Piod, a blockchain-based approach to design a scalable automotive data ecosystem

Introduction

Automotive sector is experiencing disruption from three major global megatrends, leading to definite shift in markets and revenue streams, diffusion of technology and entry of new players in the ecosystem.

- Connected Cars – Internet and telematics-based connectivity capabilities inside vehicle
- Autonomous Vehicles – Autonomous driving capabilities that include technologies such as Autonomous Driving Assistance Systems (ADAS), LiDAR, and etc.
- Shared Mobility Ecosystem – Transportation resources such as passenger vehicles will be shared amongst users.

These megatrends are leading to an unprecedented explosion in car-generated digital data, with significant implications in automotive and allied industries such as Insurance, Telecom, Semiconductor, etc. For example, in 2020, 64 million cars were enabled with internet and connected capabilities, with each car generating around 200 to 300 mb data from their telematics unit alone. By 2025, the number of connected cars will grow to over 250 million with each telematics unit generating over 500 mb data. With the proliferation of data, monetizing this data collected from cars has become a key theme mainly for the automotive OEMs and Telematics & Mobility players.

The expected growth of the value pool from car data and shared mobility could add up to more than USD 1.5 trillion by 2030, and the foreseeable proliferation of new features and services will turn “car data” into a key theme on the agenda of the auto industry. New players (e.g., “high-tech giants,” start-ups, service providers) are entering this competitive arena, as these companies are familiar with collecting enormous amounts of data, processing them, combining them with different sources, and deploying features and services that customers are willing to pay for.

Problem Overview

Nonetheless, multiple concerns are raised on the issues of “data ownership” and, more broadly, customers’ willingness to share data, which is a critical requirement for new data enabled services and features to be offered. The most important challenge for car data owners is the possibility of disclosing and violating the privacy of their car data, and the second challenge is the lack of transparency of car owners' share of the revenue from their data. In other words, car data owners are concerned about their data being shared without their permission and thus violating their data privacy. Furthermore, they want the data market to be transparent and their share of revenue to be paid from the data sale.

First, for the data ownership issues, every byte of data captured from the vehicles and the drivers must be subject to full transparency and consent. For this purpose, the vehicle operator must give consent for the collection and use of every one of these parameters—from vehicle location to data capture of driver operations (speed, braking, the G-force of turns, and so on) to identifying the person behind the wheel at any given moment. Furthermore, data privacy is important both for legal and regulatory measures with which the OEM and any partners must comply, in addition to the basic business principle of respecting and protecting all information that relates to their customers. Failure to pay attention to data privacy could subject the OEM to fines or loss of their stature in the industry, as well as casting a dark shadow over the way that they are perceived by customers. When working through a service or intermediary that is handling data on behalf of an OEM, the OEM must ensure that strong data privacy protections are included in any agreement and followed consistently. Moreover, Ensuring secure data exchanges is integral to any data monetization effort. Part of this involves monitoring and tracking where data is being sent, where it originates, and whether encryption is used consistently to secure data while in transit. Any areas in the data path that potentially allow intrusions or are vectors for abuse should be remediated to mitigate the risk. Risk has many different dimensions and security should always be implemented anywhere that a risk potential is identified. With rigorous, secure data protection mechanisms in place, hacking becomes a non-issue, rather than a concern for OEMs. Furthermore, many different mechanisms exist for capturing and transmitting vehicle and driver data. The hardware and software supporting this effort should be factored into the plan for monetizing car data. The range of hardware and vehicle types supported introduces a layer of complexity. Of critical importance to any monetization, program is the capability of collecting, cleansing, normalizing, and unifying collected data so that irrespective of the OEM's hardware decision, the vehicle and driving information is delivered to each beneficiary in a uniform, usable format. Monetization demands that the management of data across this spectrum of devices in a consistent, verifiable manner. To maximize the data value, this management should include the earliest devices in the market, all those operating today, and new devices as they are introduced.

Second, for Big Data applications in the automotive sector to be successful, certain criteria must be met. Simply collecting and aggregating huge amounts of vehicle telematics data, without being sufficiently selective or qualifying the nature of the data, is unlikely to lead to the kinds of useful insights that will identify patterns, reveal trends, and derive statistically significant results. Going into a project involving automotive data, key questions including what data points are most relevant, how much data is needed to drive the analytics and provide value, and over what time period should data be collected to ensure that the analytic results can be trusted with a high degree of confidence, should be resolved at the earliest stages of planning.

Furthermore, for some reasons such as do-it-alone mindset, low quality and few data, inferior UX and performance, unclear value generation, and conflict of interest ecosystem, the numerous efforts of many reputable actors in this automotive industry, such as large car companies, have not achieved significant results. Customers know their data is valuable, so they might not be willing to give it away for free. Nationwide found that 62% of customers have privacy concerns regarding telematics. But they also found that this barrier can be overcome, since 65% of respondents say they would allow telematics devices to capture their data in exchange for a discount.

To address the mentioned issues, various solutions have been proposed so far, none of which have been successful for the following reasons:

1. In the first category, for complete privacy, it is proposed to store vehicle data on the driver's side. In other words, in this approach, the vehicle data owner hosts the vehicle data by providing the necessary hardware capacity and does not disclose it to the intermediary for storage. This solution faces two main challenges. First, the data owner must provide a large storage and processing capacity for data storage and processing, as well as marketing for his data.
2. In the second solution, in order to eliminate the need to provide hardware infrastructure by the data owner and also to ensure data privacy, it is suggested that the data be encrypted by the user's own key and be transmitted to the servers of a third party. In this case, the possibility of disclosure or unauthorized access to data is eliminated. Although data privacy is protected and there is no need for the user to provide hardware infrastructure, but because the data is encrypted, it is not possible to search and filter it, and therefore the third party cannot respond to requests for data purchase by data consumers. As a result, in order to respond to these requests, the user must retrieve his data from the third party and decrypt it, and after responding to the data requests, encrypt them again and send them to the third party's servers, which raises the problems previously mentioned (creating hardware and processing infrastructure on the user side). In some similar solutions, blockchain infrastructure has been used to store data in encrypted form, which in addition to the reasons mentioned above, due to the high volume of information and the limited size of blocks in blockchain networks, this solution is not operational.
3. In the third category of solutions, in order to enable the search of data stored on the third party, the data is encrypted by the user but sent to a third party with a set of searchable tags so that if a purchase request is sent to a third party, it can search among the tags and send encrypted information to buyer and also the data owner sends the data decryption key to the buyer. There are several challenges in this solution. First, the user has to tag the data and must insert different tags for his data according to various data requests. Even if it has the ability to insert tags, due to the need of buyers for clean and targeted data, the encrypted data needs to be marked with multiple tags. For example, time tags, car temperature tags, geographical tags, car type and brand tags, car speed tags, and many different tags that, as these tags become more accurate, actually expose a large portion of vehicle data.

Therefore, building an efficient and scalable business model that involves the capture, validation, provisioning, and distribution of massive volumes of vehicle data and driver behavior information is required.

Solution Overview

To address the aforementioned shortcomings, a blockchain-based approach proposed for designing an efficient, scalable, and incentive automotive data eco system. The blockchain technology as a shared, immutable ledger, has been shown the ability for facilitating the process of recording valuable data, and tracking either tangible or intangible assets such as car, cash, land, intellectual property, and patents in a business network. Hence, adopting the new technology (such as blockchain) can facilitate and speed-up complicated ecosystems such as connected cars, autonomous vehicles, and shared mobility. This approach provides incentive for market participants to supply, store and manage car data, develop applications, and roll out blockchain network. Moreover, active market participation and data generation incentivized by the proposed model, expected to encourage even countries without active automobile manufacturing to establish and grow their automobile-related businesses. Our approach provides a comprehensive and practical solution for automated car data for both the supply and demand sides.

Piod as an experienced company in automotive industry provides a solution to manage vehicle data value chain. The Piod solution provides an open platform where anyone is able to participate in sharing car data or processing it into more valuable output. Built on blockchain technology and designed with end-to-end security principles in mind, Piod solution is operationally stable while guaranteeing data security, as well as protecting the rights and personal data of market participants. Piod solution utilizes blockchain technology to improve the current automobile ecosystem that consists of numerous stakeholders. The core feature of Piod solution is clean automotive data providing, searchable data, ecosystemic prospective which allow all members to participate, voluntary provision and appropriate compensation for car data. Car users, manufacturers, service providers, and all other participants in the automobile industry will be able to provide car data and receive appropriate compensation for their contribution according to market value.

Piod solution consists of Blockchain and its supporting feature, Data Generators, Piod automotive data market, Piod Dapp store, data hubs, Piod Coin, IT Infrastructure providers, Dapp developers, data consumers, transmission operators. In the first phase, Piod may use the BSV (Bitcoin Satoshi Vision) blockchain technology infrastructure to create a transparent and secure platform for its financial and data transactions. With unbounded on-chain scaling, the BSV blockchain meets the needs of large-scale technology applications: high transaction volumes, fast speed, predictable low fees, micropayment capabilities, and greater data capacity. Its powerful technical capabilities enable smart contracts, tokenization, IoT device management, computation and more. BSV also

supports an environment-friendly and regulation-compliant blockchain ecosystem that enterprises and governments want.

In the Piod solution, the generated data is stored by a third entity called Datahub. Datahubs are actually intermediaries between automotive data generators and data consumers and in order to attract more users (more data) and respond to more requests from automotive data buyers, they will give incentives to get more data from data owners. These incentives can be a share of the revenue from data sales or the possibility of free or discounted use of some car applications. Thus, in a competitive process, data hubs will try to provide more incentives to their customers to create a larger user base than their competitors. The list of these data hubs and their financial offers will be displayed in the Piod automotive data market, and automotive data owners are free to choose from the data hubs the ones that benefit them the most. Automotive data owners can send their vehicle-generated data to a data hub through a secure channel based on public key encryption which is used in blockchain. In fact, the Piod device that is installed in the user's car, continuously generates data and sends it to the data hub through a secure channel that is tamper proof. The data can be decrypted and read on the data hub side. By storing this data on its side, Data hub can accurately respond to requests received from consumers of automotive data. Now, if a data hub sells car data without paying the car owner's share or discloses the user's data for any reason, the user's revenue share from that data hub will be reduced and because in the automotive data market, the revenue and privileges of other data hubs are also listed, users will migrate from that data hub to another with better conditions and motivations, and as a result, that data hub eventually will not be able to receive more up-to-date data and will lose its competitive advantage to respond to requests. Data hubs which cannot meet the needs of the market will lose its revenue and will be out of competition. In this way, data hubs will try to attract more buyers for their business, resulting in more revenue and thus more satisfaction for car data owners, while not disclosing their users' information.

The data hub architecture of Piod solution consists of three parts.

- A blockchain node. In data hub architecture, blockchain infrastructure is used in the following cases:
  - **Key Infrastructure Management:** This infrastructure is used to build trust between platform actors. Public key encryption infrastructure guarantees the privacy of all data exchanges within the platform, thus preventing unauthorized access to the data. All incoming messages, notifications, automotive data and financial transactions will be secured and non-manipulative through this infrastructure.
  - **Secure messaging and updating system:** In order to transfer and receive data and messages on the Piod platform, the blockchain network will also act as an secure messaging platform. This infrastructure will be used to update the software and firmware of the Piod devices. In this way, the Piod equipment becomes secure and resistant to unauthorized updates that occur by hackers.
  - **Validate data integrity:** As encrypting and sending data to the data hub, the data hash will also be stored as a fingerprint on the blockchain to ensure that the data is

correct. The data buyer (consumer), after receiving the data, hashes it out and matches it to the fingerprint the data on the blockchain to make sure the data is not tampered and also is generated by a real Piod device.

- A IPFS node. Encrypted automotive data is stored on IPFS part of data hub, and data transmission between data buyers and developers of Dapps with the data hubs are managed and performed through the IPFS platform. Also, if a data generator decides to change its data hub, data will be transferred to the new data hub via IPFS infrastructure.
- A webservice node. This part of data hub is responsible for filtering, sorting and indexing vehicle data in accordance with requests received from data buyers (consumers). In other words, when the webserver receives a data purchase order, refers to its IPFS server, and by categorizing and sorting the data, responds accurately to the customer's needs.

Market overview

The rapidly increasing amount and access to automotive data has attracted the attention of both stablished automotive and non-automotive companies, which seek economic potential from the newly available data pool. While the automotive industry is just starting to capitalize on the economic value of automotive data, so that this value is therefore difficult to assess credibly, other industries have proven that viable businesses can be built on data.

Prominent examples for successful data-driven business models are pure data companies (e.g., Google, $79 billion or Facebook $27 billion in revenues), digital services (e.g., Apple’s App Store, $28 billion) or data-based service platforms (e.g., Uber, $7 billion or Airbnb, $2 billion). However, these remarkable examples of successful data-driven business models are not directly translatable to the automotive industry. This is largely due to the fact that most of the examples given above generate their revenues from rather traditional advertisement. At least from today’s vantage point, it is doubtful, that advertisement as it is presented in Facebook or Google will find its way into the vehicles of tomorrow. It is more likely that new and yet unknown mechanisms and business models will need to be devised to make data-driven businesses applicable to the automotive industry.

Essential to the development of those new business models is openness with and access to data. In contrast to e.g., smartphones and computers, which have become open platforms for third party service offerings through app-stores and publicly available APIs, vehicles are traditionally designed as closed systems, offering only limited access to the data generated or used within it. The willingness of OEMs to grant a wider group of parties’ vehicle data than today is therefore key to unlocking the economic value of automotive data.

However, indications for a paradigm shift can be observed in the industry. For one, standardization bodies are currently developing a common standard for vehicle data access (ISO 20078), the VDA released a statement to grant access to vehicle data and specific OEMs (e.g., BMW) have recently announced plans to introduce data platforms for external service providers (e.g., BMW CarData). The

fact that selected OEMs (e.g. Tesla) have demonstrated how revenues can be generated from data-driven value-added services by using vehicle and passenger generated data to further develop their vehicles' functionality, has also helped to put digital data and services on the automotive industry's agenda.

In order to grasp potential revenue sources and develop according business models for the automotive context, the vast and diverse set of automotive data must be structured and classified. The in Piod car data ecosystem we will introduce a blockchain based solution to develop such a classification and segmentation of data, derive a value chain and identify potential business models based on it.

Key partners and players

The market being created by access to massive amounts of car data is broadening the set of players in the car ecosystem, providing new sets of value creation models, and generating a large number of (related) use cases and monetization options. In the following, we will first offer systematic overviews of all of these elements as an orientation on the market's strategy options (see also Text Boxes 3 and 4), before illustrating how individual players could approach the challenge of capturing the car data monetization opportunity (see also Text Boxes 5 and 6). In terms of relevant players, start-ups providing data-enabled services and established players from sectors that were once, at best, "automotive adjacent," are now finding themselves squarely in the thick of automotive's car data landscape. The following is a look at who is already active in the car data space and how they are making their marks:

Automotive OEMs

In addition to selling connectivity-related options and services (e.g., infotainment, navigation), OEMs are already becoming active in car data analytics to better understand how customers use their cars, shape their repair and maintenance choices, and improve the link between dealers and customers (e.g., allowing for real-time, remote booking of vehicle check-ups).

Automotive suppliers

They are developing the software and hardware that are forming the infrastructure capable of capturing, analyzing, and selling car data. Although the range of technologies and applications spans widely, suppliers are now facing the challenge of understanding how to leverage data to 1) reach end customers directly; 2) better serve their B2B customers; and 3) improve their own product and services portfolio.

Insurers

They are able to capitalize on car data by offering usage-based insurance contracts, exploring occasion-related policies (e.g., short-term, location-based motor insurance) and extending their understanding of customers' behavior beyond the yearly contract signing touch point.

Roadside assistance providers

They can collect and process distress calls in real time from vehicle sensors and automated alerts, optimize the dispatching of rescue vehicles, but also analyze accident and breakdown data to provide valuable information to car OEMs and road infrastructure operators.

Infrastructure operators

Infrastructure operators including billing/toll road operators and recharging/refueling players, are analyzing car data to optimize the geographic deployment of their respective services, explore variable-pricing options, and monitor the status of their assets to reduce maintenance costs and improve safety.

High-tech giants

They are positioned to provide the fundamental car data analytics services that car OEMs and advertisers are willing to buy. In addition to being the IT backbone, they can offer front-end applications. Moreover, as the car is a central environment for digitization, multiple high-tech giants are developing in-car platforms and operating systems to boost the data generation and provide seamless connectivity experience across handhelds, vehicles, and other connected environments (e.g., the home). As we will see later, some functionalities, such as "smart, voice-activated virtual assistants" (e.g., Apple's Siri, Google Now, Microsoft's Cortana) might be the "killer applications" to persuade OEMs to offer their platforms and to motivate customers to share an even larger chunk of their data (as described in Text Box 7).

Start-ups

They are the smaller counterparts of the high-tech giants, entering the car data monetization space from a variety of angles, such as developing new apps, engineering innovative hardware/interfaces, and offering services through innovative monetization schemes (as, for example, Pandora and Spotify did for music-related content).

Service providers

Service Providers offer data management services (e.g., analytics, pseudonymization, storage) and operate the back-end infrastructure and processes (including customer care, invoicing/billing) for the players in the ecosystem.

Mobility providers

They already rely on car data to be able to offer their services such as car sharing and e-hailing. They use the power of car data (e.g., car location, usage, battery status) and user data (e.g., customer ID, credit, preferences) to even further approximate public transportation infrastructures and improve vehicle allocation, recharge, and fleet operations.

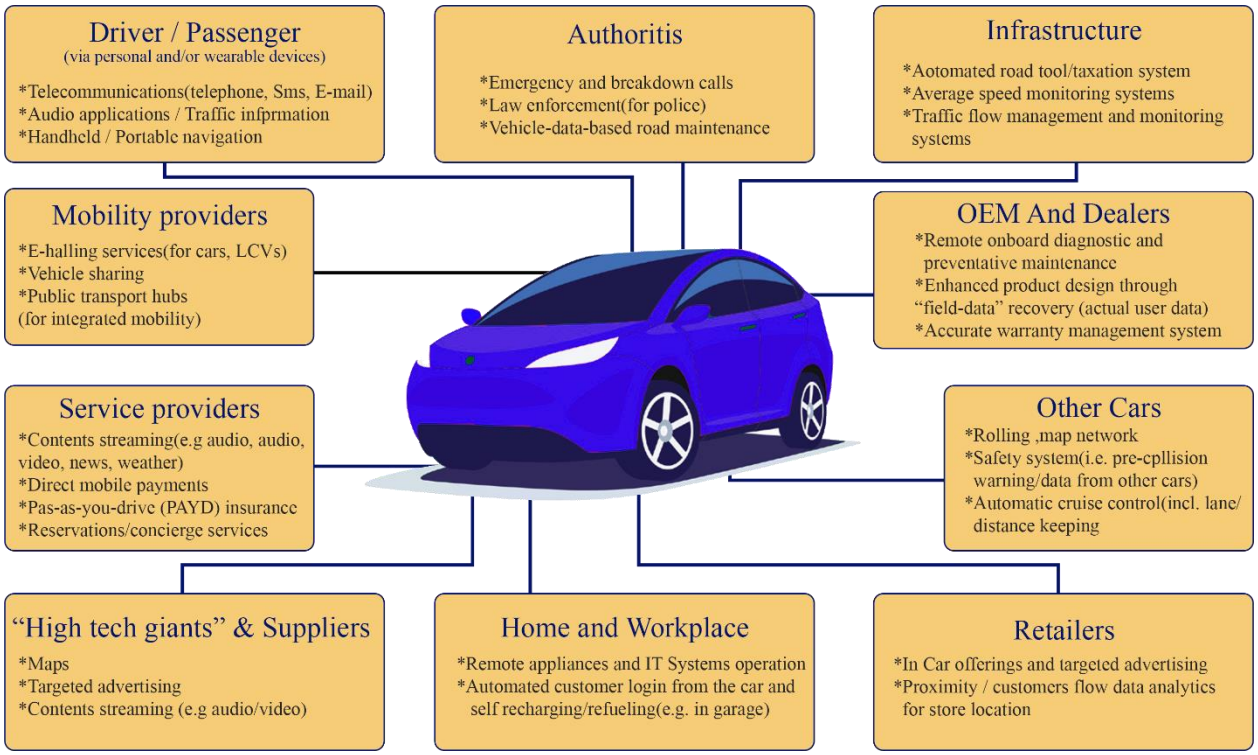
Retailers and service centers

They are using car data analytics to optimize their sales network and get the messages about their offerings directly to drivers. For example, by purchasing traffic flow data, retailers can define with greater precision their stores' footprint (i.e., number, type, and location of stores) and their inventory on the basis of

actual traffic data, even segmenting the type of end customer actually driving in front of the store. Assuming they obtain customers' clearance, they could push highly tailored advertising to car screens and drivers' handheld devices on the basis of proximity and customer preferences.

Regulators/government institutions

They are setting the standards regarding the collection and sharing of car data. They are also in a position to mandate car data-enabled services that support the public good, such as emergency call features, and regulate controversial topics, such as technical certification of the connected vehicles, data ownership rights, and intellectual property rights over shared technologies and services. Working with infrastructure operators on big data, regulators can also seek to minimize congestion and reduce car accidents using traffic flow data analysis.

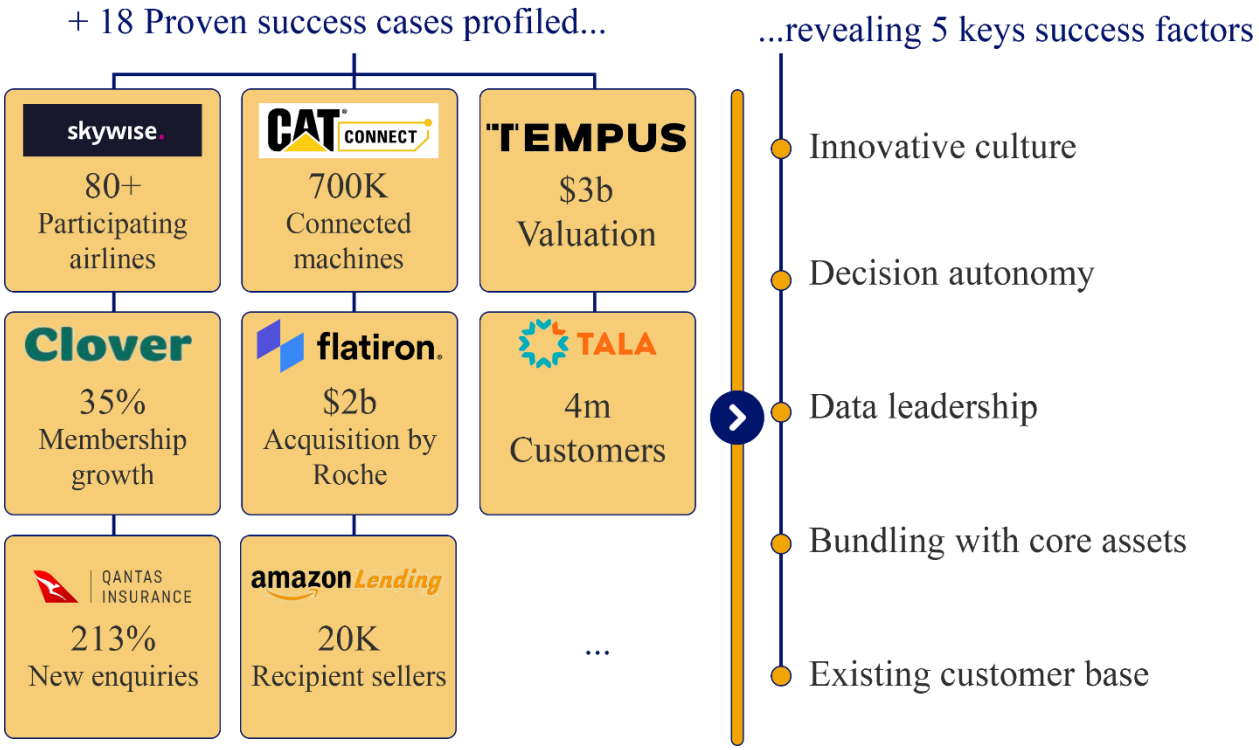


THE CAR DATA MARKET IS JUST BEGINNING

The following information are the result of McKinsey Institution on business models in the automotive data market and shows that this market is just beginning and there is a lot of potential for growth in this market.

- Data privacy is deemed critical in order to enable new features and services from car data. Today, despite the stated privacy concerns, 71% of surveyed drivers consciously share their data in exchange for tangible benefits.
- Data connectivity will generate a vast set of benefits that customers will likely want to pursue, leveraging their personal data as "currency." The value represented by this "currency" is already significant and expected to grow rapidly over the years to come.
- Customer attitude towards privacy and data sharing suggests that the car data "revolution" may be led by China (where > 90% of customers are willing to share their data with auto OEMs) and by younger car buyers globally, as a large share would switch their current OEM for improved connectivity features and > 60% is interested in owning autonomous vehicles.
- Car data monetization opportunities will grow incrementally for industry players along the mobility value chain, as car data is likely to generate value through increased revenues, reduced mobility cost, and increased safety and security.
- Autonomous driving has the potential to create a step change in the value of car data, since up to 50 minutes of the user's traveling time per day become available for other activities (e.g., working, sleeping, online shopping).
- The new business models have the potential to transform transportation into a service, as mobility might even be offered for free to end-customers in selected environments.

Across industries data businesses scale successfuly



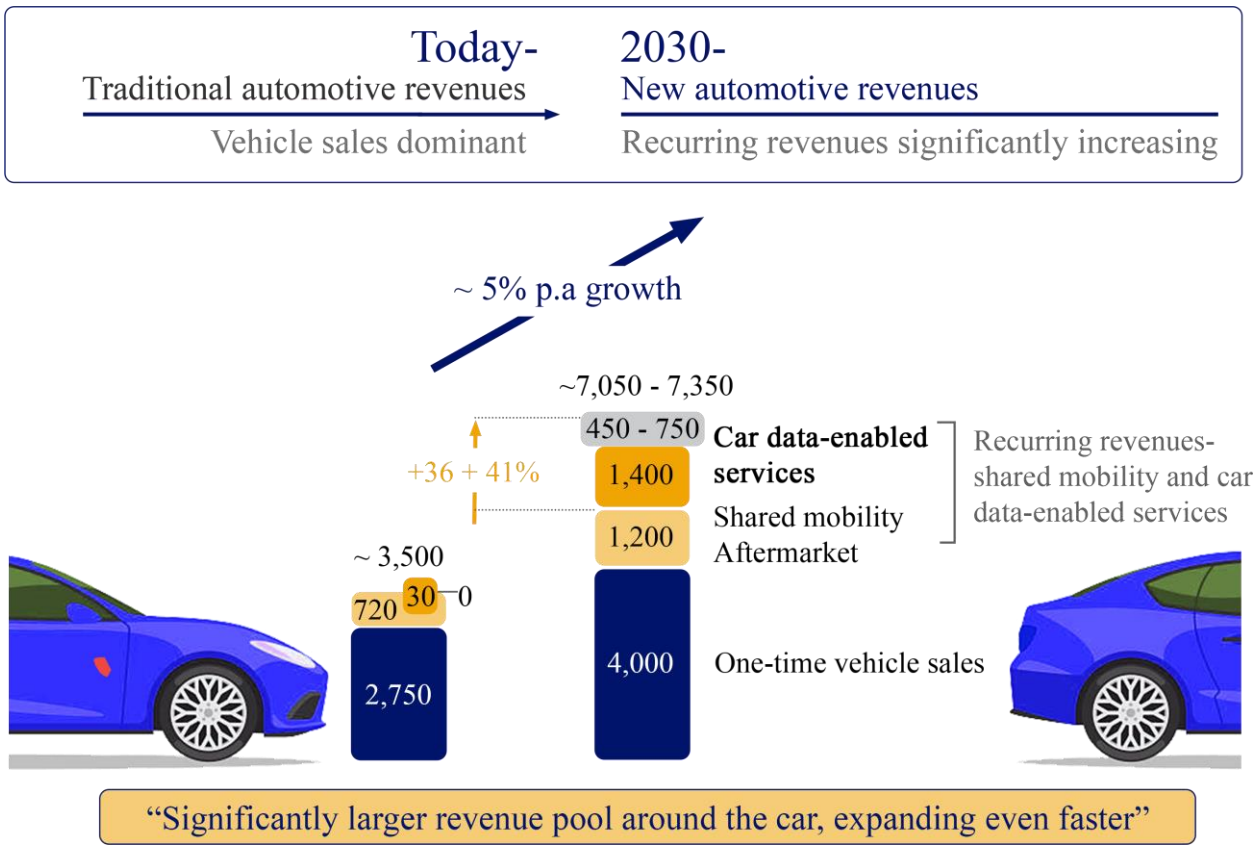
Car data holds significant value for customers, as shown by their increasing willingness to share data and, at the same time, to pay for connectivity features and services. As a result, data will create significantly more value for customers and industry players, becoming a "currency" enabling them to access benefits in exchange for data sharing. The trends around connectivity, autonomy, and diverse/shared mobility will optimize customer travelling time and will probably be driven by China and younger car owners. The car will become an environment that allows users to perform and enjoy activities other than driving while traveling. Customers might be offered mobility services in exchange for watching targeted advertisements, providing product feedback, or purchasing while in the car. This might transform the car into a "control point" for many purchasing experiences and greatly expand the potential of customer influencing and spending done in the car. From a business perspective, car data-enabled business models could trigger a new wave of opportunities, increasingly hinging on what happens "during" personal transportation. As these opportunities will be shaped by technological and business-related choices that will be made in the next three to five years, a set of strategic questions need to be addressed by industry players aiming at shaping the scenario going forward, e.g.:

- How can customer value be created and communicated, in order to ensure that data sharing will be perceived as a "fair deal"?
- How should customer trust be built and maintained?
- What technologies and innovations might be needed to deploy the new offerings?

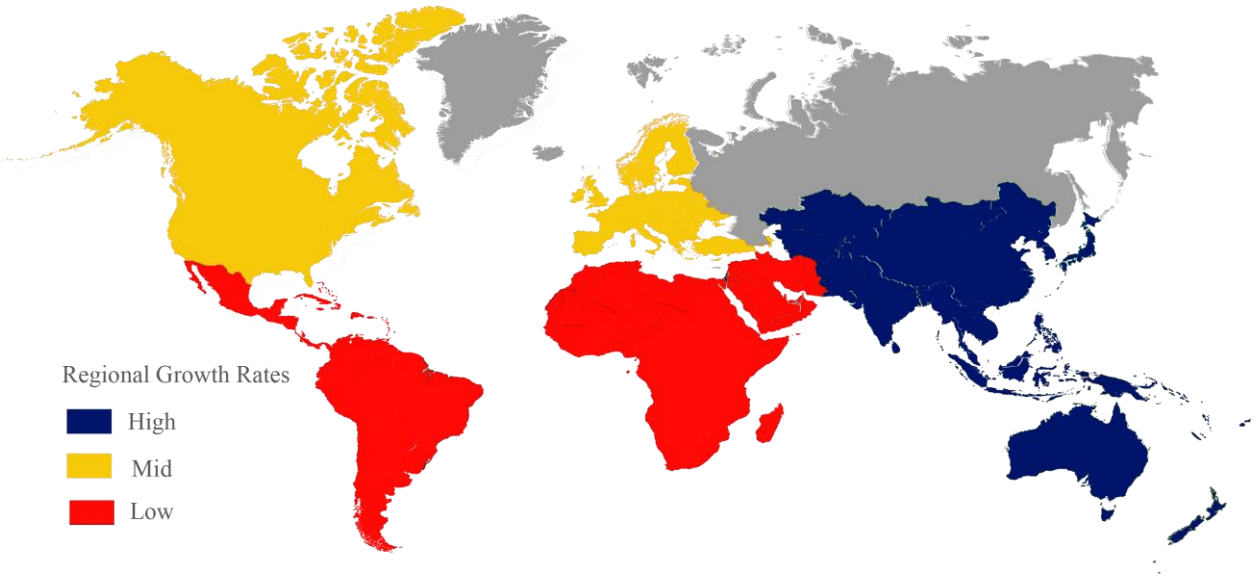
- How could scaling and network effects be leveraged to ensure viable economics for the new business models?
- What organizational model and specific capabilities will be required to succeed in launching and (most importantly) monetizing car data-enabled business models?

Market size

The big data market in the automotive industry was valued at USD 3,607.47 million in 2020, and it is expected to reach USD 8,929.37 million by 2026, registering a CAGR of 16.81% during the period of 2021-2026 and global revenue pool from car data monetization could be as high as $750 billion by 2030.



Automotive Data Monetization Market - Growth Rate by Region (2021 - 2026)



Major Players

1. IBM
2. Caruso Dataplace
3. Microaoft
4. Tesla
5. Oracle

Market Concentration

Consolidated - Market dominated by 1-5 major players

Automotive Data Monetization Market

Fragmented - Highly cometitive market without dominant players

Recent Developments

- April 2021 - Ford Motor Company introduced its "Power-Up" over-the-air update capability to make remote improvements to its trucks and cars, with a goal of rolling out 33 million vehicles by the end of 2028. The new system would collect data on millions of commercial and consumer customers, allowing automakers to generate cash.
- December 2020 - A multi-year deal was announced between Amazon Web Services, Inc. (AWS) and BlackBerry Limited to develop and sell IVY, BlackBerry's intelligent vehicle data platform. Ivy enables automakers to collect

automobile sensor data uniformly and securely, normalize it, and generate actionable insights as needed. The data can also be utilized to improve the experience of passengers and drivers.

Problem

An automobile generates a diverse collection of data throughout its journey from start to finish—beginning at the car manufacturer and ending at the scrapping facility. The data reflects the lifecycle of the car and could be used to improve the state of car manufacturing, car rental, car sharing, insurance, and vacation industries. However, no commonly agreed-upon standard or system currently exists for the systematic collection, storage, and use of this data. On occasion, car data may be utilized by independent service providers, but oftentimes they overlook the potential of generating further value from the car data and fail to make full use of it.

Unsystematic Collection of Data

While data from external and in-car sources about vehicle usage, equipment, and components has long been available, the systematic collection and management of the data has been extremely limited. Most car manufacturers and service providers rely on individualized systems for data storage and management. Only with the recent introduction of connected cars, have electric vehicles, and autonomous cars enabled the use of V2X data, generated through interaction with roads, vehicles, pedestrians, and the overall traffic infrastructure. Following advancements in the electric vehicle industry, not only in-car data but also charging and battery-related insights are being recognized as valuable information. The progress on smart cars has also increased demand for user data generated by various applications.

The problem is that the format of collected car data varies by vehicle manufacturer and service provider. In most cases, the data is technically incompatible with other systems and cannot be shared. While legislative limitations might partially account for the lack of data sharing, the main obstacle to sharing car data is the lack of a common technical framework. Since there is no public protocol for gathering data, it is impossible for participants to be properly informed about how their personal information is being used and whether agreed boundaries for data use are being respected. Additionally, even if individuals agree to share their data with service providers under contractual agreements, they are not fairly compensated for their contribution.

Currently, there is no institution or company that performs comprehensive collection of valuable car data generated in each part of the vehicle operation process, covering the communication systems, internal and external systems, and the application layer.

Inefficient and Uncompensated Data Provision

Access to car data opens up new business opportunities for service providers to offer customized services to car users. However, because there isn't an equal relationship in data transactions between car users and service providers

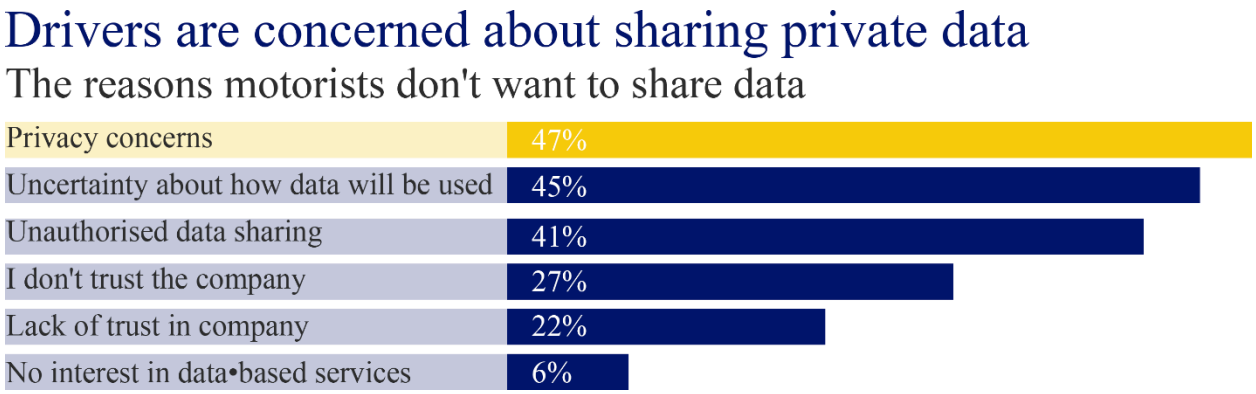
(such as car manufacturers, developers of automobile services, car insurance providers, etc.), there is also no means of rewarding car users for their provision of data. Personal data only serves as evidence of contract fulfillment, rather than amounting to any generation of additional value. In particular, service providers that are unable to provide a high level of data protection can easily end up misusing
customer data beyond the bounds of agreement and even leaking the data.

Therefore, there is a need to establish a trustworthy platform that can quantify the value of car data and provide a fair compensation system for data contribution. In this way, both data providers and data consumers will stand to benefit from the exchange

Insufficient Data Security and Privacy Protection

Car data can be categorized based on whether or not it includes personal information. Car data that includes personal information must be collected and stored in a manner that provides adequate privacy protection in accordance with the rights of the data subjects. In particular, any distribution of such data must follow protection protocols and processes. For instance, collection and storage of sensitive data such as daily driving patterns without proper security measures can give rise to social issues regarding privacy. It's crucial to address the current method of relying on portable devices (SD cards, etc.) for storing important data generated within the vehicle, data transmitted via internal vehicle networks, and additional vehicle-related data.

Any information that includes private information must be shared and utilized only after completing de-identification of the data for adequate privacy protection. Car data that is not shared or used only has potential value without any actual value. Due to the current lack of rules and security guidelines surrounding car data, the sharing and use of car data can only be perceived as a risk, rather than an opportunity for creating value.



Lack of ecosystemic prospective

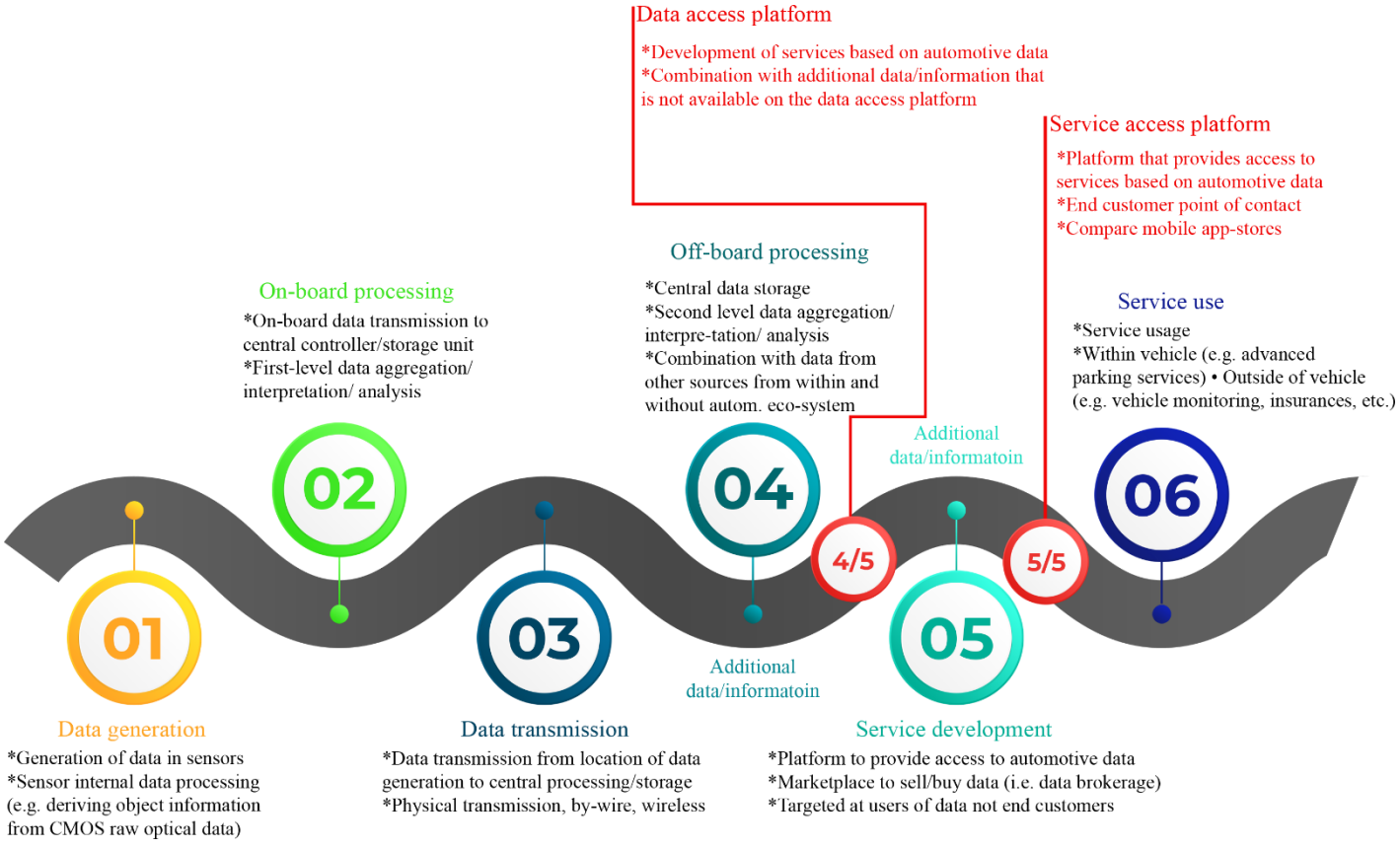
So far, many efforts have been made to properly manage automotive data, but due to the lack of an ecosystem and platform approach, the platform for the participation of all actors in the automotive data value chain has not been provided. Two of the five main reasons for not developing a comprehensive solution till now, do-it-alone mindset and the existence of conflicts of interest between actors are evidence of this claim.

We believe, Unleashing the potential of automotive data will be possible through the creation of a participatory platform with the presence of all actors active in the automotive industry value chain.

Automotive value chain and stakeholders' classes

Similar to a value chain for production goods and services, we expect an automotive data value chain to merge which comprises the necessary activities for commercial usage of data. This value chain describes the necessary steps from raw data to an application of data in form of a service.

Exhibit below, depicts a generic value chain for automotive data. It consists of 6 distinct value creation steps and incorporates platforms with which data and services are made available to a specific set of stakeholders. Similar to value chains for tangible goods and services, each processing step within the value chain increases the value of the underlying data.



The generation of raw data marks the beginning of the automotive data value chain. Subsequent to a sensor internal processing, these data are transmitted to electronic control units for further vehicle on-board processing (Piod sensors). As a prerequisite for a usage of data beyond the physical vehicle systems, a transmission of data to a central processing and storage entity is required (Piod device), which will most likely take place via WLAN or mobile communication connection.

The off-board processing of data on servers is a key value chain step for generating economic value out of vehicle-related data. Further data analytics and evaluations can be performed due to a much larger amount of available data sources and higher processing performance (data hub). Furthermore, external data from other sources, e.g. infrastructure data, can be combined in this step. In many other competitors' products, the access to data is restricted to OEMs, thereby limiting the potential to capture economic value.

Piod solution provides access to automotive data to further parties therefore represents a key element for the monetization of those data. As it stands today, OEMs and some third parties have begun to establish data access platforms, which collect data and provide it to downstream processes. Publicly accessible data access platforms which are run by OEMs such as PSA's P4D or BMW's CarData exist, but are rather limited. Typically, those platforms offer selected data from a single OEM and allow a well-defined set of manipulations on those data. In contrast to OEMs, Piod solution can collect data from a wider range of sources and offer the collected data publicly to a wider range of potential customers.

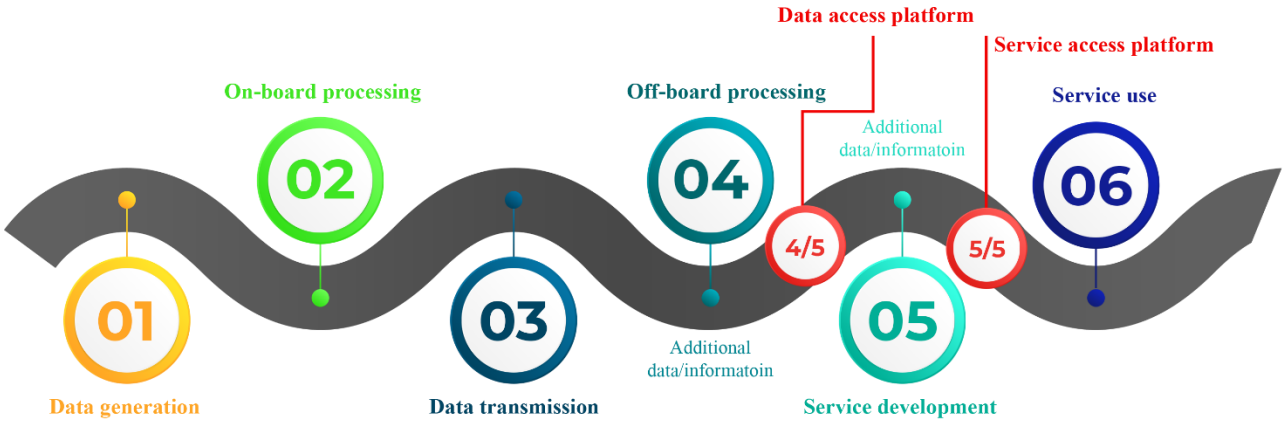
In contrast to the aforementioned data access platforms, Piod defines "data access platforms" as marketplaces in a wider sense. In that sense, a data access platform represents a marketplace in which data from potentially all data sources in the automotive eco-system is made available and being exchanged to potentially any party who is interested in those data.

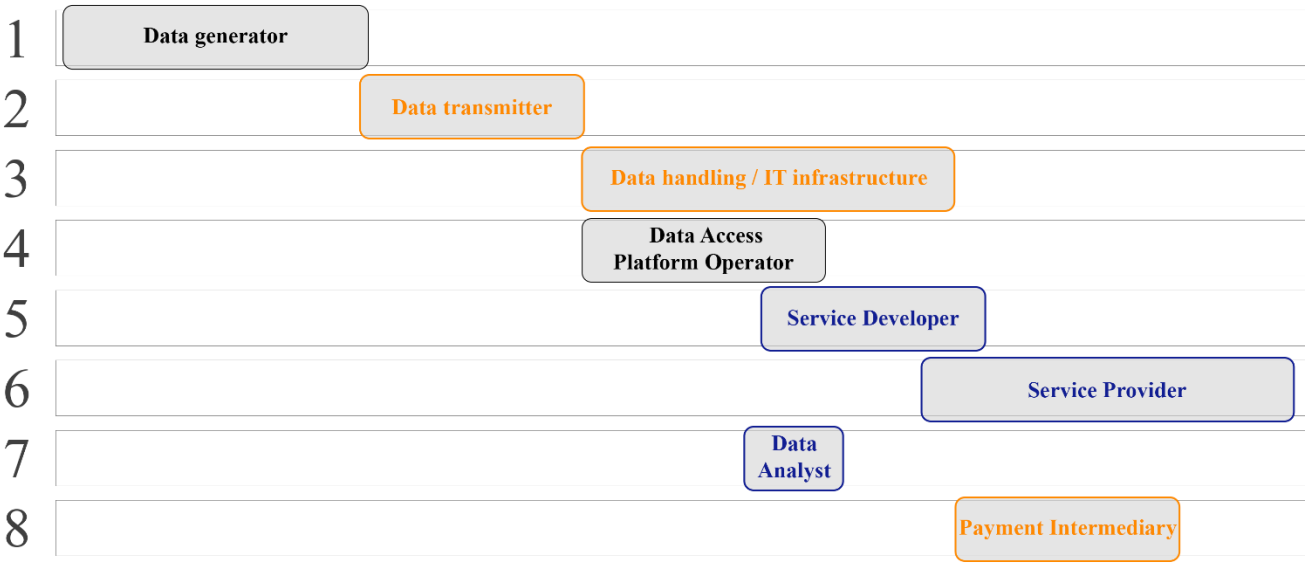
While data can also be monetized along other steps of the value chain, the data access platform acts as the central market place in which prices are formed and value is attributed to different types and qualities of data. As economic value goes unused if data is not made available to a broader circle of potential buyers, it is expected that data access platforms that start out OEM only" will eventually open-up to a wider audience.

By means of the described access platform, automotive data is made available to interested parties, which can then develop their services on those data as a next step in the value chain. In that step, data from the access platform is used to build a service offering appealing to an end customer. The developed services are subsequently made available to the service users via a service access platform and Piod token. Similar to the data access platform, this platform also represents a marketplace on which service developers/providers offer their solutions to end customers. Although the data access platform and the service access platform will potentially be hosted on the same server or at least be operated by the same market player, both platforms serve different purposes and different audiences.

The final step in the automotive data value chain is the actual use of the service (e.g. advanced parking services) in a vehicle or at any other place. It is in this step in which monetization of automotive data is most obvious. Nonetheless, data can be monetized in any of the described steps of the value chain.

Monetizing data along the value chain





Legend:
Data providers
Data users
Intermediaries

Legend:
Data providers
Data users
Intermediaries

Data Generators

The Data Generator represents the player in the very first step of the value chain, generating or collecting data close to its source (e.g. within the vehicle). Today, OEMs or large Tier1 suppliers can act as an example of the data generator business model, selling the data produced during the operation of the vehicles to other parties. However, the data generator business model is not limited to

suppliers or OEMs but is valid for other players as well. Google for instance already acts as a data generator for traffic data by collecting mobile phone and movement data via Android devices and selling them to other parties. Another example are parking operators selling their data on available parking spots to developers of parking apps or navigation systems.

Data Transmitters

The Data Transmitter monetizes on breaching the physical gap between the location of data generation and its central storage (Data hub). Natural candidates for this role are telecommunication companies such as Deutsche Telekom or Vodafone.

Data handling and IT infrastructure

The processing of digital data along the value chain requires not only data transmission infrastructure. At minimum, a data handling and IT infrastructure needs to be in place to collect, store and provide access to data, which offers another way to monetize on automotive data. The data handler and IT infrastructure provider establishes performant server architectures and monetizes them on the back of e.g. provided storage capacity.

Data access platform operator

The data access platform operator collects data from generators and/or transmitters and makes it available on an established IT infrastructure. It defines the design of the access platform and charges a fee by Piod token for the transactions on the platform. Some OEMs (e.g. Peugeot with the PG4D) have started to adventure into this role but have yet to monetize on it. While at this point, it is too early to judge, whether the prime revenue stream will be from charging parties that want to buy or parties that want to sell data, it is expected that access platforms will need to find a way to get reimbursed for their costs, be it through advertisement or any other form.

service developers

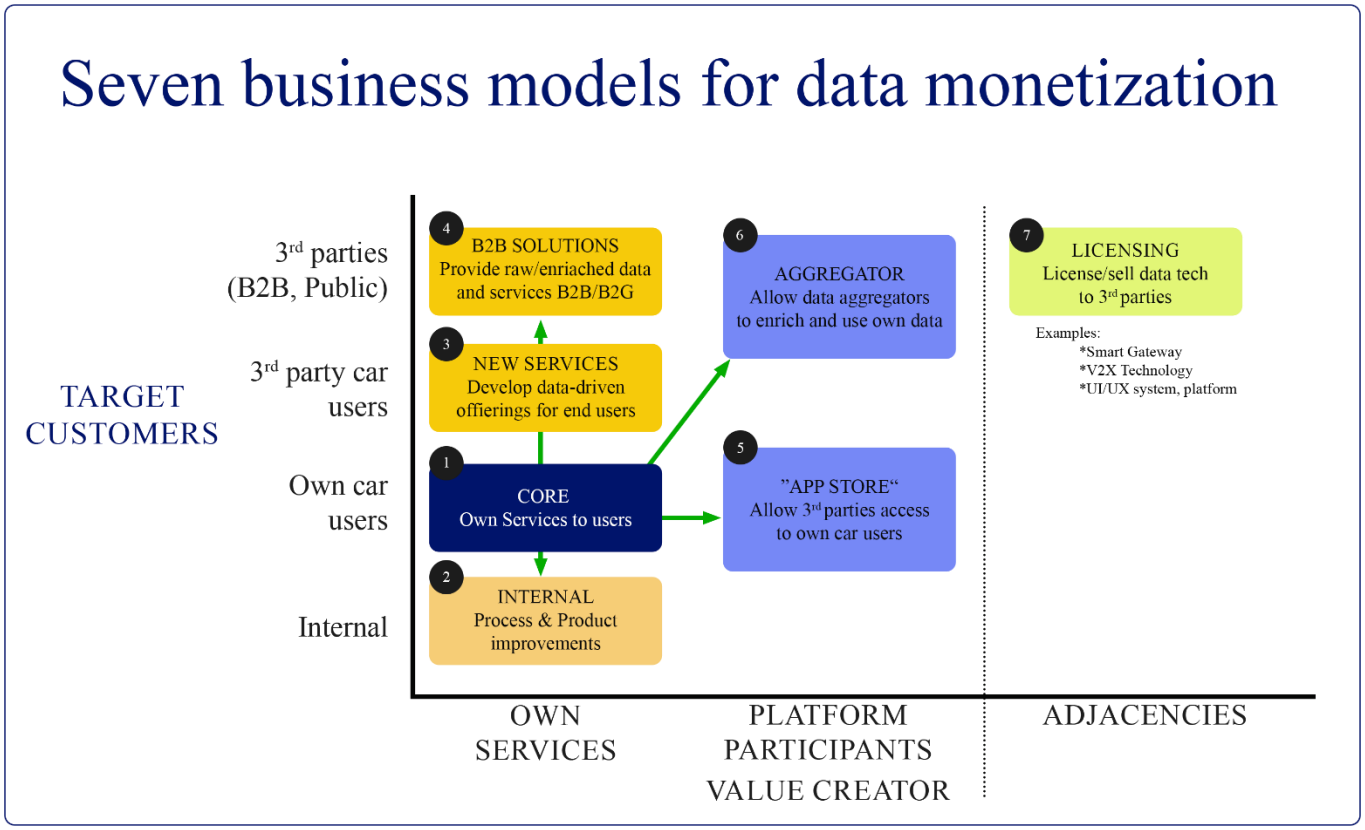
With access to automotive data, service developers can make use of the information made available to develop compelling services (Dapp) for users within and beyond the automotive eco-system. Natural candidates for this role are e.g. app developers for smart devices or software development companies. But also, OEMs or other traditional players in the eco-system such as parking providers could take this role. Essential to this business model is that the service developer is reimbursed for the development of the service (e.g. the developed app) and is not necessarily providing the service to the end customer.

service provider

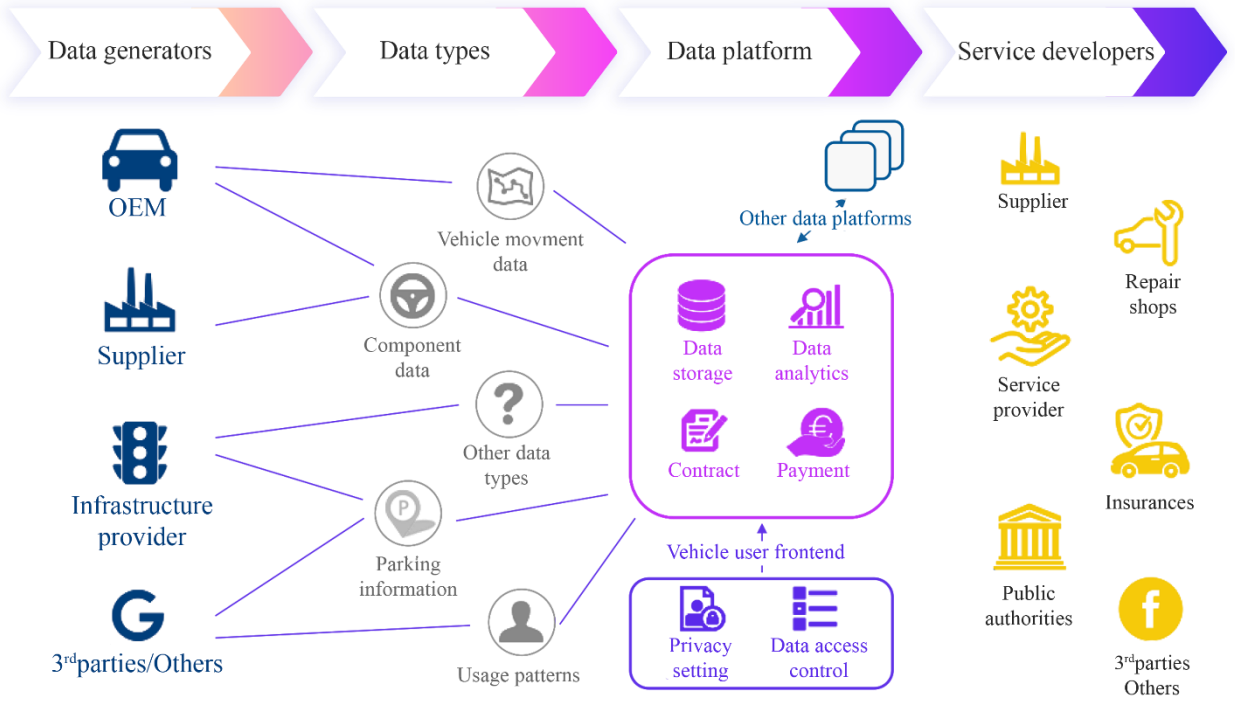
This is the role of the service provider, whose business model is not developing a service, but offering a service to an end customer. The business model builds around usage fees raised for the end customer, while the service developer gets reimbursed from the service provider. The relationship between a vehicle driver (i.e., the end customer or service user), an OEM (the service provider) and a software development company (the service developer) illustrates the concept.

payment intermediaries

At the end of the value chain, service usage poses another business opportunity for payment intermediaries, which handle the billing and payment of the end customer for using automotive data-based services. OEMs which plan to offer additional data-based services in their vehicles face the added challenge (in contrast to e.g. Google) of their limited experience in managing usage based payment schemes, as their business model is based on one-time sales. Consequently, their internal processes and structures are geared towards one-time sales and not set up (yet) to effectively and efficiently handle usage-based payment. Payment intermediaries from other industries (e.g. telecommunications) on the other hand, do have this experience and may enter the playing field offering their services to either the service providers or end users. These dynamics are especially transparent whenever micro-payments are involved, for instance paying a parking ticket via the monthly mobile phone bill.



When considering the above-described business model archetypes, three groups of archetypes emerge according to the nature of their offering. Data generators and platform operators can be clustered to data providers. Service developer, service provider and data analysts on the other hand can be described as data users. The data transmitter, data handling/IT infrastructure and payment intermediaries all provide intermediary services.



Concept of an automotive data access platform

Our solution principles

The connected car data market challenges typically involve three major pillars, all of which must be resolved as a part of an effective business model for providing connected car services.

DATA MANAGEMENT: INTEGRITY, SECURITY, AND PRIVACY

Building a business model that involves the capture, validation, provisioning, and distribution of massive volumes of vehicle data and driver behavior information requires considerable expertise and supporting infrastructure. Under the umbrella of data management, several specific areas of data handling must be addressed to meet the concerns of OEMs.

Transparency

Every byte of data about a vehicle and the driver operating that vehicle must be subject to full transparency and consent. The driver must be consistently informed of what automotive data is being collected, how it will be used, how long it will be stored, who else will have access to it, and what prerogative does the driver or vehicle owner have for terminating consent given for the use of this data. The most effective Big Data applications associated with automotive use assume an always-on model that can capture vehicle data throughout its cradle-to-grave lifecycle, whether it is in motion or parked, and includes a very wide range of parameters. The vehicle operator must give consent for the collection and use of every one of these parameters—from vehicle location to data capture of driver operations (speed, braking, the G-force of turns, and so on) to identifying the person behind the wheel at any given moment.

Privacy

Different jurisdictions around the world have varying levels of regulations and mandates in terms of an individual's data privacy. These laws and mandates can be complex and in some case overlap depending on the region and even the state. Data privacy is important both for legal and regulatory measures with which the OEM and any partners must comply, in addition to the basic business principle of respecting and protecting all information that relates to their customers.

Failure to pay attention to data privacy could subject the OEM to fines or loss of their stature in the industry, as well as casting a dark shadow over the way that they are perceived by customers. When working through a service or intermediary that is handling data on behalf of an OEM, the OEM must ensure that strong data privacy protections are included in any agreement and followed consistently.

Security

Ensuring secure data exchanges is integral to any data monetization effort. Part of this involves monitoring and tracking where data is being sent, where it originates, and whether encryption is used consistently to secure data while in transit. Any areas in the data path that potentially allow intrusions or are vectors for abuse should be remediated to mitigate the risk. Risk has many different dimensions and security should always be implemented anywhere that a risk potential is identified. With rigorous, secure data protection mechanisms in place, hacking becomes a non-issue, rather than a concern for OEMs.

Required Vehicle Equipment

Many different mechanisms exist for capturing and transmitting vehicle and driver data. The hardware and software supporting this effort should be factored into the plan for monetizing car data. The range of hardware and vehicle types supported introduces a layer of complexity. Of critical importance to any monetization, program is the capability of collecting, cleansing, normalizing, and unifying collected data so that irrespective of the OEM's hardware decision, the vehicle and driving information is delivered to each beneficiary in a uniform, usable format. Monetization demands that the management of data across this spectrum of devices in a consistent, verifiable manner. To maximize the data value, this management should include the earliest devices in the market, all those operating today, and new devices as they are introduced (always maintaining backward compatibility).

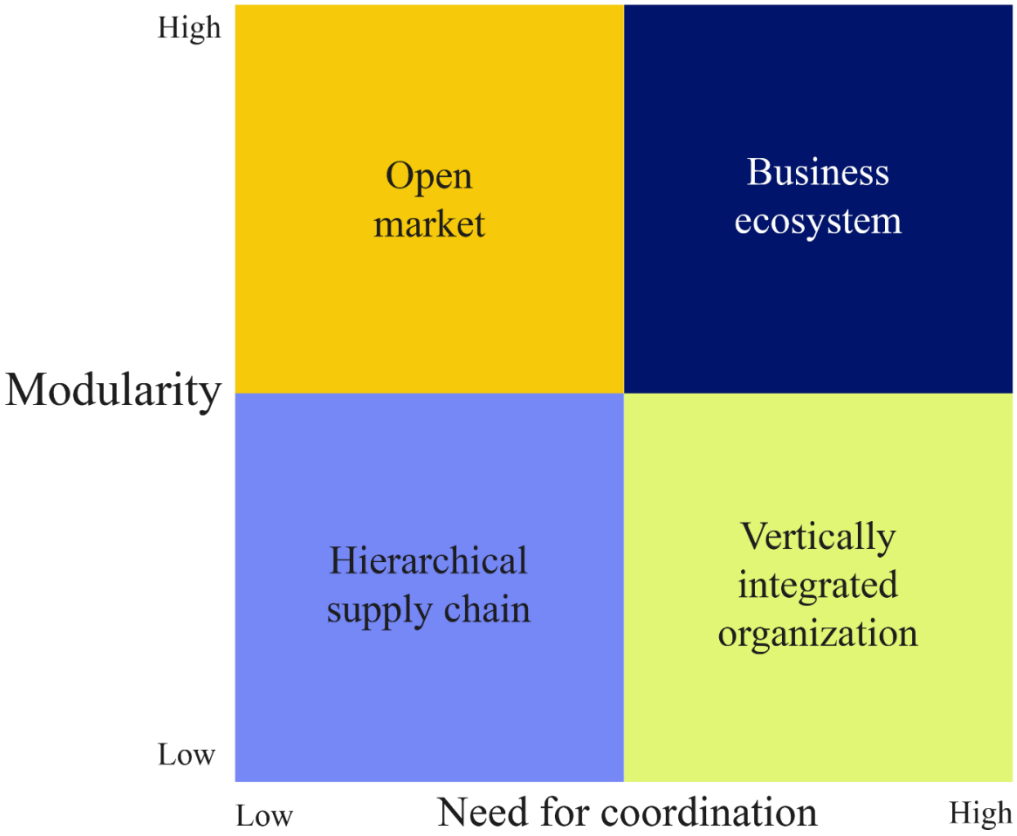
Ecosystemic prospective and model of GOVERNANCE

A business ecosystem is the network of organizations—including suppliers, distributors, customers, competitors, government agencies, and so on—involved in the delivery of a specific product or service through both competition and cooperation. The idea is that each entity in the ecosystem affects and is affected by the others, creating a constantly evolving relationship in which each entity must be flexible and adaptable in order to survive as in a biological ecosystem.

Business ecosystems are economic communities that are supported by foundation of interacting organizations and individuals that are usually created around platforms.

Business ecosystems offer three critical benefits: **access to a broad range of capabilities, the ability to scale quickly, and flexibility and resilience.**

How to Find the Right Governance Model



Since there are many actors in the automotive data business and the delivery of the final product to the end users needs high level of cooperation between these members, the ecosystem business model will be a efficient method. Perhaps this is why the do-it-alone mindset model has been one of the five main reasons for the failure of automated data monetization solutions.

Incentive

Customers know their data is valuable, so they might not be willing to give it away for free. Nationwide found that 62% of customers have privacy concerns regarding telematics. But they also found that this barrier can be overcome, since 65% of respondents say they would allow telematics devices to capture their data in exchange for a discount.

Piod solution and goals

The vision of PIOD is to create a secure and reliable environment for sharing car data that builds upon our expertise in the automobile industry. The first step in achieving this is to solve the current problems in the automobile data industry as explained in detail above.

Online, continuous and standardized collection of automotive data

Compensation System for Data Provision

To solve the problem of non-standardized, low quality, and fragmented data collection systems, a range of hardware and software data collectors should be developed under a specific standard. These include a hardware data collector, a mobile application as an interface among driver and data collector device and service providers, software embedded into a car's telematics systems, and software data collector for V2X devices.

At the first steps, Piod company designs all mentioned software and hardware and other manufacturers and developers also can develop their Piod compatible products to join Piod automotive data ecosystem.

Following a car's entire lifecycle, from the first registration of the car in the ecosystem, to records of any accident history or services engaged, to the final scrapping of the car, it is possible to systematically collect car data for a wide variety of uses, regardless of national boundaries or type of vehicle. Furthermore, specifications and standards for car data will be publicly available so that anyone will be able to participate and contribute to the car data market. This will prevent Piod from monopolizing car data as a business tool. To this end, a public blockchain is necessary in allowing this type of open data sharing.

Data will consist not only of what is generated by drivers and other car users (Car Data), but also secondary generated data (Processed Car Data) from those who provide any kind of services within the auto industry. The specifications for Car Data and Processed Car Data will also be define ed and shared through the blockchain in order to encourage use.

Piod provides users with the Data and application Market, a blockchain-based car data market, which is an environment that facilitates exchange between data producers and consumers. Piod Market solely provides the environment for trade and does not assume data ownership rights. Car data becomes a commodity, and data producers and consumers contribute to determining the value of car data. Any market-based value transaction involving provision of car data and service fees will be rightfully compensated with Piod Coins.

This compensation model provides incentive for market participants to supply car data, store and manage data, develop applications, and roll out blockchain network. In the future, active market participation and data generation incentivized by the compensation model is expected to encourage even countries without active automobile manufacturing to establish and grow their automobile-related businesses.

Applying Data Security and Privacy Protection to the Blockchain

Car data will be stored on Data hub infrastructures (IPFS) and its proof on the Blockchain, along with other relevant information about the transaction, data ownership rights and data usage rights. Similar to the way data is typically stored on the blockchain, fingerprint of all this data will be stored in blocks. The raw data, which contains sensitive personal information, can be encrypted and fragmented in order to preserve maximum security by any registered Data hubs (which Piod will also run the first Data hub). Data hubs which is selected by data owner (Drivers) will provide data storage resources in exchange for proper compensation. Storage space created through this organic system is therefore potentially limitless.

Data in distributed storage is delivered in a secure channel on request of the data buyer, only with the authorization of the rightful data owner. This process of verifying credentials and permissions is facilitated by Piod Platform. However, Piod Platform is only involved in making the peer-to-peer connections and retains absolutely no access to the data.

DAO as Piod Platform Governance Model

To avoid PIOD monopoly in the governance and decision-making process for the automotive data solution, the decision-making process will be left to a DAO. In this DAO, eligible members can vote for the future of the system and participate in its governance process.

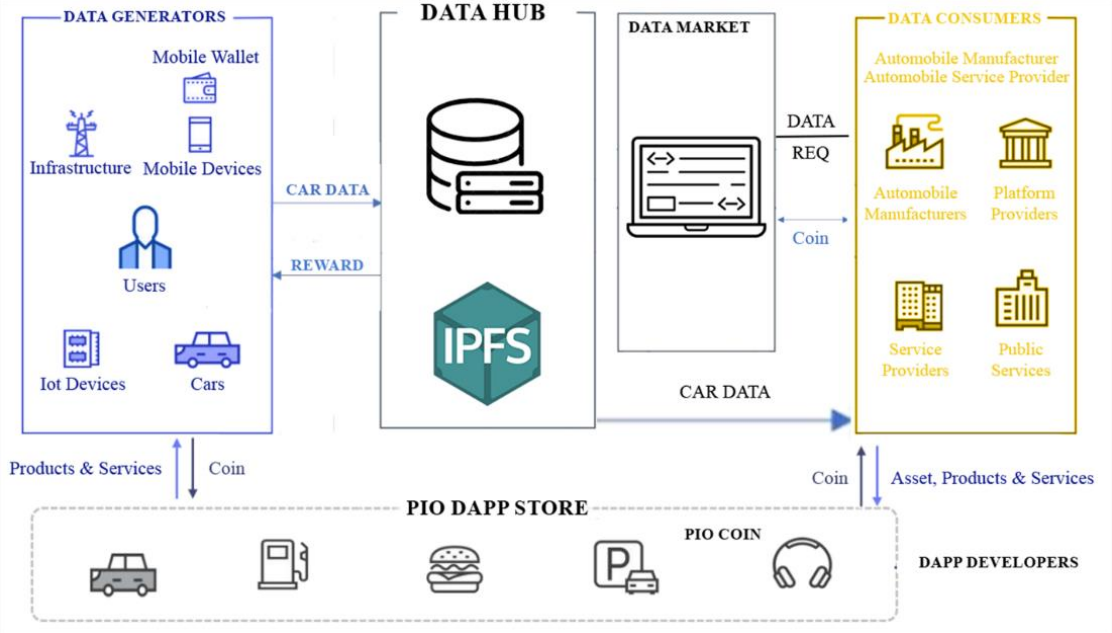
In this way, the system will be run democratically, and as a result, the playing field will be leveled for the cooperation of multiple stakeholders, thus preventing conflicts of interest.

Piod solution in detail

The Piod solution provides an open platform where anyone is able to participate in sharing car data or processing it into more valuable output. Built on blockchain technology and designed with end-to-end security principles in mind, Piod solution is operationally stable while guaranteeing data security, as well as protecting the rights and personal data of market participants.

Architecture based on automotive data value chain

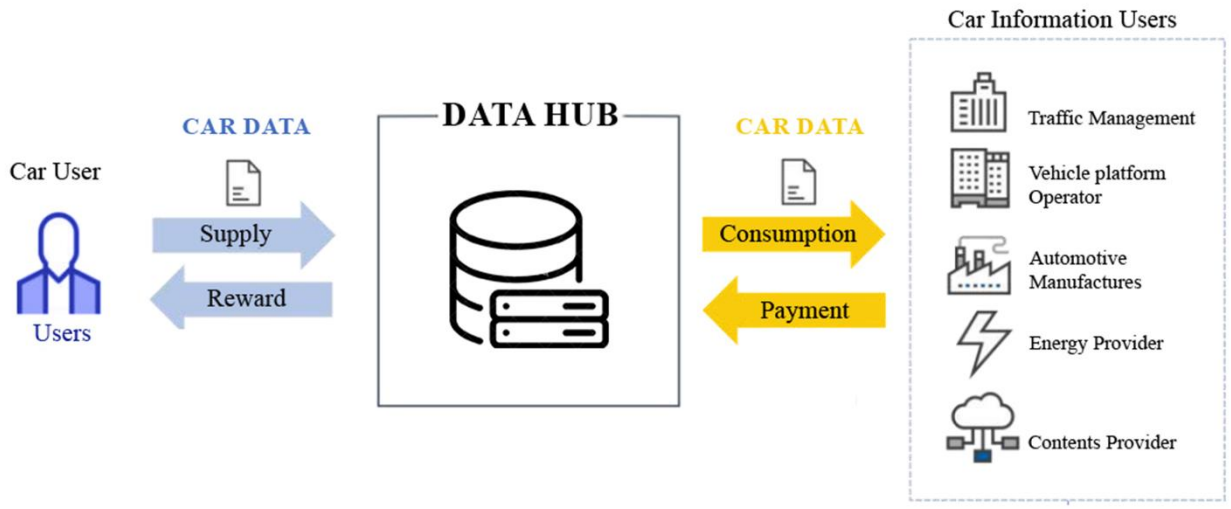
Piod solution utilizes blockchain technology to improve the current automobile ecosystem that consists of numerous stakeholders. The core feature of Piod solution is clean automotive data providing, searchable data, ecosystemic prospective which allow all members to participate, voluntary provision and appropriate compensation for car data. Car users, manufacturers, service providers, and all other participants in the automobile industry will be able to provide car data and receive appropriate compensation for their contribution according to market value.



Piod solution consists of a Blockchain and its supporting feature, Data Generators, Piod automotive data market, Piod Dapp store, data hubs, Piod Coin, IT Infrastructure providers, Dapp developers, data consumers, transmission operators.

Data Generators

With the Piod data collector device that can be easily attached to a vehicle's OBD-II port, together with the Piod mobile smartphone application, car users are able to collect car data for sharing on Piod solution. The car data that car users have agreed to share is then stored on the data hub in exchange for defined data hub reward which can be Piod coin or any free car application or any compensations according to the value of the data provided. Using these Piod coins, car users are able to purchase various products and services offered by manufacturers and service providers participating in Piod Dapp store. Data consumers can obtain the rights to access and use the data by paying that evaluated value in Piod coins to data hubs.



Piod Data hubs

The car data generated by car users will be processed and stored by data hub. Each data generator is free to select one data hub at a time based on data hub reward system. Also, users can change their data hub by their own decision. All communications are encrypted and any transaction details, data ownership and usage rights are stored and managed together by data hub. Raw data which includes an automotive information is encrypted before storage on data hub.

Data hubs are free in the type and number of rewards they offer to data generators, and in a competitive market, data hubs will compete for a more valuable set of data. But financial and contractual conditions between data generators and data hubs will be managed as much as possible through smart contracts.

If one data hub fails to meet its obligations, as a result, the data generators connected to that data hub will migrate to competitors, and the revenue of that data hub will decrease due to lack of sufficient and up-to-date vehicle data, and as a result, data hubs will logically fulfill their obligations. It should be noted that if a data generator does not trust any data hub to host its data, it can be a data hub for its own data. Thus, it is responsible for finding the data buyer (consumer) for its own automotive data.

Data hubs can also develop a number of automotive data applications to attract more data generators and provide for free or at a discount. All financial transactions between Piod solution's participants must be done through Piod coins.

Automotive data Market

The automotive data marketplace is an open platform through which data hubs can sell automotive data to consumers. Consumers of automotive data submit their requests to the market along with their financial conditions, and data hubs respond to requests by evaluating and searching for data on their servers. If the data request of a data consumer can be fulfill by several data hubs, a data hub that responds sooner will be selected and the key(s) to access that data will be sent to the data consumer through a secure channel by selected data hub.

Other automotive data market terms and conditions will be announced later.

Dapp Developers

Dapp developers can develop automotive related applications (Dapp) for data consumers and data generators and place them on the Piod Dapp Store for free or for a fee. As developers need automotive data, they can either purchase the data from the data hubs through data market (as a data consumer) or join a data hub(s) and develop applications for their clients.

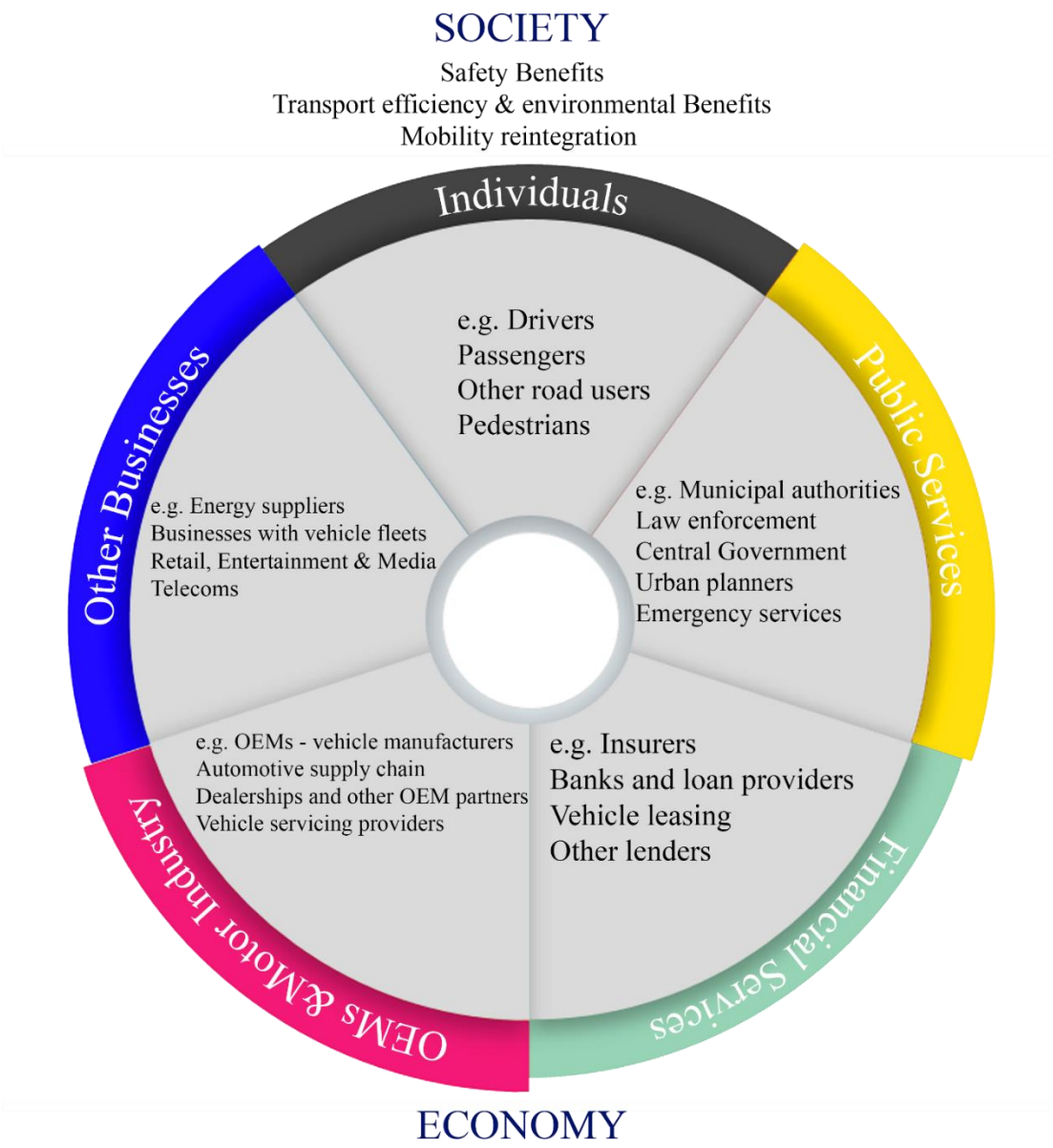
In a competitive market, some dada hubs may pay for application development but offer the Dapps for free to their users in exchange for their data.

Data Consumers

Data consumers can purchase car data recorded in data hubs in order to provide up to date service to car users or for research or any other purposes.

Listed below are various use-cases for car data with a thriving Piod solution. However, note that the objective of the Piod project is not to launch the services themselves. Instead, the aim of Piod is to provide an environment in which such services may be implemented and continuously upgraded.

- Lifecycle management services including the exchange of car parts
- Prediction of car faults and safety improvement
- Prevention of counterfeit or theft of cars and car parts
- Analysis of car accidents
- Customization of car insurance plans
- Trustworthy P2P sale of used cars
- P2P sale of electricity for car charging
- Location information services for available car charging and parking lots
- Music and video streaming and billing
- Simultaneous content streaming experience in multiple vehicles
- Local Dynamic Map (LDM) services
- Open participation for bounty for car data users
- Secure monitoring for car-related personal information
- In-car or connected car commerce/payments



Some potential automotive data consumers are as follow:

- Automotive OMEs
- Automotive suppliers
- Insurers
- Roadside assistance providers
- Infrastructure operators
- High-tech giants
- Start ups
- Automotive service providers
- Mobility providers
- Retailers and maintenance service centers
- Regulators

Piod Dapp store

Developed applications based on automotive data and compatible with Blockchain network are placed in this store. Data generators can either buy these Dapps using Piod coins or use these Dapp for free or at a discount in exchange for providing their data to a data hub.

Piod Coin

The Piod coin is a blockchain-based token used as a payment token and also have the main following utilities:

- To purchase Dapps from Dapp store
- As compensation to incentivize data generator to share their data
- To buy data set from data hubs
- For airdrop and marketing campaigns
- In DAO as a voting power metric
- As a staking mechanism

In addition, Piod tokens have other utilities that will be discussed in the Token Economics section

Blockchain Platform

In the first phase, Piod may use the BSV (Bitcoin Satoshi Vision) blockchain technology infrastructure to create a transparent and secure platform for its financial and data transactions.

With unbounded on-chain scaling, the BSV blockchain meets the needs of large-scale technology applications: high transaction volumes, fast speed, predictable low fees, micropayment capabilities, and greater data capacity. Its powerful technical capabilities enable smart contracts, tokenization, IoT device management, computation and more. BSV also supports an environment-friendly and regulation-compliant blockchain ecosystem that enterprises and governments want.

The reasons to choose BSV blockchain are as follow:

- MICRO & NANO TRANSACTIONS: with BSV, you can efficiently and instantly send tiny fractions of a U.S. cent anywhere in the world – enabling new micro and nano-payment business models.
- DATA INTEGRITY: as a public ledger, BSV enables anyone to verify and certify data, and actions performed upon it.
- UNLOCKABLE CONTENT: create content or communications that can only be accessed by those you wish or pay.
- ON-CHAIN DATA STORAGE: BSV can be used for stable, decentralized and low-cost data storage and management.
- TAMPER PROOF INDELIBILITY: create documents and content that cannot be changed in any way, ever, provably.

- SMART CONTRACTS: automate the execution of agreements, visibly to all parties, without any costly intermediary.
- REGULATION FRIENDLY: BSV supports legal compliance through its infrastructure and policy approaches.

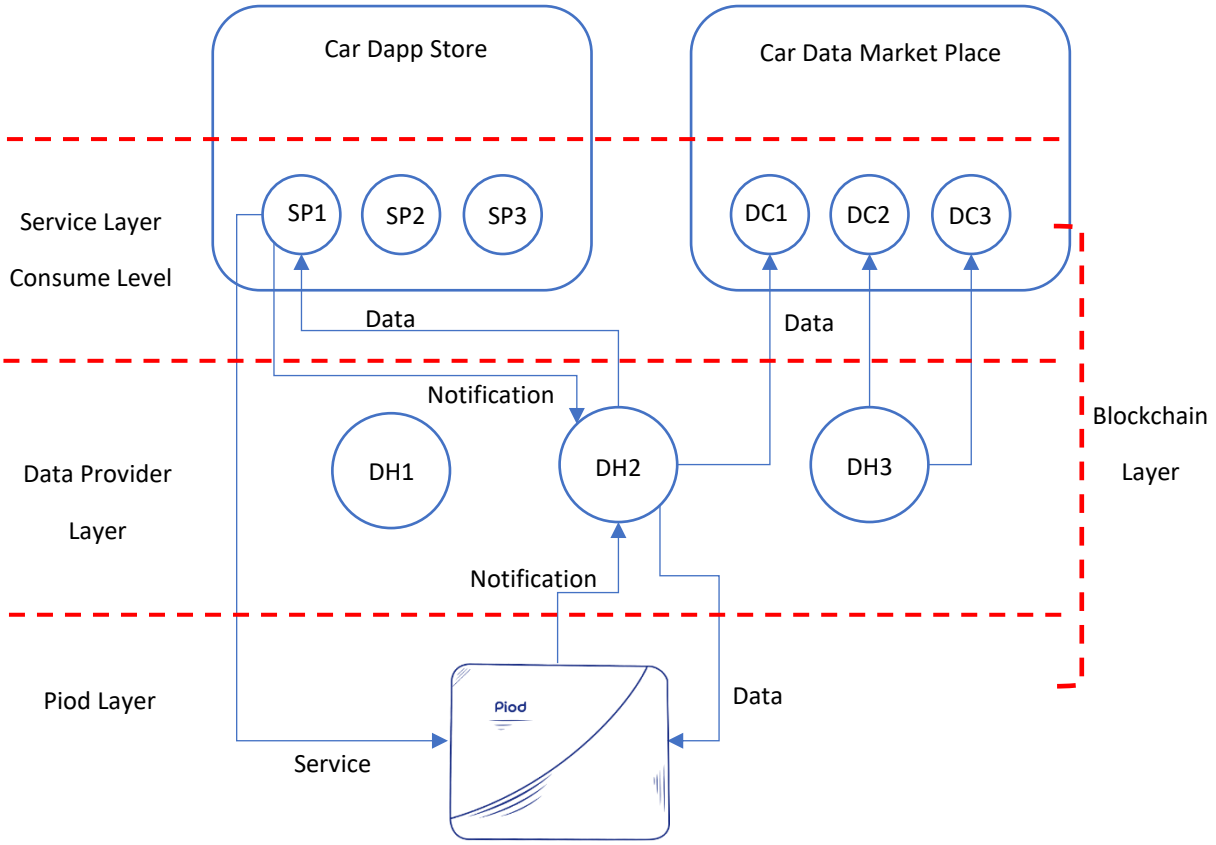


Figure 1 Piod solution conceptual architecture

Data hub technical details

The technical architecture of the data hub of the Piod platform is described below.

The data hub architecture consists of three parts.

- A blockchain node
- A IPFS node
- A webservice node

Blockchain node of a data hub

In data hub architecture, blockchain infrastructure is used in the following cases:

- **Key Infrastructure Management:** This infrastructure is used to build trust between platform actors. Public key encryption infrastructure guarantees the privacy of all data exchanges within the platform, thus preventing unauthorized access to the data. All incoming messages, notifications, automotive data and financial transactions will be secured and non-manipulative through this infrastructure.

- **Secure messaging and updating system:** In order to transfer and receive data and messages on the Piod platform, the blockchain network will also act as an secure messaging platform. This infrastructure will be used to update the software and firmware of the Piod devices. In this way, the Piod equipment becomes secure and resistant to unauthorized updates that occur by hackers.
- **Validate data integrity:** As encrypting and sending data to the data hub, the data hash will also be stored as a fingerprint on the blockchain to ensure that the data is correct. The data buyer (consumer), after receiving the data, hashes it out and matches it to the fingerprint the data on the blockchain to make sure the data is not tampered and also is generated by a real Piod device.

IPFS node of data hub

Encrypted automotive data is stored on IPFS part of data hub, and data transmission between data buyers and developers of Dapps with the data hubs are managed and performed through the IPFS platform. Also, if a data generator decides to change its data hub, data will be transferred to the new data hub via IPFS infrastructure.

Webservice node of data hub

This part of data hub is responsible for filtering, sorting and indexing vehicle data in accordance with requests received from data buyers (consumers). In other words, when the webserver receives a data purchase order, refers to its IPFS server, and by categorizing and sorting the data, responds accurately to the customer's needs.

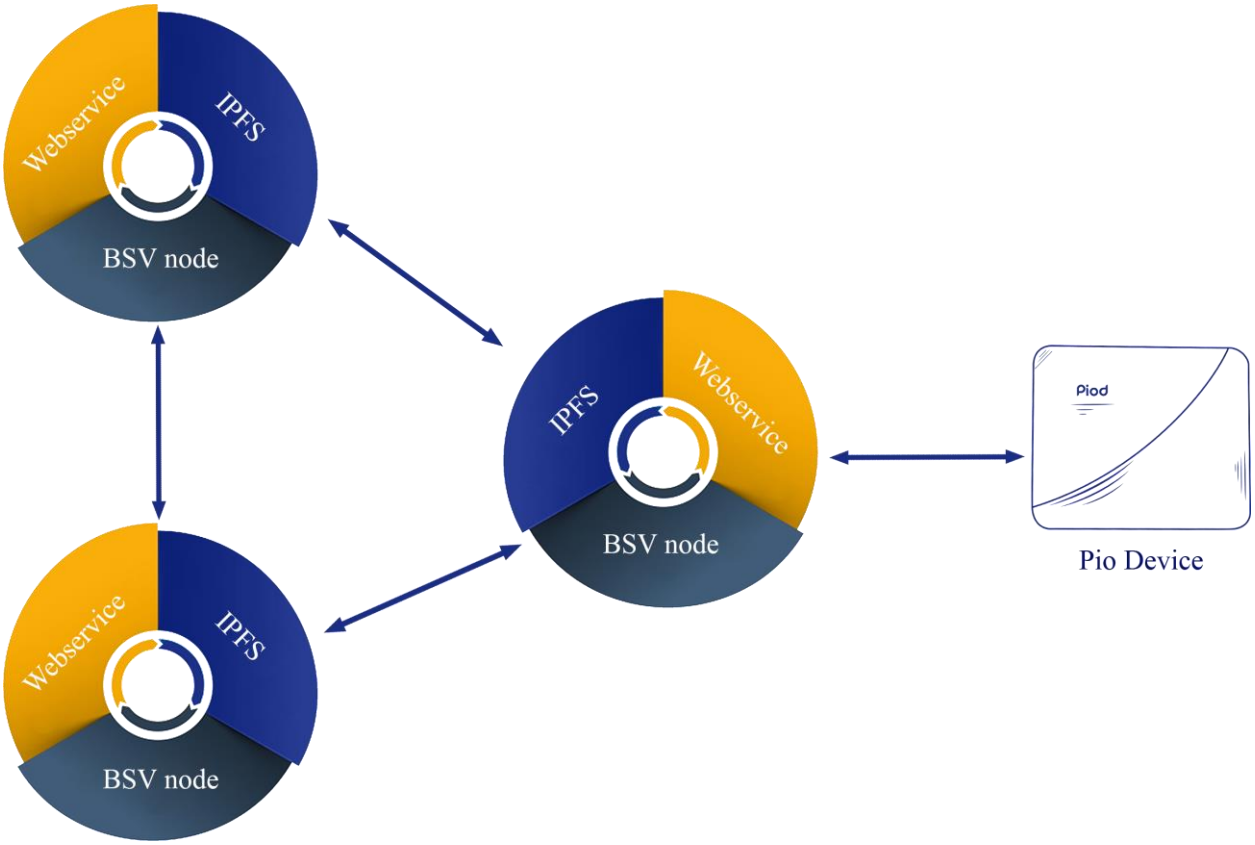


Figure 2 Technical details of data hub nodes

Piod Co role in the car data ecosystem architecture

One of the biggest advantages of Piod solution over other competitors is that the company either implemented or is implementing the architectural components of its proposed solution.

The company has developed the following components:

- Piod Data Generator
- Piod application for data owners
- Piod Automotive data market
- Piod App Store
- Piod Data hub
- Piod token
- Smart contracts required
- APIs required to connect developers to the Piod platform

It is worth noting that since the Piod solution is an open solution, other participants in the automotive industry can also benefit from the financial and data capacity of this platform by developing their data generators, data hub, applications and app stores. This way, companies can focus on their core business without having to worry about developing a blockchain network.

Piod data generator

The Piod data generator connects to the car's OBD II port and monitors the vehicle sensors instantly and online, and by analyzing various information from the ECU and sensors inside the Piod device before the breakdown, detects the car defect and inform users to fix the problem before it damages other part of vehicle. It should be noted that Piod device is compatible with all cars on the market and has successfully passed its test phases.

Piod application for data owners

If drivers install the Piod data generator in their vehicle and be connect to the Piod data hub, can use the following services. Other app developers can also develop app for car data owners.

Smart diagnosis service

Based on the data it receives from the car ECU, Piod smart diagnosis service can inform the driver about car problems before the car breaks down completely.

Smart alarm service

The ability to turn off the car from anywhere in the world is a feature that distinguishes the smart alarm from conventional alarms. In case of car theft, the user can use the application to turn off his car.

Periodic maintenance services

This service, by accurately evaluating the automobile data, informs driver of the exact time of changing the car accessories and parts.

Other Piod services are as follow:

- G-reminder service
- Piod vehicle robot
- Piod vehicle monitoring

Token economy

Piod coin as Piod platform native token, is a blockchain based token with maximum supply of 400.000.000 unit. The main purpose of Piod Token is to distribute the economic benefits of the Piod solution, the governance of Piod platform, and to establish effective communication between businesses related to the automotive industry and other potential customers.

The following are the three main utility categories of Piod coin:

- **For Dapp developers and data consumers**
  - Payment tool to purchase data from vehicle data owners
  - Payment tools to sell Dapps to data generators
  - To pay platform fees
  - To pay Piod blockchain transaction fees (when Piod blockchain is launched)
  - As voting power in DAO mechanism
  - Receive referral fees from businesses
  - and for any financial relationship with other participants
- **For data hubs**
  - Payment tool to sell data to developers or other data consumers
  - Participate in network governance
  - Pay rewards to data generators (optional)
  - Pay rewards to developers (optional)
  - To pay platform fees
  - To pay Piod blockchain transaction fees (when Piod blockchain is launched)
  - Receive referral fees from businesses
  - As a staking mechanism to guarantee the performance of data hubs (under develop)
  - and for any financial relationship with other participants
- **For data generators**
  - To pay platform fees
  - To pay Piod blockchain transaction fees (when Piod blockchain is launched)
  - As voting power in DAO mechanism
  - Received reward to generate data (optional)
  - To buy Piod Device
  - and for any financial relationship with other participants

Piod Coin liquidity guarantee

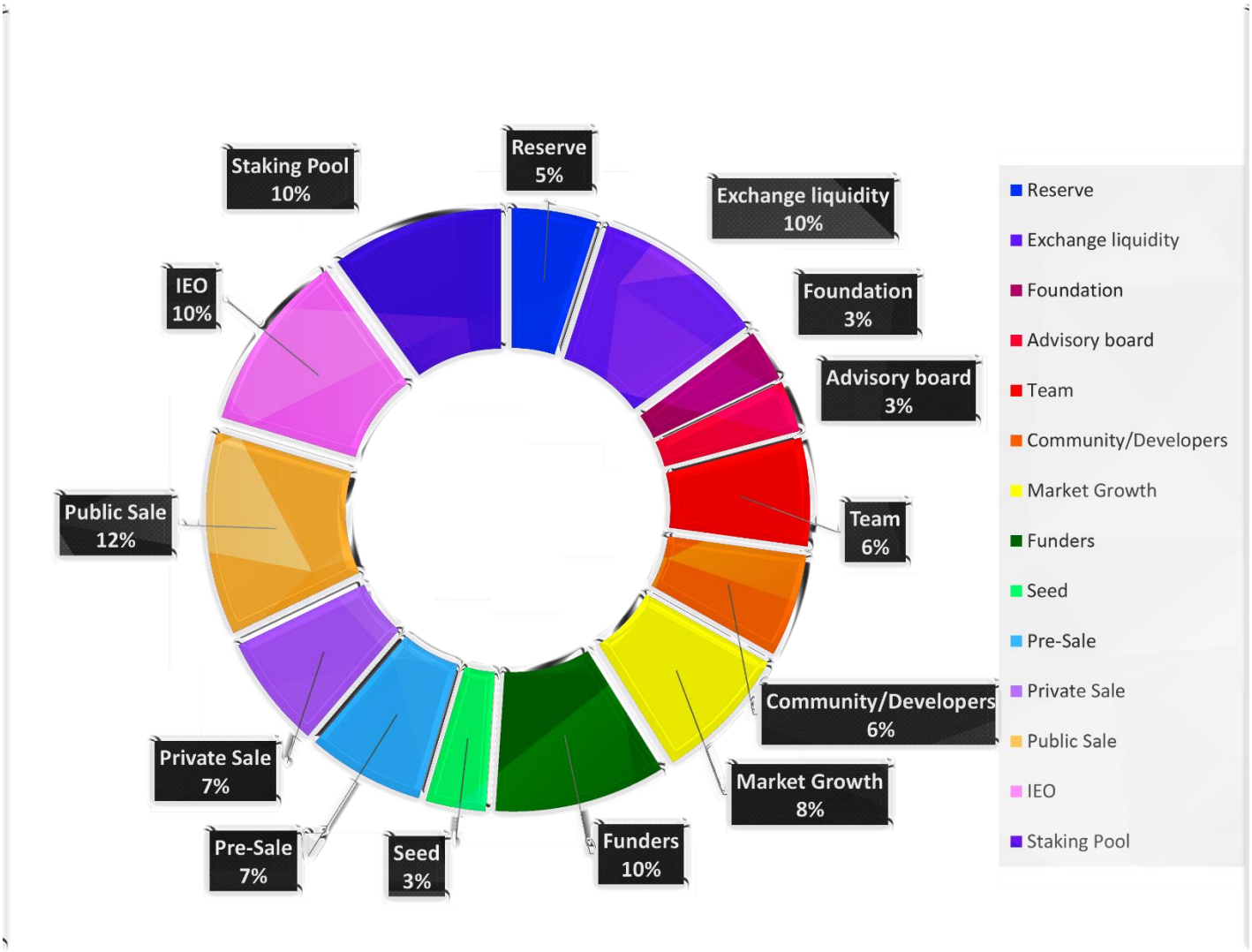
Piod Company will always try to create an upward growth value trend for its token with the help of conventional tools in the world of cryptocurrencies and by increasing the usability of Piod tokens through new partnerships, but if the value of the Piod token fluctuates and falls under its price at initial token offering (ICO), the Piod company guarantees that it is ready to deliver the Piod device to the token holders at ICO price. In this way, the price floor of the token is always

guaranteed and as a result, the risk of buying and investing in tokens is minimized for token holders.

Token Specification

Pio	
Token Name	Pio
Token Symbol	Pio
Total Supply	400,000,000 Pio
Division number	8
Token Type	
Blockchain Network	BSV
Max Intial circulating supply	137,200,200 Pio - 34.3%
Fully diluted market cap	$60M USD
Max Intial Market cap	$16.05M USD
General Emission Type	Fixed Sypply

Token Allocation

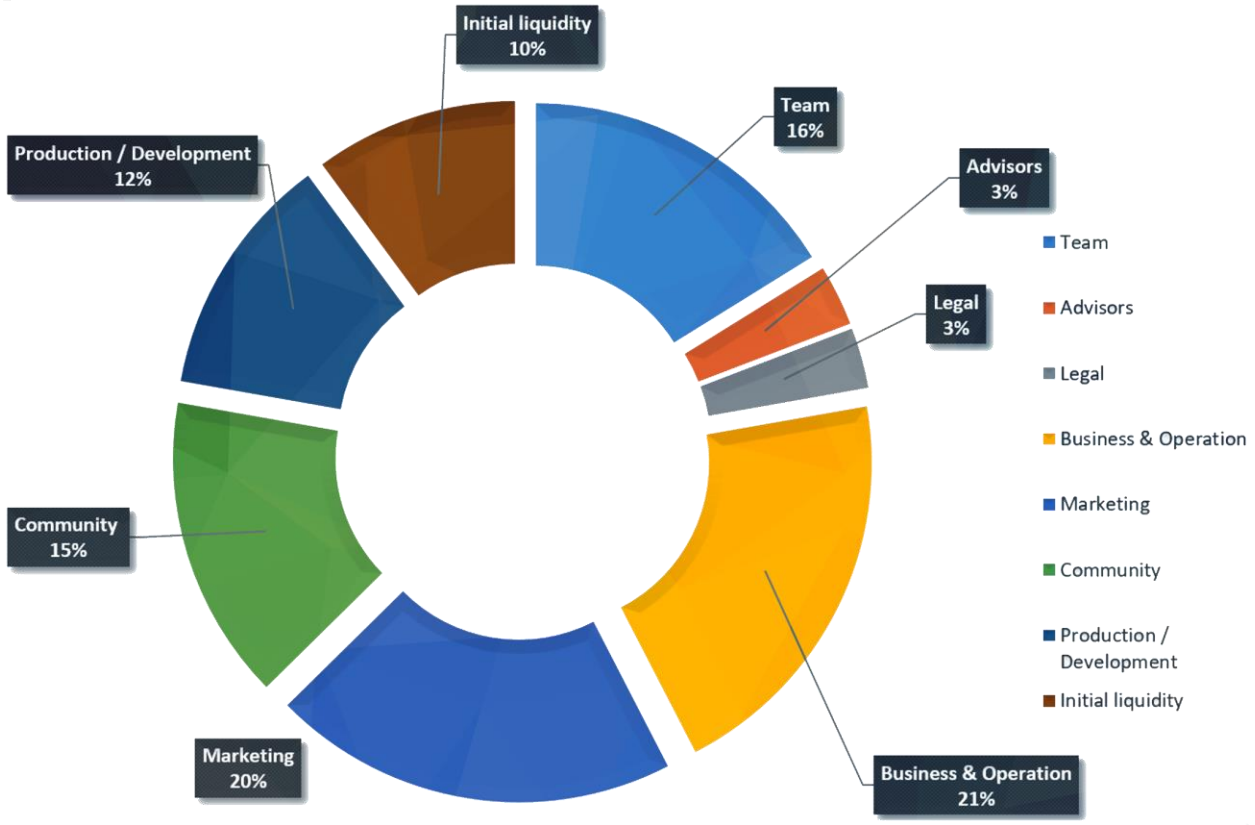


Token Allocation Conditions

If the Soft Cap required funds have not been raised, The founders will fill it up.

Lock up		Vesting Time	Vesting Period
Team	20 Months	3 Years	Quarterly
Founders	36 Months	4 Years	Quarterly
Advisory Board	20 Months	2 Years	Quarterly
Exchange Liquidity	19 Months	-	-
Reserved	1 Years	3 Years	Quarterly
Foundation	4 Years	1 Years	Quarterly

Funds Usage



Token Offering Plan

Sales Rounds	Soft Cap	Hard Cap	Deadline	Duration
Seed	$ 650K	$ 800K	Jul 2022	8 Weeks
Private Sale	$ 1.2M	$ 1.5M	Oct 2022	7 Weeks
Pre-Sale	$ 1.8M	$ 2M	Mar 2023	6 Weeks
Public Sale	$ 2.5M	$ 3M	Jun 2023	5 Weeks
IEO	$ 4M	$ 5M	Dec 2023	2-3 Weeks
Total	$ 10.15M USD	$ 12.5M USD		

Seed (~260% Expected profit)

Total Token Distributed	17,500,000 PIO 4.4%
Price	$ 0.0457 USD
Hard Cap	$ 800K USD
Soft Cap	$ 650K USD
Min Buy	$ 20,000 USD
Max Buy	$ 200K USD
Lock up	20 Months (Jan 2024)
Vesting time	2 Months
Offering Duration	8 Weeks

Tiers	Token Price
< $20K USD Purchase	$ 0.0457 USD
> $100K USD Purchase	$ 0.0452 USD

Private Sale (~230% Expected profit)

Total Token Distributed	25,500,000 PIO 6.4%
Price	$ 0.059 USD
Hard Cap	$ 1.5M USD
Soft Cap	$ 1.2M USD
Min Buy	$ 10,000 USD
Max Buy	$ 500K USD
Lock up	17 Months (Jan 2024)
Vesting time	3 Months
Offering Duration	7 Weeks

Tiers	Token Price
$ 0 - $ 500K USD	$ 0.0588
$ 500K - $1M USD	$ 0.0590
$ 1M - $2.2M USD	$ 0.0594

Pre-Sale (~200% Expected profit)

Total Token Distributed	22,200,000 PIO 5.5%
Price	$ 0.090 USD
Hard Cap	$ 2M USD
Soft Cap	$ 1.8M USD
Min Buy	$ 1,000 USD
Max Buy	$ 200K USD
Lock up	12 Months (Jan 2024)
Vesting time	4 Months
Offering Duration	6 Weeks

Tiers	Token Price
$ 0 - $ 500K USD	$ 0.088
$ 500K - $1M USD	$ 0.090
$ 1M - $2.2M USD	$ 0.093

Public Sale (~170% Expected profit)

Total Token Distributed	30,000,000 PIO 7.5%
Price	$ 0.10
Hard Cap	$ 3M
Soft Cap	$ 2.5M
Min Buy	$ 250
Max Buy	$ 200K
Lock up	9 Months (Jan 2024)
Vesting time	6 Months
Offering Duration	5 Weeks
Whitelist	3 Weeks Before Public Sale

Tiers	Token Price
$ 0 - $ 500K USD	$ 0.0842
$ 500K - $1M USD	$ 0.0845
$ 1M - $3M USD	$ 0.085

IEO (~25% Expected profit)

Total Token Distributed	42,000,000 PIO 10.5%
Price	$ 0.12
Hard Cap	$ 5M
Soft Cap	$ 4M
Min Buy	$ 100
Max Buy	$ 250K
Lock Time	-
Vesting Period	-
Offering Duration	2-3 Weeks

Roadmap

Roadmap	Road Map Since 2019 Apr	
Course length	Timespan	Description of important activities of the course
4 months	Apr 2019 ~ July 2019	* Needs assessment * Market research * Product analysis and design * Team building * Piod Gadget POC * Piod blockchain POC
3 months	Aug 2019 ~ Oct 2019	* Database collection * Translate over 5,000 general vehicle error codes to complete the database * Application prototype
9 months	Nov 2019 ~ July 2020	* Piod Company Roadmap Design, Piod Gadget, Piod Blockchain. * Start building the Piod commercial model of passenger cars compatible with blockchain. * Consulting and designing the economic model of Piod blockchain and tokens. * Start building the Piod Truck commercial model compatible with blockchain. * Start Develop Piod Application with a solution-oriented approach. * Continue translating and loading car error codes. (Multi Languages - Multi Functional - Multiple uses) (Designed for sale to : 1. End consumer market. 2. Companies and organizations. 3. insurances. 4. Police. 5. Automotive dealer network. 6. governments and ...) * Development of artificial intelligence for Piod. * Started a marketing team, and planning to develop the Piod blockchain platform and gadget and application, worldwide.
6 months	Aug 2020 ~ Jan 2021	* Testing Piod gadget on more than 500 cars and eliminating defects and improving the product and improving the compatibility of the gadget with different cars and different conditions. * Pre launch Piod Gadget and B2C App. (JAN 2021)
9 months	Feb 2021 ~ Oct 2021	* Start the first stage of selling gadgets to the B2C market. (5000 gadgets for trial sale) * Creating legal infrastructure. * Team building and starting the graphic and media department. * Start designing and building a gadget equipped with a camera for the blockchain project. * Start designing and building gadgets to mining digital currencies using the car's kinetic energy. * Start building infrastructure for business partnerships in

		various countries, including Canada, UAE, Oman, Georgia, Germany, Turkey, China and the United States.
6 months	Nov 2021 ~ Apr 2022	* Build infrastructure and hardware to produce more than 60,000 gadgets in one year. * Create an HR department and team building and starting work of all teams: 1. Production team. (Includes hiring, training, implementing organizational processes.) 2. Distribution and installation team. (Includes hiring, training, implementing organizational processes.) 3. Support and warranty team. (Includes hiring, training, implementing organizational processes.) 4. Online and offline sales network. (Includes hiring, training, implementing organizational processes.) 5. Economic team. (Includes hiring, training, implementing organizational processes.) 6. Development of application developer and blockchain team. (Includes hiring, training, implementing organizational processes.) 7. Advertising team. (Includes hiring, training, implementing organizational processes.) * launch Piod Gadget and B2C App And Public Sale. (JAN 2022)
8 months	May 2022 ~ Des 2022	* Application development to enter the B2C , B2B and B2G market in different countries. * Launch Piod With Wi-Fi Relay in Market for sale . * Launch Piod With Wi-Fi Relay in Market for sale . * Start designing and programming a dedicated blockchain for Piod platform. * Final preparation of the token economy. * Start Social Media. * Start designing and building Piod smart watch platform Project . * Start designing and building a processing gadget to create a large popular processing network using automotive energy. * Creating the infrastructure of the first data provider. * Infrastructure and creation of Piod's first Dapp store. * Creating useful applications for Piod Dapp Store. * Server infrastructure development. * Development of network security infrastructure. * Publish White paper Version 1.0. * Participate in at least 1 prestigious international exhibitions for the official introduction of the Piod platform. * Start private sale and attract strategic partners Piod platform tokens. * Pre-sale of tokens and raising capital for market development * Register the order of raw materials and create a regular production cycle for the monthly production of at least 100,000 gadgets from April 2023.

9 months	Jan 2023 ~ Sep 2023	* Participate in at least 3 prestigious international exhibitions for the official introduction of the Piod platform. * Publish White paper Version 2.0. * Data market place development * launch Piod Platform on Blockchain. (Jan 2023) * Dapp store development. * Opening of support offices in Turkey, UAE, Canada, Iraq, Oman, Georgia and ... * Register the order of raw materials and create a regular production cycle for the monthly production of at least 1,000,000 gadgets from Jan/2024. * Native blockchain design and develop * Launch Piod S.series and start Sale in market .
6 months	Oct 2023 ~ Mar 2024	* Participate in at least 6 prestigious international exhibitions for the official introduction of the Piod platform. * Publish White paper Version 3.0. * Public sale Piod Tokens. * Creating the infrastructure to transfer the production technology of Piod Gadget to all factories interested in producing and selling Piod Gadget. * Piod native blockchain development * launch Piod Native Blockchain. (JAN 2024)
5 months	Apr 2024 ~ Aug 2024	* Participate in at least 5 prestigious international exhibitions for the official introduction of the Piod platform. * Attract more manufacturers around the world to produce Piod gadgets and Pivot platform development.
4 months	Sep 2024 ~ Dec 2024	* Participate in at least 4 prestigious international exhibitions for the official presentation of the Piod platform.

Piod certificates and licenses

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