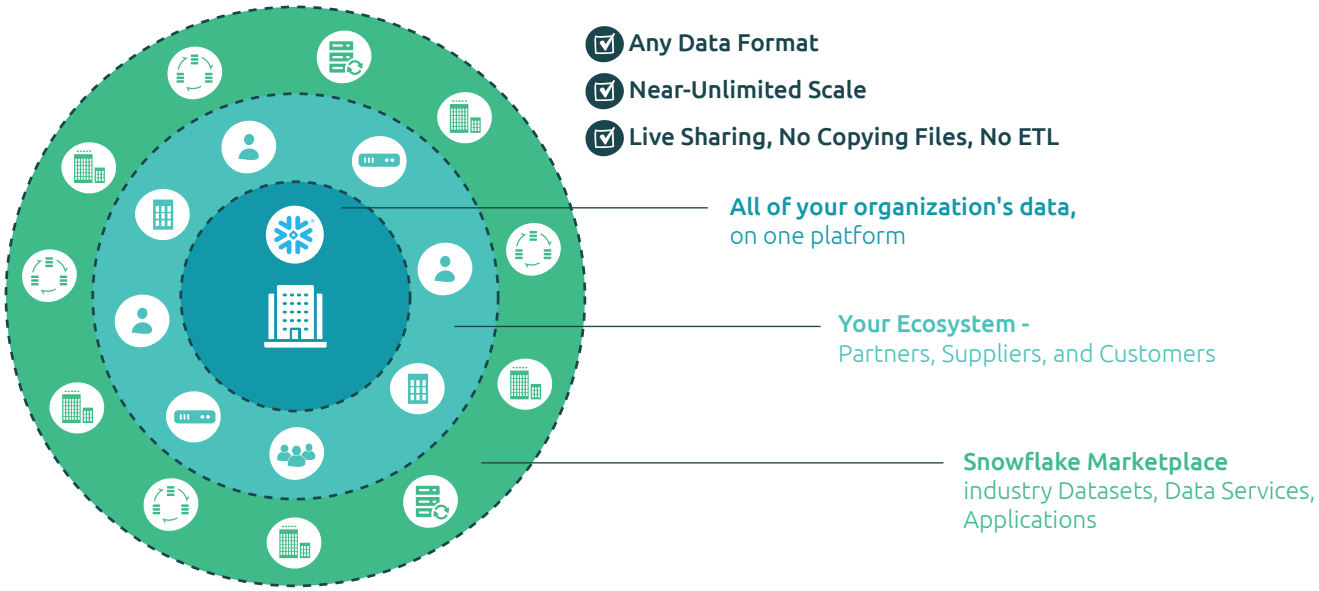


Live, ready-to-query data, services and apps cross-cloud and cross-region. No ETL.

3.3.2 Building the Data Cloud

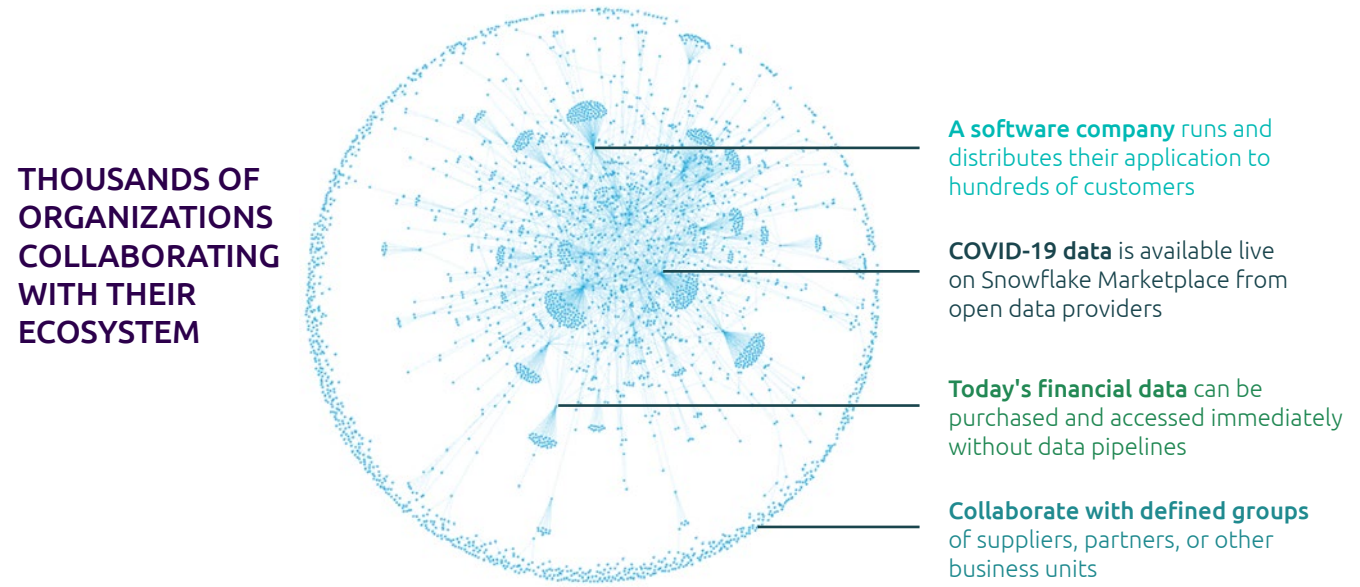
By using the *Snowflake Data Sharing* capabilities, organizations can accelerate the collaboration with their ecosystem all along the value chain, building a network allowing immediate data sharing with no burden.

Figure 16 **Extended enterprise collaboration**



All these organizations collaborating in *Snowflake* are a part of the Data Cloud, a global network, where thousands of organizations mobilize data with near-unlimited scale, concurrency, and performance.

Figure 17 **Snowflake Data Cloud**

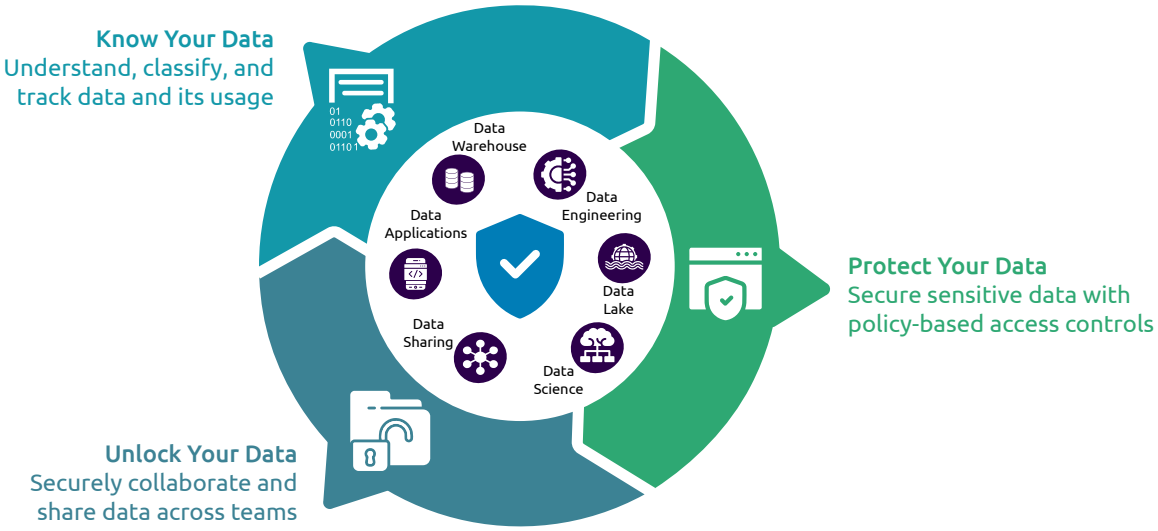


Source: Visualization based on actual Data Cloud sharing activity as of April 30, 2022

3.3.3 Tackling the sensitivity challenges

Data security and governance is a must, not only in a data ecosystem perspective, but also just from a Data Platform perspective. *Snowflake* is designed to govern the data all along its life cycle, from acquisition to preparation, and enrichment to consumption and sharing. All capabilities apply not only for the first party usage (Data engineering, BI, Data Science, etc.), but also for data sharing, providing a governed approach to collaborate around data.

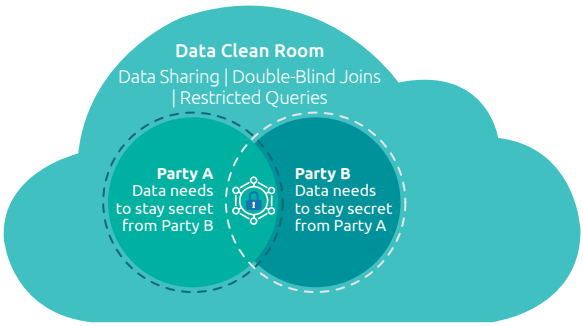
Figure 18 **Unlock the data**



As we saw before, some organizations are reluctant in sharing data with their ecosystems for regulatory (ex: GDPR) or trust and strategic reasons. To unlock the data value even in such a constrained environment, the data-clean room allows parties to securely share data and generate new insights without exposing granular information. *Snowflake* can power distributed data-clean rooms, where each participant controls its own data while allowing governed, controlled analytics with another party, or even with multiple other parties simultaneously.

Snowflake's data sharing capabilities allow this without copying all the data into one database, and without having to trust a single party with all of the data.

Figure 19 **Data-Clean Room**



Data-clean rooms control the following:

- What data comes in
- How the data in the clean room can be joined to other data in the clean room
- What types of analytics each party can perform on the data
- What data, if any, can leave

3.4 Building trust in the data ecosystem

3.4.1 Clean, complete, uncompromised data for everyone

Poor and uncontrolled data can compromise your ability to make sound business decisions and build better digital experiences. And as your data ecosystem grows, diagnosing and fixing issues become exponentially more challenging.

Your data ecosystem needs to be in great data health to support your business objectives. This requires a careful balance between availability, usability, integrity, and security. *Talend* can help you obtain and maintain the complete, clean, and uncompromised data you need to stay in control and mitigate risk. Put simply, you can get healthy data.

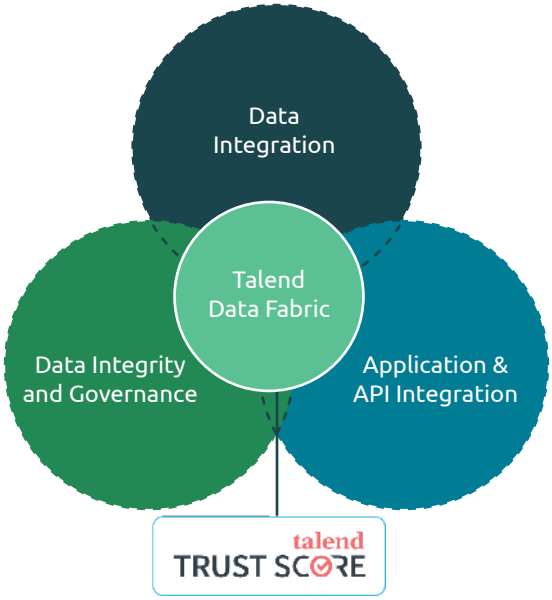
Figure 20 **Key dimensions of healthy data**

Accuracy The degree to which data correctly describes the real-world object or event being described	**Timeliness** The degree to which data represents reality from the required point in time
Completeness The proportion of data stored in a dataset against the potential for 100%	**Uniqueness** No item, or entity instance, is recorded more than once based upon how that thing is identified
Consistency The absence of difference, when comparing two or more representations of a thing against a definition	**Validity or conformity** The degree to which data conforms to the syntax (format, type, or range) of its definition

Bring together people, data, and machine learning technology to easily access, monitor, and fix your data. *Talend* Data Fabric combines data integration and governance capabilities into a single platform to discover, federate, and share healthy data to all the people who need it. It improves data health with automated quality checks and browser-based, point-and-click tools for sharing and capturing legacy knowledge from business users.

Whether you're modernizing your cloud data infrastructure, ensuring regulatory compliance, or developing your internal data marketplace, *Talend* Data Fabric can help.

Figure 21 **Talend Data Fabric**



The *Talend* Trust Score™ gives you instant visibility into the reliability of any dataset, so you can put healthy data at the center of business, move faster, and make better decisions.

The *Talend* Trust Score combines dimensions of data quality, data popularity, and user-defined ratings, while providing clear intelligence on where your data came from, and how it's been used. With *Talend* Data Inventory, you can easily view any dataset's Trust Score at a glance. Any dataset identified as incomplete, corrupt, or untrustworthy can be easily diagnosed and fixed with a few clicks, giving you complete confidence in every dataset and every decision you make.

Talend Trust Score is now available natively inside *Snowflake*, enabling *Snowflake* customers to have instant and easy access to review, improve and certify the reliability of their data. *Snowflake* customers will be able to see how accurate their Data Health really is, including areas of strength and areas of concern, where data may need to be improved prior to using and sharing, to bring data clarity to their business users.

Figure 22 **Key Talend capabilities to assess the health of your data**

Understand and improve the health of your data

The robust features of the Talend Trust Score give you instant access to, and confidence in the information you need to make timely decisions, and run your business:

Trust Score crawler

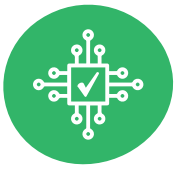
Automate review and indexing of all the datasets in your data warehouse

Data lineage

Get clear reports that tell you where data came from and how it has been used and modified

Diagnostics and advice

Easily identify incomplete, corrupt, or untrustworthy data, then remedy issues with a few clicks



Embedded data quality

Ensure data integrity at every stage of the data lifecycle with integrated checks

Social engagement

Share data, even between business units, with data validation, trending, curation, commenting, and tagging

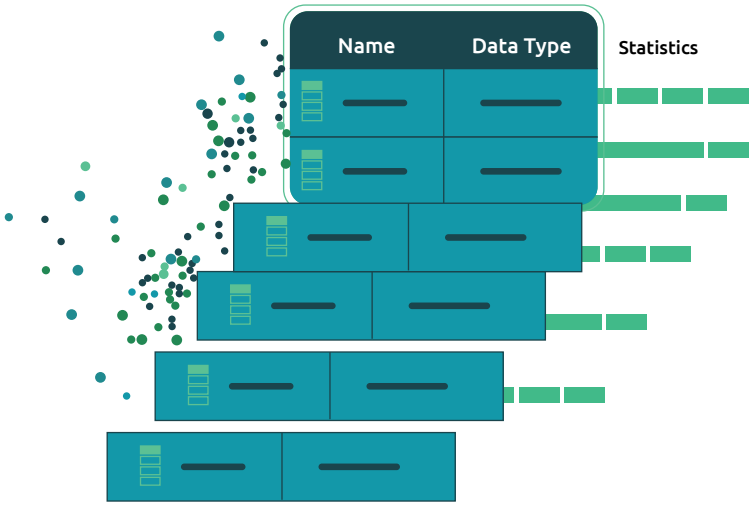
3.4.2 Crawl, profile, organize, link, and enrich all your data at speed

Talend Data Catalog gives your organization a single, secure point of control for your data. With robust tools for search and discovery, and connectors to extract metadata from virtually any data source, Data Catalog makes it easy to protect your data, govern your analytics, manage data pipelines, and accelerate your ETL processes.

Automate data discovery

Data Catalog automatically crawls, profiles, organizes, links, and enriches all your metadata. Up to 80% of the information associated with the data is documented automatically and kept up-to-date through smart relationships and machine learning, continually delivering the most current data to the user.

Figure 23 **Organizing Metadata through automated discovery**

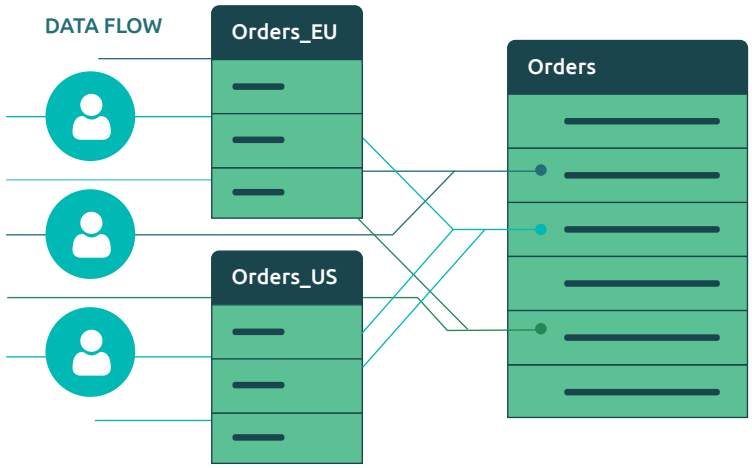


Create and govern a central data catalog

Make data governance a team sport with a secure, single point of control, where you can collaborate to improve data accessibility, accuracy, and business relevance.

Support data privacy and regulatory compliance with intelligent data lineage tracing and compliance tracking.

Figure 24 Intelligent Data Lineage Tracing

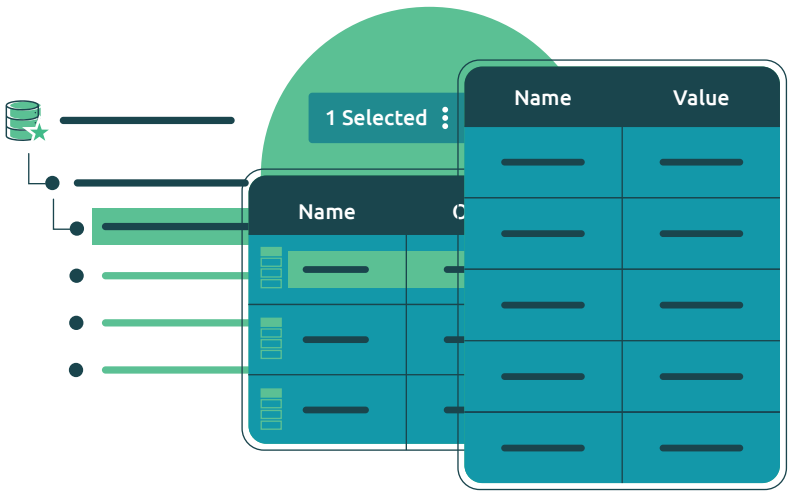


Find and share trusted data faster

Empower your data consumers to get right to the data. Data Catalog makes it easy to search and access data, then verify its validity before sharing it with peers.

A collaborative user experience allows anyone to contribute metadata or business glossary information.

Figure 25 Find and share trusted data



3.4.3 Profile, clean, and standardize data across your systems

As an integral part of *Talend* Data Fabric, *Talend*'s Data Quality software profiles, cleans and masks data in real time to deliver data you can trust for the insights you need. Machine learning powers recommendations for addressing data quality issues as data flows through your systems. The convenient self-service interface is as intuitive for business users as technical users, fostering company-wide collaboration.

Automate better data

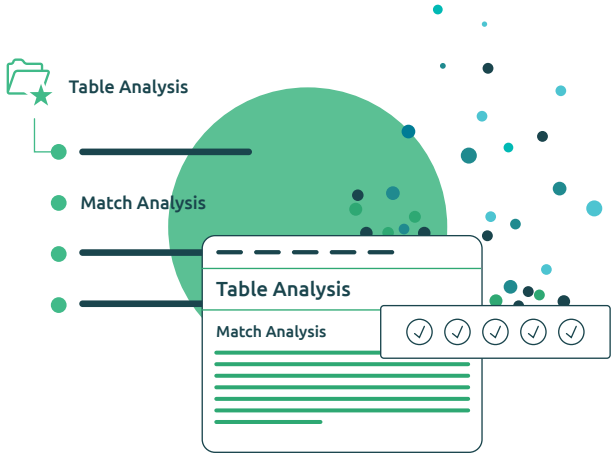
Data profiling lets you quickly identify data quality issues, discover hidden patterns, and spot anomalies through summary statistics, and graphical representations. Our built-in *Talend* Trust Score gives you an immediate, explainable, actionable assessment of confidence, so you know what's safe to share and which datasets require additional data cleansing.

Figure 26 **Talend Data Trust Score to assess the reliability of any data set**

Free up data workers to focus on what matters

Talend automatically cleanses incoming data with machine learning-enabled de-duplication, validation, and standardization. It can enrich data by joining it with details from external sources such as postal validation codes or business identification. Meanwhile, your business and data analysts are free to focus on more meaningful tasks.

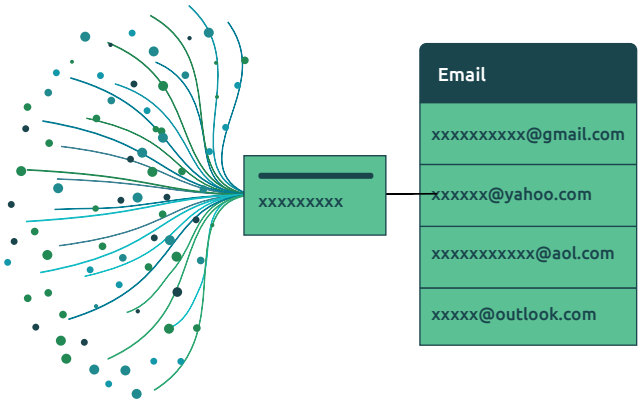
Figure 27 **Data Harmonization**



Protect your assets and prioritize compliance

Because no one can afford a security breach, *Talend* lets you selectively share data to trusted users on-premises or in the cloud without exposing personally identifiable information (PII) to unauthorized individuals. Data Quality protects sensitive data with built-in masking, ensuring compliance with internal and external data privacy and data protection regulations.

Figure 28 **Data Masking**



3.4.4 Ensure data privacy and compliance

Data is the new oil fueling the global economy, and organizations are realizing that they need to manage the risks of a spill because they are increasingly held accountable for privacy violations and damages caused by a data breach. Rather than trying to comply with each new data regulation, they need to understand the OECD Fair Information Practice Principles for Data Privacy and apply them on a global basis.

Respecting data privacy takes much more than reinforcing legal controls, security infrastructures, and reporting foundations. Businesses need to establish a practical approach regarding global compliance and get hands-on with their data.

A concrete data governance program establishes the policies, standards, data hubs, and controls to protect data effectively, publish it for decision making, and meets the mandates of data privacy and sovereignty legislations that apply to them.

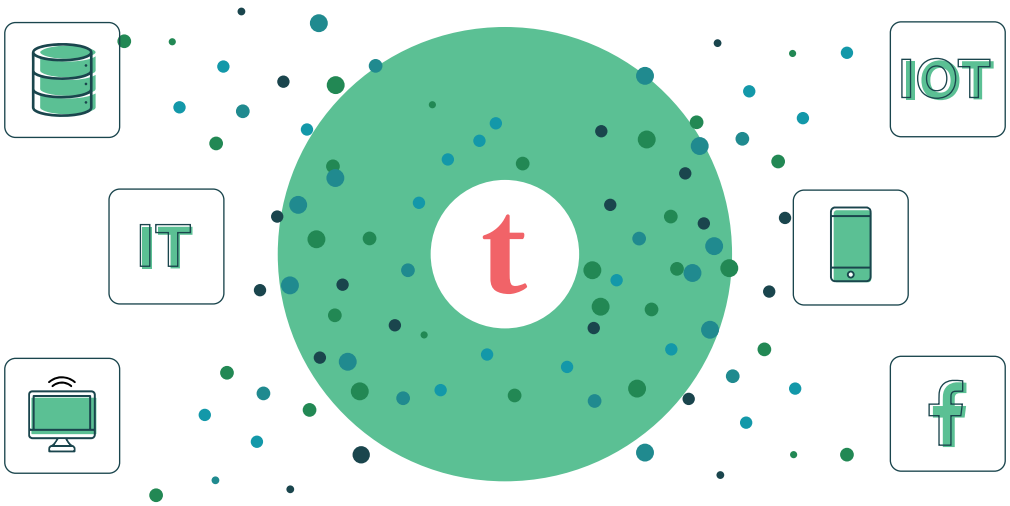
An end-to-end approach to data governance for data sovereignty should allow you to address these main challenges:

- **Know your personal data** by mapping critical data elements to data fields across your IT landscape using metadata management.
- **Foster accountability by** creating workflows for data stewardship and managing end user computing.
- **Establish a personal data ecosystem** with native data quality for consent management.
- **Track and trace** data with audit trails and data lineage.
- **Deliver a privacy** so that consumers, customers, employees, and citizens can control rights for access, rectification, portability, and erasure.

Maintain data agility and accelerate time to compliance with CCPA, GDPR, and other data security, and privacy regulations

Create a data inventory automatically by collecting data from everywhere: legacy systems, shadow IT, CRM systems, device sensors, digital apps, social networks, and more. *Talend* captures and maps critical data elements across disparate datasets, and then tracks and traces where they came from and how they have been used.

Figure 29 **Data Inventory**



Take the pain out of rules and workflows

Design and launch data controls all along your data pipelines. Anonymize or pseudonymize with data masking, ensure data quality with ML-aided automation, user tips, and self-service apps, and foster accountability across teams with data stewardship. With *Talend*, your organization will be ready for GDPR with established processes and control over any personal data.

Figure 30 **Compliance Processes**

Make it easier to manage consent

Manage opt-in consent across customer-facing applications and establish the right to be forgotten, right of accessibility, and right of rectification for all your users. Unlock data portability in compliance with HIPAA, making it possible to share access to the people whose information you will be processing.

Figure 31 **Consent Management**

3.5 The potential of data ecosystems

Although many companies have made their first steps into data ecosystems, the full potential of data ecosystems remains untapped yet. Many organizations engage only in simple data sharing in ecosystems with low levels of collaboration.

Consider increasing the complexity of data sharing. There are three different types of data sharing:

1. Direct data sharing
2. Aggregator-based data sharing
3. Data sharing via exchanges or marketplaces

Think of leveraging other data ecosystem models additionally to the traditional data brokerage:

- Reciprocal data sharing
- Federated analytics
- Collaborative data supply chain

Our survey shows that 61% organizations make use of only two out of three types of data sharing and leverage only data brokerage, and reciprocal data sharing. Data ecosystem models with higher benefits remain largely untapped. Data ecosystems with greater collaboration and complexity of data sharing offer significantly higher benefits over others.

Figure 32 **Today's usage of data sharing types and ecosystem models**

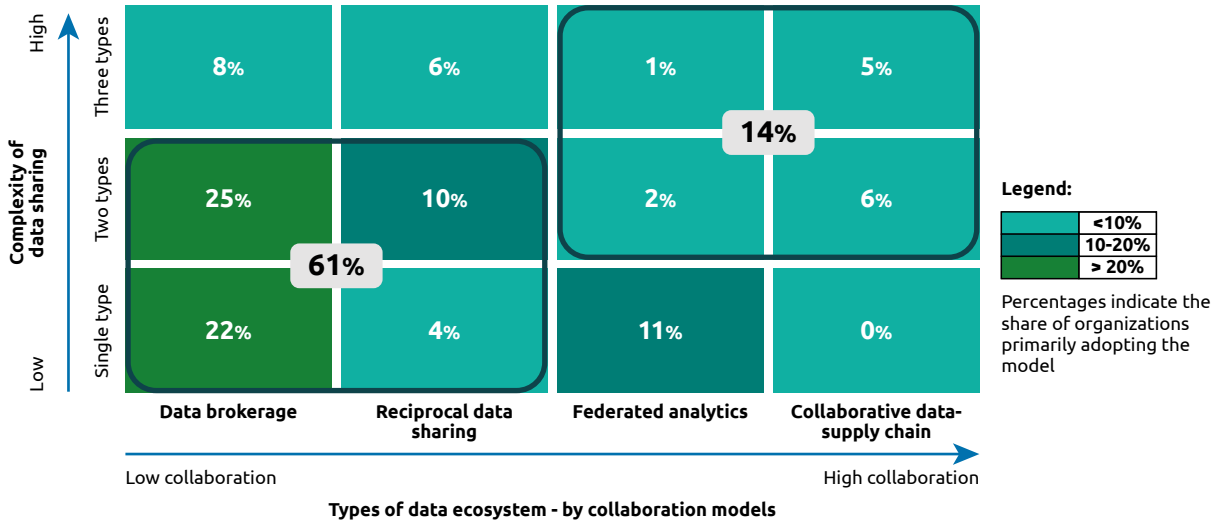
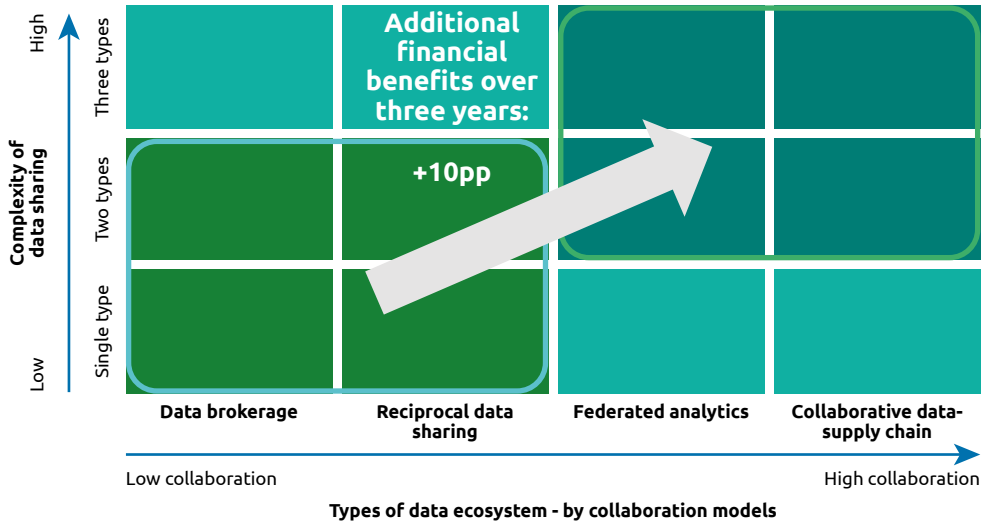


Figure 33 **The untapped potential of data ecosystems (Capgemini estimation)**



Data ecosystems play a critical role to make the most out of the data along the collaboration chain, and to meet the customer expectations. The effects exceed simple win-win opportunities and will be a main driver for further disruption in the automotive industry. Data ecosystems not only open up new business models like data monetarization and new integrated services with third parties, but they also become a key factor in protecting the business against external threats. For example, major supply chain disruptions like the current semi-conductor shortage can be more easily mitigated with a collaborative data-supply chain. Plant closures, trade wars etc., can only be on the risk radar of predictions with a comprehensive data background that requires combining as much relevant data as possible. Non-traditional competitors like Google, Apple, but also Tesla are aggressively leveraging data, and will keep exploiting weaknesses that established businesses might show due to uninformed decisions or an inability to adapt to changing markets. Also, the Automotive players recognized the importance of IT and data for the new Automotive era and are investing in the digital age, they might outpace by pure digital companies. Thus, data ecosystems are essential for preserving and fostering the innovative power, and competitiveness of Europe's automobile industry.

4 Key takeaways

ECOSYSTEM

Industry data ecosystems and open data ecosystems are on the rise, as prime examples of the next generation of value-creation through collaboration on data.

WIN-WIN

Find the right business model and define a unique value proposition that is a win-win for all data ecosystem participants.

TRUST AND ETHICS AT THE HEART

Address issues of data ownership, regulatory compliance, ethics, trust, and privacy - as a foundational quality of any data ecosystem.

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About Snowflake

Snowflake delivers the Data Cloud — a global network where thousands of organizations mobilize data with near-unlimited scale, concurrency, and performance. Inside the Data Cloud, organizations unite their siloed data, easily discover and securely share governed data, and execute diverse analytic workloads. Wherever data or users live, Snowflake delivers a single and seamless experience across multiple public clouds. Snowflake's platform is the engine that powers and provides access to the Data Cloud, creating a solution for data warehousing, data lakes, data engineering, data science, data application development, and data sharing. Snowflake customers, partners, and data providers already taking their businesses to new frontiers in the Data Cloud.

www.snowflake.com

About Talend

Talend, a global leader in data integration and data management, is taking the work out of working with data.

To compete and win, organizations need to use data more effectively. Talend offers the only end-to-end platform that combines enterprise-grade data integration, integrity, and governance capabilities to unify data across any cloud, hybrid, or multi-cloud environment. Innovations like the Talend Trust Score™, which instantly quantifies the reliability of any dataset, remove barriers to becoming data-driven. Talend's no-code and low-code modules give data experts and business users alike the means to actively promote the health of their data. With Talend, users across the organization actively collaborate to understand, improve, and create value from data organization-wide data.

Over 7,250 customers have chosen Talend for healthy data and a healthy business. Top analyst firms and industry media recognize Talend as a leader in data management software.

Talend is headquartered in San Mateo, California.

For more information, please visit **www.talend.com** and follow us on **LinkedIn.com** and **Twitter: @Talend**

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